Three essays in corporate governance

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THREE ESSAYS IN CORPORATE GOVERNANCE

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This thesis consists of three independent essays which focus on agency conflicts and the role of governance in mitigating such conflicts. The first essay exploits a quasi-natural experiment that imposes stricter restrictions on the executive's mobility and uses a unique hand-collected dataset to examine the net effect of such restrictions on corporate policies. Firms managed by professional chief executive officers (CEOs) who depend more on outside employment options to diversify their career risks adopt suboptimal corporate policies after such stricter restrictions on mobility. The study uses an additional quasi-natural experiment where professional CEOs replace founder CEOs in exogenous turnovers. The study finds casual evidence that professional CEOs' exacerbated career concerns aggravate risk-related agency conflicts and thus, influence corporate decisions systematically. This estimation has implications for public policy prescriptions regarding firm-level governance and the design of a flexible labor market that ensures allocational efficiency.

The second essay uses a quasi-exogenous regulatory shock to analyze whether forced changes in board composition help to reign in powerful CEOs. The study finds that post-regulation, firms led by powerful CEOs initiate a strategic shift in resource allocation. Firms managed by powerful CEOs increase innovation inputs (R&D expenditures) and produce more innovation outputs (patents) that are scientifically more important and economically more valuable. Investment quality also improves, manifesting in better takeover performance. Such evidence suggests that firms with an independent board can balance executive power, force powerful CEOs to consider other opinions, and reign in value destruction.

The third essay uses a unique hand-collected dataset on family ownership and family management of S&P500 firms and shows that firm performance is sensitive to the measurement of family ownership and founder CEO status. The study also documents that variation in the definition of a family-firm may modify the impact of family-firms on strategic investment decisions (Mergers & Acquisitions) and financing decisions. Overall, the findings highlight that the relationship between family-firms and corporate policy documented so far in the literature should be evaluated with caution, as such associations are sensitive to the measurement of family ownership and whether the CEO is the founder of the firm.

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Abstract

This thesis consists of three independent essays which focus on agency conflicts and the role of governance in mitigating such conflicts. The first essay exploits a quasi-natural experiment that imposes stricter restrictions on the executive's mobility and uses a unique hand-collected dataset to examine the net effect of such restrictions on corporate policies. Firms managed by professional chief executive officers (CEOs) who depend more on outside employment options to diversify their career risks adopt suboptimal corporate policies after such stricter restrictions on mobility. The study uses an additional quasi-natural experiment where professional CEOs replace founder CEOs in exogenous turnovers. The study finds casual evidence that professional CEOs' exacerbated career concerns aggravate risk-related agency conflicts and thus, influence corporate decisions systematically. This estimation has implications for public policy prescriptions regarding firm-level governance and the design of a flexible labor market that ensures allocational efficiency.

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Overall, the findings highlight that the relationship between family-firms and corporate policy documented so far in the literature should be evaluated with caution, as such associations are sensitive to the measurement of family ownership and whether the CEO is the founder of the firm.

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Chapter 1

Introduction

1.1 Motivation and Findings

Agency conflicts that affect strategic decision-making and a firm's performance are quite pervasive. The common thread binding the essays in this thesis is understanding various forms of agency conflicts: risk-related agency conflicts and empire-building related agency conflicts and devising solutions to these problems.

There is a substantial literature that suggests that agency conflicts, driven by managerial preferences for enjoying private benefits and exerting lower efforts than shareholders desire, can have significant implications for shareholders. Theory suggests that agency conflicts may also occur due to incongruity in risk-preferences (i.e., risk-related conflicts) between diversified shareholders (principal) and their under-diversified managers (agents) (see, Jensen and Meckling 1976, Parrino, Poteshman, and Weisbach 2005). Since a manager's personal risk preferences are associated with the firm's risk attributes, the manager's motive to reduce the firm's risk can significantly affect corporate policies (Amihud and Lev 1981, May 1995, Holmström 1999).

There is some evidence on the effect of risk-related conflicts on firm-level decision-making when both the firm and its managers are exposed to a unidirectional increase in risk (See, Gormley and Matsa 2011). However, there is a lack of systematic evidence in the literature that sheds light on the nature of risk-related conflicts when a firm becomes safer while its manager's career risk exacerbates exogenously. The first essay fills this gap in the literature by focusing on a fundamentally different incentive problem where incongruity in risk-preferences occurs due to the firm and its managers experiencing directionally opposite exposure to risk.

In particular, the first essay exploits a quasi-natural experiment-the staggered adoption of legal recourse, known as the Inevitable Disclosure Doctrine (IDD), by the State Court that protects a firm's trade secrets through enforcing post-employment restrictions. More precisely, IDD is a legal doctrine that suggests that a firm's former employees can be prevented from working for a rival if this would "inevitably" lead employees to divulge the firm's trade secrets to competitors and the firm would be exposed to irreparable harm due to this divulgence. Although the adoption of IDD makes

a firm's operations safer, such changes in the legal environment also aggravate managerial career concerns by reducing their outside employment options.

The first essay shows that the stricter enforceability of post-employment restrictions exacerbates a manager's career concerns and thus triggers risk-related agency conflicts. Such risk-related agency conflicts impose real costs on firms by distorting decisions on which managers have real influence. Specifically, the study shows that after the adoption of IDD when the firm's optimal strategy is to adopt less conservative corporate policies, firms managed by the CEOs whose career concerns exacerbate relatively more, on average, adopt more conservative corporate policies. Further analysis suggests that such conservative corporate policies are suboptimal from the perspective of shareholders.

Thus, this essay advances the literature on risk-related agency conflicts by lending empirical support to existing theories (Holmstrom and Ricart I Costa 1986) that argue that the manager's career concern is the primary driver of risk-related agency conflicts. It also highlights the importance of a flexible, competitive, and frictionless managerial labor market that ensures allocation efficiency in the economy through moderating risk-related agency conflicts.

The second essay of the thesis focuses on other forms of agency conflicts, namely private benefits extraction and empire-building by powerful managers, and the role of governance in mitigating such conflicts. The study uses the concurrent passage of the Sarbanes-Oxley Act of 2002 (SOX) and NYSE/NASDAQ listing regulation changes (collectively, "SOX") as a quasi-natural experiment which brought about exogenous changes in the internal governance of the firms from changes in regulatory mandates. The second essay documents that an improvement in board governance can initiate a strategic shift in powerful CEO managed firms.

Powerful CEOs by virtue of their position can extract private benefits from corporate resources. Prior studies suggest that CEO-power hurts corporate outcomes (Ryan and Wiggins 2004, Adams, Almeida, and Ferreira 2005). A key mechanism of corporate governance to discipline the behavior of self-serving managers is the board of directors, a market solution to an organizational design problem (see, Hermalin and Weisbach 1998). This mechanism is particularly important in the context of powerful-CEOs, as

powerful CEOs may have more ability and authority to make decisions and adopt policies that are not in the best interest of the shareholders. Powerful-CEOs may engage in empire building and avoid value-enhancing strategic investments such as Research and Development (R&D). However, managerial incentives in exercising power in the context of sub-optimal capital allocation decisions could be restrained or ameliorated by the board of directors (Fama and Jensen 1983).

This study finds that after being monitored by a powerful board, powerful CEOs managed firms initiate resource reallocation that spurs successful innovation. These innovations, proxied by the grants of new patents, are not only scientifically important (higher forward citations) but also economically more valuable (more positive stock market reactions to patent grants).

Better governed powerful CEO managed firms also launch more breakthrough products evident from the market reactions to the announcement of new products. Capital expenditures, which are arguably symptomatic of empire-building, decline, and payment of dividend increases. Finally, powerful CEO managed firms, coupled with better board governance, make better acquisition decision as suggested by the market reactions to the announcement of Mergers and Acquisitions (M&A).

Overall, the empirical evidence suggests that powerful CEOs coupled with weak corporate governance often drives the negative views about powerful CEOs. The second essay emphasizes the need for striking the right balance between executive power and corporate board power that can divert the energy and efforts of powerful CEOs to value maximizing corporate policies.

The third essay particularly focuses on family firms. Family businesses are quite prevalent in many economies around the world and have significant resources under their control. Although the family firm has been a subject of extensive research across many disciplines, the literature is rife with conflicting findings regarding the effect of founding family ownership and management on firm-level policies and outcomes. The third essay of the thesis highlights the importance of a consistent definition of a family firm in the literature to reconcile such conflicting views in the family firm literature.

Some studies (Anderson and Reeb 2003a, Villalonga and Amit 2006, Hsu, Huang, Massa, and Zhang 2014) document a positive 'founding family premium'. In contrast, other studies highlight value destruction by the founding families and suggest that family firms may extract private benefits to the detriment of shareholders or stakeholders (Demsetz, 1983, Demsetz and Lehn 1985, Morck, Shleifer, and Vishny 1988, Holderness and Sheehan 1988).

One plausible explanation for such conflicting views in the literature is the absence of a consistent definition of a family firm. Specifically, empirical studies utilize a wide variety of definitions of family-firms, and as such, the conclusion of these studies are likely to be sensitive to how family firms are defined. In addition, some studies do not distinguish between family ownership and family management when defining a family firm. More importantly, pervasive endogeneity also hinders a causal interpretation of the observed association between the founding family and firm-level outcomes.

This essay utilizes an extensive hand-collected unique dataset on family ownership and founder CEO status from proxy filings of S&P500 firms for a long panel (2001-2010) to analyze the sensitivity of the relationship between family firms and firm performance to the definition of a family firm. Specifically, the study focuses on the variation in ownership stakes and founder CEO status in defining family firms. Additionally, unlike other extant studies in the family firm literature, the study attempts to address the concern for endogeneity in the empirical setting using the financial crisis of 2008-2009 as a shock to a firm's business. This is because the financial crisis initiates an exogenous variation on firm performance.

The results show that family firms, defined as either the ownership stakes of the founding-family (incrementally varying ownership thresholds in the magnitude of 5%) or founder CEO status, outperform non-family firms when ownership stakes increase. However, when family firms are defined only on founding family ownership stakes without necessarily requiring founding family management (whether the founder is the current CEO), the family firm premium disappears after a certain level of ownership. This finding suggests that the definitional ambiguity of family firms potentially drives the conflicting results in the family firm literature.

The impact of family firms on the corporate leverage decision is also analyzed using the financial crisis of 2008-2009 as a quasi-exogeneous liquidity shock. The results suggest that family firms, per se, do not seem to have any detectable impact on the firms' leverage level decision. In terms of investment decisions, firms with founder CEOs undertake value accretive M&A deals. However, this association is also sensitive to various levels of family ownership as family firms (with or without explicit consideration of the founder CEO's presence) may not undertake valuable M&A projects when family ownership is high. Overall, supporting the literature that suggests that high managerial ownership may trigger risk aversion (Gormley and Matsa 2016), the findings highlight the sensitivity of investment performance to the definition of family firms.

The findings of this essay are particularly policy-relevant since it documents that in assessing the influence of family firm on firm performance, financing, and investment decisions, stakeholders or policy-makers should consider the significant heterogeneity among family firms that arises from differences in the financial stakes involved and provision of human capital by founder families. This essay advances the literature by suggesting the sources of contradictory findings in the family firm literature in addition to facilitating a causal interpretation of these relationships.

1.2 Presentations

Research in this thesis has been presented and defended at various conferences and research workshops.

Chapter 2: Mobility Restrictions and Risk-Related Agency Conflicts: Evidence from a Quasi-Natural Experiment

2019 SFS Cavalcade Asia/Pacific

2019 Semi-finalist for the best paper award at the 2019 FMA Annual Meeting

2019 FIRN Annual Meeting

2019 Empirical Legal Studies, Claremont McKenna College

2019 UNSW PhD Workshop

2019 FIRN Women Research Workshop

2019 Seminar Series at the Monash Business School

2019 American Law and Economic Association (ALEA), NYU Law School

Chapter 3: Powerful CEOs and Corporate Governance

2019 FMA Asia/Pacific Conference

2019 AsianFA

2018 UNSW PhD Workshop

2018 Financial Management Association (FMA) Annual Meeting

2018 FIRN Annual Meeting

2018 Financial Market and Corporate Governance Conference

2017 Australasian Finance and Banking Conference

2017 Auckland Finance Meeting Doctoral Student Consortium (With Best paper Award)

2017 8th Emerging Market Finance Conference, IGIDR Mumbai (in collaboration with Vanderbilt Law School)

2017 SIRCA Young Researcher Workshop

Chapter 2

Mobility Restrictions and Risk-Related Agency Conflicts: Evidence from a Quasi-Natural Experiment

2.1 Introduction

After five and half years of outstanding performance, in 2010, Hewlett-Packard (HP) sued Mark Hurd, the former professional CEO and Charmain of HP, a day after the announcement of his hiring by Oracle, on the accusation of threatened misappropriation of trade secrets. However, HP failed to enjoin Hurd in the state court of California- an employee-friendly state that does not recognize Inevitable Disclosure Doctrine (IDD).[1] On the other hand, Motorola, based in Illinois- which adopted IDD in 1989, launched a successful lawsuit against its former president Mike Zafirovski in 2005, on the ground of Zafirovski's access to Motorola's trade secrets, two days after Nortel announced his recruitment as its new CEO. The suit intended to stop Zafirovski from working for Nortel for two years. While Nortel reimbursed Zafirovski for the $11.5 million settlement amount, not many companies will go to such length to retain restricted employees.

Given the threat of legal action, many executives may choose survival strategies of lying low, take a career detour, and thereby scrapping valuable skills accumulated over decades.[2] Stricter enforceability of post-employment restrictions may exacerbate managerial career risk and thus, lead to incongruity in risk-preferences between well-diversified shareholders and their undiversified managers, i.e., risk-related agency conflicts (Hölmstrom 1999). However, since a firm often loses trade secrets to rivals through the mobility of key executives, weaker enforceability of such restrictions also compromises the firm's competitive advantages.[3] Despite the "double-edged sword" nature of post-employment restrictions, there is a lack of systematic evidence in the literature of the *net impact* of these restrictions on corporate policies. To fill this gap in

[1]IDD is a legal doctrine that suggests that a firm's former employees can be prevented from working for a rival if this would "inevitably" lead employees to divulge the firm's trade secrets to competitors and the firm would be exposed to irreparable harm due to this divulgence.

[2]Lowry (1988) notes that IDD may subtly favor the interests of employers to protect trade secrets in trade secret litigations. Klasa, Ortiz-Molina, Serfling, and Srinivasan (2018) find that the adoption of IDD in a state increases the number of trade secrets litigations in that state since firms expect more favorable outcomes after the adoption of IDD.

[3]U.S. Chamber of Commerce estimates that firms lose over $50 billion annually due to the divulgence of their trade secrets (ASIS International, September 2002 report "Trends in Proprietary Information Loss"). Almeling, Snyder, Sapoznikow, and McCollum (2010) report that in over 93% of the instances, trade secret misappropriator is an employee or a business partner.

the literature, I use a unique hand-collected dataset that tracks managers' reliance on outside employment options to gauge cross-sectional variations in managerial career risk and use the staggered adoption of IDD as a quasi-natural experiment that restricts managers' outside employment options. The study provides novel evidence that stricter enforceability of post-employment restrictions trades the benefits of trade secrets protection against the costs of risk-related agency conflicts, especially in firms where managers rely more on outside employment options.

This estimation is important for several reasons. First, little is known about whether aggravated managerial career concerns due to mobility restrictions may systematically counteract the benefits of enhanced trade secrets protection. Second, since managerial career concerns influence their preferences and thus, can affect financing and investment decisions (Jensen and Meckling 1976, Jensen 1993), such an estimation has implications for growth, risk-taking, knowledge diffusion (Franco and Filson 2006), and overall investments in the broader economy.[4] Finally, a manager's concerns for future career influence her incentives (Hölmstrom 1999) even in the presence of contracts (Gibbons and Murphy 1992) and thus, can exacerbate risk-related agency problems (Hölmstrom and Ricart I Costa 1986). Therefore, this study has implications for public policy prescriptions (see, Aghion, Van Reenen, and Zingales 2013), regarding firm-level governance and especially the design of a flexible labor market that ensures allocational efficiency (Arrow 1962).

Theories suggest that restrictions on mobility potentially undermine employees' bargaining power, trigger career concerns, hurt risk-taking incentives, and exacerbate risk-related agency conflicts (Hölmstrom and Ricart I Costa 1986, Fulghieri and Sevilir 2011). This argument is likely to hold more strongly for a set of firms with executives whose career outcomes hinge critically on outside employability. I refer to this as the 'exacerbated career concerns hypothesis.' Nevertheless, since human capital is inalienable (Hart and Moore 1994), theories also suggest that the stability of human capital promotes

[4]Ben Casselman argues that 'playing safe' preference of managers triggers an increasingly risk-averse culture in the U.S. that essentially lowers the growth rate of the economy (Source: The Wall Street Journal, June 2, 2013).

risky corporate policies (e.g., investment in organizational capital) (Eisfeldt and Papanikolaou 2013). More importantly, the reduction in competitive threats of divulgence of trade secrets (trade secrets risk) through employee predation by competitors should lead to less conservative corporate policies (e.g., financing policies).[5] I refer to this as the 'trade secrets protection hypothesis', which applies to all firms, in general, since trade secrets that make firms unique are pervasive in all industries (Lobel 2013).

However, testing the *net effect* of stricter enforceability of post-employment restrictions on firm-level decision making is challenging for at least two reasons. First, isolating an exogenous increase in managerial career concerns without an ex-post increase in a firm's overall risk is challenging. This study overcomes this identification challenge by utilizing a quasi-natural experiment-the staggered adoption of legal recourse- IDD by the state courts. An *intended consequence* of this legal shock is a reduction of trade secrets risk through stricter enforceability of post-employment restrictions. However, such restrictions also aggravate managers' career risk-an *unintended consequence* of the adoption of IDD. Thus, this experimental setting allows the identification of the additional effect of restrictions on mobility through exacerbated career concerns on firm-level policies by minimizing other potentially confounding explanations that often hinder a causal interpretation in the absence of a quasi-natural experiment.

Second, measurement of cross-sectional variations in managerial career concerns is also challenging. To overcome this issue, I focus on the aspect of career concerns that stems from a manager's reliance on outside employment options. I utilize hand-collected data that track the ex-ante differences in the entrepreneurial spirit of managers based on whether they have founded the focal firms. Literature suggests that founder CEOs, who start companies at the expense of pursuing more stable and better-paying employment, arguably have a lower degree of dependence on outside employability. Importantly, founder CEOs have a longer horizon (Fahlenbrach 2009) which renders them inherently less dependent on external employability to maximize career outcomes. Therefore,

[5]See, Campello 2006, Frésard 2010, Valta 2012, Agrawal and Matsa 2013, Hoberg, Phillips, and Prabhala 2014.

founder CEOs are less likely to move to rival firms. Even if they do, founders are less likely to encounter the visceral negative experience of legal battles since the firm is their brain-child as suggested by anecdotal accounts.[6] I also show that founder CEOs are less likely to face forced turnover. Additionally, utilizing the exact setting of Aghion et al. (2013), who argue that institutional investors reduce managerial career concerns, I show that such an effect is discernible only among professional CEO-led firms. This out-of-sample evidence reinforces the notion that founder CEOs arguably have less career concerns.

I chose to focus predominantly on major capital structure decision in my main analysis since the previous literature has already studied a firm's capital structure in the context of the adoption of IDD (Klasa et al., 2018). I use the same empirical setting to explore the additional effects of managerial career concerns stemming from stricter enforceability of post-employment restrictions on corporate policies. Additionally, literature suggests that managers have a significant influence on a firm's capital structure decision (Grossman and Hart 1982, Graham, Harvey, and Puri 2013) and 'Leverage' has been used in the extant literature as a proxy for risky corporate policies (Malmendier, Tate and Yan 2011, Bernile, Bhagwat and Rau 2017).

Consistent with the literature, the 'trade secrets protection hypothesis' predicts that restrictions on mobility lead to a higher debt ratio. This is because restrictions on mobility reduce trade secrets risk and thus, decrease the strategic benefits of maintaining unused debt capacity (Klasa et al., 2018). However, higher debt implies a higher probability of bankruptcy and the perceived human costs in the context of bankruptcy are substantial. This situation is more likely to be even more dramatic when the executive's outside employment options are restricted. Thus, the 'exacerbated career concerns hypothesis' predicts that managers, for whom career concerns are exacerbated, may prefer not to increase Leverage (Berk, Stanton, and Zechner 2010).

[6]Bernie Gordon, a serial entrepreneur, prolific inventor and founder CEO of Analogic Corporation was not been sued by Analogic when he founded another competing firm NeuroLogica, headquartered in Massachusetts- a state that recognizes IDD, although Analogic raised concern that its intellectual property and other rights had been violated. Indeed, Gordon successfully sued Analogic later for freezing NeuroLogica's effort to sell the company to another acquirer.

I find that, on the one hand, for firms without professional CEOs, the adoption of IDD leads to an increase in *Leverage* of 17.8% (trade secrets protection channel). In contrast, the adoption of IDD leads to a *decrease* in *Leverage* of 16.9% for firms managed by professional CEOs, relative to founder CEO-led firms (exacerbated career concerns channel). The adverse effect of heightened career concerns, on average, offsets the positive impact of trade secrets protection. The net effect of the adoption of IDD on *Leverage* is statistically indistinguishable from zero for firms led by professional CEOs. Such discernible differences in the financing structure can be reconciled from differences in the issuance of new debt. I find that professional CEO-managed firms issue relatively less new debt in post-IDD regimes. Importantly, under-utilization of unused debt capacity by professional CEOs occurs in an environment when increasing *Leverage* is a firm's optimal response.[7] Utilizing the reversal of the initially adopted IDD, that shifts the incentive equilibrium in opposite directions, I also find consistent evidence supporting the central economic argument of the study.

In the empirical specifications, I control for unobserved, time-invariant differences across firms and unobserved, time-varying differences across states and industries. Thus, by using *high-dimensional fixed effects*, I confirm that my estimates of the observed effect are robust to many types of unobservable omitted variables that can potentially confound this type of analysis (see, Gormley and Matsa 2014). Additionally, I rule out any residual concern arising from the comparability of firms managed by founder CEOs versus those managed by their professional counterparts. Specifically, I study plausibly *exogenous* CEO turnovers in a sample of founder-managed firms right *after* the adoption of IDD. This quasi-experimental setting constitutes an *exogenous* transition in managerial style (from a founder CEO to a professional CEO) in the milieu of an *exogenous* change in career concerns. Employing a Difference-in-Differences Matching Estimator (DiD ME) methodology (see, Abadie and Imbens 2006, 2011), I show that firms exogenously transitioning from founder to professional CEOs (treated firms) experience a significant

[7]Klasa et al. (2018) argue that, after the adoption of IDD, firms move from an equilibrium of weak legal protection of their trade secrets and lower *Leverage* to another one with stronger legal protection of their trade secrets and higher *Leverage*.

decline in *Leverage* relative to a matched set of founder CEO-led firms (control firms) that do not undergo any CEO transition. More importantly, this decline in average *Leverage* is observed among treated firms (only) in IDD adopting states. In a falsification test, I do not find any such differential response by treated firms in states that *do not* adopt IDD. These sharply contrasting findings suggest that the exacerbated career concerns of professional CEOs primarily drive the observed effect.

Further cross-sectional tests show that under-utilization of *Leverage* is discernible *only* among firms where professional CEOs are not nearing retirement age. In contrast, I do not observe any heterogeneities in responses of firms led by professional CEOs depending on *levels* of managerial ownership. Moreover, I find that such debt-aversion is discernibly visible among firms with weaker corporate governance or firms where managers are disproportionately more entrenched. I also conduct various additional tests that help to exclude plausible alternative explanations of the debt-aversion of professional CEO-managed firms following the adoption of IDD. These tests include, among others, exploration of cross-sectional differences in a firm's risk profile, access to the debt market, growth potentials, acquisitions, investments, and firm life cycle. Exploring the market value of Leverage, I further show underutilization of debt capacity by professional CEO-managed firms leads to a lower increase in market capitalization. This study also provides some suggestive evidence that stricter enforceability of post-employment restrictions also systematically affects strategic investments of firms managed by professional CEOs.

My study makes three main contributions. First, I highlight the importance of an accommodating, competitive, and flexible labor market that facilitates assortative matching of employees to firms (Arrow 1962, Becker 1962, Gabaix and Landier 2008) to ensure adequate risk-taking by corporate managers (Hirshleifer and Thakor 1992). Prior research suggests that a manager's exposure to career risk may discipline as well as provide incentives to work harder, assist in building the reputation and sending credible signals of productivity to the labor market (Hölmstrom 1979, Grossman and Hart 1982). However, when restrictions on mobility dissuade managers by preventing them from selling their reputation and expertise to the highest bidder, a natural response from managers could be excessive risk-aversion or policy conservatism (Colak and Korkeamaki

2017). Policymakers are also wrestling with adverse effects of restrictions on employee mobility (Office of Economic Policy, U.S. Dept. of the Treasury 2016, White House 2016, Marx, Strumsky, and Fleming 2009, Marx 2011). Since the majority of large firms in the U.S. are led by professional CEOs, who presumably have, on average, a higher degree of reliance on outside employability, my findings suggest that employer-friendly (as opposed to employee-friendly) state-level policies can dampen the risk-taking attitude of the managers and thus, the broader economy.

Second, my study extends the literature on risk-related agency conflicts. Gormley and Matsa (2011) and Panousi and Papanikolaou (2012) examine risk-related agency conflicts in contexts where both firms and their managers experience a *unidirectional* increase in risk. Relatedly, an unexplored issue is whether risk-related agency conflicts attenuate automatically when a firm's risk subsides exogenously. I address this issue by focusing on a fundamentally different incentive problem where incongruity in risk-preferences occurs due to firms and their managers experiencing *directionally opposite* exposure to risk. Although the extant literature provides theoretical predictions on risk-related conflicts in the face of career concerns, empirical evidence evaluating these theories is sparse. I help close this gap in the literature by exploiting a quasi-natural experiment and show that risk-related agency conflicts are not just pervasive, but rather they can causally affect critical strategic decisions quite systematically. My study also extends the literature that shows that CEO's characteristics and experience influence firm's capital structure (see, Berk et al., 2010, Malmendier, Tate and Yan 2011, Bernile, Bhagwat and Rau 2017, Cain and McKeon 2016). The results which exploit frictions in the managerial labor market, extend the insights in Berk et al. (2010) and suggest that perceived loss of the value of managerial human capital due to corporate bankruptcy can limit the use of corporate debt. Relatedly, I contribute to the governance literature by highlighting that well-functioning governance can mitigate the adverse effects of risk-related agency conflicts. [8]

[8]Shleifer and Vishny 1989, Becht, Bolton, and Röell 2003, Bertrand and Mullainathan 2003, Manso 2011, Shleifer and Vishny 2012.

Finally, this study also provides some evidence that founders' entrepreneurial spirit (Puri and Robinson 2013) uncompromised by career concerns could potentially explain an unexplained empirical regularity in the founder CEO literature- the 'founder CEO premium.'[9] Specifically, this study shows that in the milieu of exacerbated career concerns, decisions by professional CEOs are relatively less likely to be aligned with shareholder wealth creation. More importantly, identifying the causal effect of founder CEOs on firm-level decisions is plagued by two issues: pervasive *endogeneity* and *comparability*. The experimental design used in this study overcomes both issues by utilizing staggered legal shocks and exogenous founder CEO turnovers. Thus, this 'design-based' test (Angrist and Pischke 2009) is a significant methodological contribution to the founder CEO literature.

2.2 Related Literature

A large body of academic research highlights both bright and dark sides of executive mobility. On the one hand, restrictions on mobility, by stabilizing human capital, reduce firm's systematic risk (Donangelo 2014), trade secrets risk, and lead to human capital-driven acquisitions (Chen, Gao, and Ma 2018). Since intellectual property accounts for roughly one-third of the aggregate market equity value of U.S. publicly traded firms (Shapiro and Hassett 2005), concern about divulgence of trade secrets to competitors through the departing (or poached) employees is valid from a firm's perspective. Moreover, lower risk of losing key talented executives that limits employer's holdup problems, especially after the adoption of IDD, may lead to value-enhancing corporate policies (Qiu and Wang 2018).

On the other hand, though career risk could be beneficial in an efficient market(Fama 1980, Jensen 1986), rigidity in labor market hurts executives' signaling incentives and thus, triggers fundamental incongruity between the manager's concern for human capital return (career risk) and the firm's concern for financial return (see, Spence 1973, Holmström 1999, Gibbons, Katz, Lemieux, and Parent 2005, Garmaise 2011). Such

[9]See, for example, Villalonga and Amit 2006, Anderson, Duru, and Reeb 2009, Fahlenbrach 2009.

incongruity exacerbates risk-related agency conflicts (Hölmstrom and Ricart I Costa 1986). Since executives suffer a non-trivial devaluation of their human capital after a job loss (Fee and Hadlock 2004), post-employment restrictions that are enforced through the adoption of IDD may make this human capital devaluation even more dramatic.[10] In a similar vein, Matheson (1998) highlights how the adoption of IDD may cause *irreparable* damage for employees-"*The adoption of IDD may leave the employee without recourse, except to find work in a job or industry unrelated to the former employer's business. Consequently, the worker's skills and marketability are devalued.*" Highlighting the context of corporate bankruptcy, Berk et al. (2010) note that human costs of bankruptcy, despite almost invariably receiving traction from media, receive limited attention in the corporate finance literature. They suggest that human costs of bankruptcy are large enough to impose significant limits on the use of corporate debt.

Since managers' personal risk preferences are associated with the firm's risk attributes, managerial career concerns may affect the firm's risk and corporate policies quite significantly (Gormley and Matsa 2011, 2016). Jensen and Meckling (1976) argue that management has incentives to avoid taking actions which could increase the probability of bankruptcy, even when doing so would be in the best interest of shareholders. Literature also suggests that managers engage in conglomerate mergers to decrease their undiversifiable career risk (Amihud and Lev 1981), may selectively disclose corporate information (Ali, Li, and Zhang 2018, Gao, Zhang, and Zhang 2018, Glaeser 2018, Li, Lin, and Zhang 2018), and prefer short-term corporate profit over shareholders' welfare or shy away from long-term risky investments to boost their wages and build their reputation (Narayanan 1985, Porter 1992).

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[10]Clandestine efforts by tech titans of California to circumvent the non-enforceability of Non-Compete Clause (NCC) or IDD are evident from the anti-poaching agreements among Apple, Google, Intel, Intuit, Adobe, and Pixar that eventually led to the filing of a high-profile class-action lawsuit. The lawsuit involved 64,000 programmers who claimed billions of dollars in damage and alleged industry executives of agreeing between 2005 and 2009 not to poach one other employee. The U.S. Department of Justice said that the agreements diminished competition to the detriment of affected employees who were likely deprived of competitively important information and access to better job opportunities. Source: The New York Times, February 28, 2014.

A related set of studies examines the effect of enforceability of Non-Compete Covenant (NCC) or a lack thereof on incentives and behavior of managers and employees in the financial service industry (see, Clifford and Gerken 2018, Gurun, Stoffman, and Yonker 2018, Cici, Hendriock, and Kempf 2018, Ellul, Pagano, and Scognamiglio 2018). Samila and Sorenson (2011) and Jeffers (2018) examine the effect of NCC on employment growth, innovation, and firm investment. Further, Contigiani, Hsu, and Barankay (2018) and Islam, Rahman, Sen, and Zein (2018) show that restrictions on mobility hurt innovation. Acharya, Baghai, and Subramanian (2013) using wrongful-discharge employment protection acts show that employee-friendly acts flourish innovation. In contrast, utilizing the adoption of IDD as a quasi-natural experiment, this study attempts to disentangle the benefits of trade secrets protections from the costs of managerial career concerns.

2.3 Legal Background, Identification Strategy and Empirical Design

2.3.1 Legal Background

Imposition of restrictions on the executive's mobility is pervasive at firm-level. Bishara, Martin, and Thomas (2015) document that 79% of employment contracts of CEOs of S&P1500 firms include the NCC during 1993-2010. 70% of CEO contracts impose direct post-employment restrictions. However, the enforceability of such restriction rests on states since jurisdictions for employment contracts follow state employment law. IDD imposes a stricter restriction on employee mobility in the presence of a valid employee-signed employment contract. Notably, IDD is applicable even in the absence of NCC and increases the enforceability of NCC.[11] If the employer can prove legitimate interest to enjoin the employee, NCC imposes restrictions for a limited duration and limited geographic scope (e.g., within the state). Courts also appear to take into consideration

[11]In 2011 Aspect Software Inc. successfully enforced the NCC to enjoin Gary Barnett in the court of Massachusetts that adopted IDD in 1994. Barnett and his new employer Avaya presented evidence of Avaya's suggestions to follow law and Barnett's intention to avoid disclosure of Aspect's trade secrets. However, the court enjoined Barnett based on a 'threat of disclosure' citing some of the cases of IDD in spite of lack of evidence of actual wrongdoing.

the financial hardship to the employee while enforcing NCC. Without valid concern, NCC is not imposed, and the employee must receive some benefit in exchange for the restriction (see, Rowe 2005, Malsberger, Campbell, Carr, and Pedowitz 2010, Garmaise 2011, Wiesner 2012).

Additionally, higher-level employees commonly sign a Non-Disclosure Agreement (NDA). Rowe (2005) notes that employees generally show little hesitation in signing NDAs since restrictions under NDAs are limited. More precisely, the court imposes injunctions under NDA when there is clear evidence of the misappropriation, and the employee has already caused irreparable harm to the former employer. In contrast, firms are not required to establish actual wrongdoing by the employee or disclose the exact details of underlying trade secrets in the lawsuit involving the application of IDD. The plaintiff can sue against a former employee based on the mere threat that misappropriation and irreparable harm will occur (aka "Threatened Misappropriation"). Moreover, IDD does not entail any geographic restrictions.

2.3.2 Exogeneity of IDD

Judicial decisions in precedent-setting cases involving the adoption of IDD extend employers' interests in protecting trade secrets (Harris 2000, Godfrey 2004). Variations in risk related agency conflicts that accrue from the manager's exacerbated career concerns are unintended consequences of the adoption of IDD. I use the adoption of IDD as a quasi-natural experiment since outcomes of precedent-setting cases rely on judges who are most likely to be immune to political pressure and expected to be independent. Moreover, in contrast to other state or federal laws (e.g., Business Combination Laws), there is a lack of evidence of lobbying or anticipation by affected parties around the adoption of IDD. The market also did not react differently before the adoption of IDD suggesting IDD is likely to be an unanticipated event (see, Klasa et al., 2018).

Finally, if a shock is as good as random, treated and control groups should have balanced covariates in the pre-shock period. One credible way of confirming a reasonable balance in covariates between treatment and control groups is to use multiple shocks that create multiple control groups (Atanasov and Black 2016, pp: 241). Similarly, the

reversal of the original shock with the expectation of a reversed sign improves the credibility of shock-based inference and rules out many plausible alternative explanations (see, Atanasov and Black 2016). The adoption of IDD offers a sharper shock-based experimental design through both staggered multiple shocks, and in few cases, recision of original shocks. The study includes 21 IDD adopting and 3 IDD rejecting states (see, Graph 1).

2.3.3 Strength of IDD

This study focuses on managers/CEOs since managers typically entail knowledge of employers' trade secrets and thus, are expected to be significantly affected by the stricter enforceability of post-employment restrictions (Rowe 2005). Klasa et al. (2018) show that the recognition of the IDD reduces the mobility of individuals in managerial and related occupations relative to that of individuals in other professions. Marx, Singh, and Fleming (2015), Png and Samila (2015) and Gu, Huang, Mao, and Tian (2018) document a similar pattern.

Nevertheless, career concerns may not be unequivocally strong for all executives (see, Gibbons and Murphy 1992). In an ideal empirical setup, one would like to have a measure of career concerns that produces a clear dichotomy- the presence of career concerns or its absence. However, in practice, the existence of such a measure is challenging. Executives' age or tenure are often used as proxies for career concerns, although the literature is inconclusive regarding the 'predicted effect' of these proxies for career concerns on corporate outcomes (see, Chevalier and Ellison 1999, Yim 2013, Pan, Wang, and Weisbach 2016, among others).

Graph 1: Geography of States Adopting and Rejecting IDD

Figure 1 highlights states where state courts adopted IDD. Figure 2 highlights states where sates courts rejected previously adopted IDD.

Figure 1: IDD Adopting States

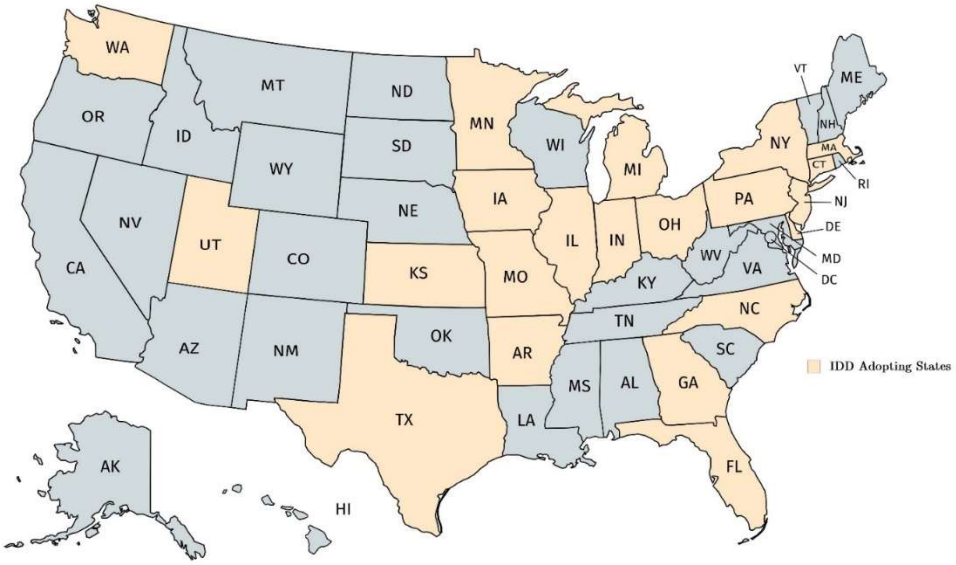
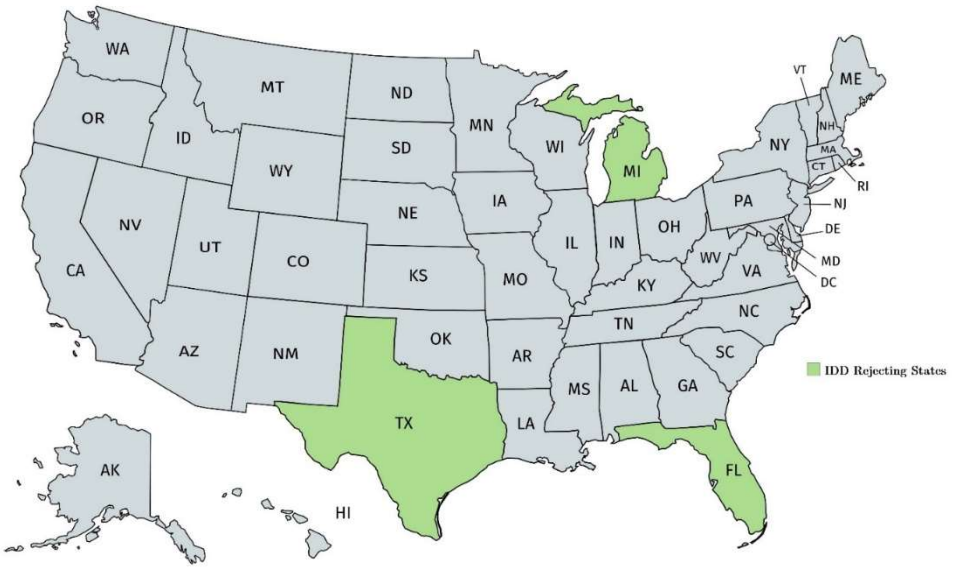


Figure 2: IDD Rejecting States



This study uses the managerial labor market as a laboratory to investigate the net effect of stricter enforceability of post-employment restrictions through the adoption of IDD. I argue that IDD would aggravate risk related agency conflicts disproportionately more in professional CEO-managed firms since founder CEOs are less likely to move to direct rivals. Notably, I find 188 instances where a professional CEO moves to another firm in my firm sample. In contrast, I find only 5 such instances involving founder CEOs: 2 instances where a founder CEO becomes an interim CEO and 3 instances involving M&A transactions and where the firm's name change. I also collect biographical information on defendants of first precedent-setting legal cases documented by Klasa et al. (2018) and do not uncover any cases where a defendant employee is the founder CEO of the firm.

Second, I also test the 'career concerns hypothesis' of Aghion et al. (2013) to provide further evidence that professional CEOs have stronger career concerns. They argue that institutional owners insulate managers from being fired in the face of failed innovation and thus, can reduce a manager's career concerns and increase innovation. Since they do not explicitly consider whether CEOs are professionals or founders, I hand-collect data to identify founder CEOs in their sample. I find that out of 803 firms in their sample, 151 are founder-run. In Panel A of Table 1, I replicate Table 1 of Aghion et al. (2013) where I additionally control for a CEO's founder status. In Panel B (C), I reproduce the result for the founder (professional) CEO sub-sample. The result holds for the professional CEO subsample only (Panel C) and provides suggestive evidence that institutional owners can reduce the career concerns of professional CEOs. Since such an effect of institutional shareholdings is absent for founder CEO-led firms (Panel B), this result constitutes indirect evidence (external validity test) that the 'career concerns hypothesis' is less likely to be operative or is dormant for founder CEOs.

Table 1: Testing Career Concerns Hypothesis of Aghion et al. (2013): Founder v. Professional CEOs

This table replicates table 1 of Aghion et al. (2013). Panel A reports the replication of main results (Table 1 of Aghion et al. 2013) controlling for 'Founder CEOs.' Panel B (C) reports results for founder (professional) CEO subsample. Since Aghion et al. (2013) do not provide data on founder CEOs, I hand-collect required data for the subsample analysis (see, Aghion et al. 2013 for variable definitions). 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise.

	Full sample							
Panel A: Method	OLS	OLS	Poisson	Poisson	Poisson	Negative binomial	Negative binomial	Negative binomial
	ln (CITES)	ln (CITES)	CITES	CITES	CITES	CITES	CITES	CITES
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Institutions	0.006***	0.006***	0.009***	0.008***	0.007***	0.010***	0.009***	0.006***
	(3.172)	(3.052)	(3.829)	(3.577)	(3.089)	(4.654)	(4.682)	(3.688)
Ln(K/L)	0.428***	0.254***	0.449***	0.296*	0.363***	0.612***	0.335***	0.246***
	(4.592)	(3.035)	(3.250)	(1.715)	(2.895)	(5.759)	(3.832)	(3.240)
Ln(Sales)	0.580***	0.322***	0.838***	0.366***	0.219***	0.497***	0.233***	0.136***
	(15.425)	(7.094)	(18.214)	(3.134)	(3.668)	(10.263)	(3.855)	(3.271)
Ln(R&D stock)		0.339***		0.499***	0.002		0.454***	0.183***
		(8.471)		(3.437)	(0.017)		(11.558)	(6.213)
Founder CEO	0.288**	0.327***	0.311	0.334*	0.546***	0.217	0.370**	0.455***
	(2.225)	(2.815)	(1.560)	(1.776)	(3.673)	(1.113)	(2.399)	(3.727)
Fixed Effects	NO	NO	NO	NO	YES	NO	NO	YES
Observations	4,025	4,025	6,208	6,208	6,208	6,208	6,208	6,208

Founder CEO Subsample

Panel B: Method	OLS	OLS	Poisson	Poisson	Poisson	Negative binomial	Negative binomial	Negative binomial
	ln (CITES)	ln (CITES)	CITES	CITES	CITES	CITES	CITES	CITES
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Institutions	0.005	0.005	-0.006	-0.007	-0.005	0.004	0.005	0.003
	(1.036)	(1.103)	(-1.101)	(-1.253)	(-1.135)	(0.729)	(1.182)	(0.594)
Ln(K/L)	0.777***	0.411	0.864***	0.645*	0.584**	1.047***	0.526**	0.335*
	(2.914)	(1.592)	(3.857)	(1.954)	(2.463)	(3.703)	(2.257)	(1.842)
Ln(Sales)	0.503***	0.187*	0.622***	0.420**	0.329**	0.403***	0.059	0.046
	(4.668)	(1.739)	(8.023)	(2.215)	(2.413)	(4.089)	(0.672)	(0.586)
Ln(R&D stock)		0.466***		0.249	-0.095		0.669***	0.322***
		(5.617)		(1.009)	(-0.486)		(8.605)	(4.235)
Fixed Effects	NO	NO	NO	NO	YES	NO	NO	YES
Observations	693	693	969	969	969	969	969	969

Professional CEO Subsample

Panel C: Method	OLS	OLS	Poisson	Poisson	Poisson	Negative binomial	Negative binomial	Negative binomial
	ln (CITES)	ln (CITES)	CITES	CITES	CITES	CITES	CITES	CITES
Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Institutions	0.007***	0.006***	0.012***	0.011***	0.008***	0.010***	0.009***	0.007***
	(3.223)	(2.975)	(5.967)	(5.582)	(3.451)	(4.466)	(4.566)	(4.019)
Ln(K/L)	0.365***	0.216**	0.381**	0.305	0.304*	0.559***	0.317***	0.183**
	(3.682)	(2.464)	(2.308)	(1.526)	(1.840)	(4.703)	(3.293)	(2.229)
Ln(Sales)	0.604***	0.358***	0.913***	0.422***	0.201***	0.534***	0.264***	0.153***
	(14.341)	(7.034)	(22.862)	(3.423)	(2.850)	(12.366)	(4.576)	(3.249)
Ln(R&D stock)		0.316***		0.493***	-0.008		0.429***	0.158***
		(7.132)		(3.694)	(-0.086)		(10.737)	(5.216)
Fixed Effects	NO	NO	NO	NO	YES	NO	NO	YES
Observations	3,332	3,332	5,239	5,239	5,239	5,239	5,239	5,239

Lastly, the literature suggests that the risk of being fired may exacerbate career concern (Kaplan and Minton 2006) and founder CEOs are relatively less likely to face forced turnover (Guo and Masulis 2015).[12] Using data from Eisfeldt and Kuhnen (2013) during 1992-2005, I find 1,489 instances where a professional CEO replaces a founder CEO or another professional CEO in my sample. Column 4 in Table 2 indicates that professional CEOs are more likely to experience forced turnover (see, the forced turnover rows in both Panel A and B) relative to that for founder CEOs and the difference is statistically significant.[13]

2.3.4 Empirical Design

To test the potential trade-off from the 'trade secrets protection hypothesis' and the 'exacerbated career concerns hypothesis', I estimate the following model:

$$Y_{i,j,s,t+1} = \alpha_i + \alpha_{j,t} + \alpha_{s,t} + \beta_1\, IDD\ Adoption_{i,t} + \beta_2\, Professional\ CEOs_{i,t} + \beta_3\, Professional\ CEOs_{i,t} x\ IDD\ Adoption_{i,t} + \delta' Controls_{i,t} + \epsilon_{i,t} \quad (1)$$

Where i indexes firms; j indexes industries; s indexes a firm's headquarter-state; t indexes time; and α_i, $\alpha_{j,t}$, and $\alpha_{s,t}$ are firm, industry-year, and state-year fixed effects. Standard errors are clustered at the headquarter-state level. I correct standard errors for heteroskedasticity and cluster at the firm's headquarter state level following Bertrand, Duflo, and Mullainathan (2004). The dependent variable in equation (1) represents corporate policies. I winsorize observations at the 1 percent levels to minimize the effect of outliers.

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[12] "*If you have control of the company - like I do at Facebook and an increasing number of founders do -- then it is very difficult for investors to fire you. This means you don't need to worry about losing your job over a couple of bad quarters or controversial short-term decisions, and that makes it easier for you to make the decisions you think are correct as well.*"- Mark Zuckerberg, Founder CEO, Facebook.

[13] Noam Wasserman in his book-'Founder's Dilemma' argues that a founder's career risk aggravates while founders are no longer in control of boards and boards get the power to replace founders. However, Wasserman's arguments on the founder's career concerns hinge on the *firing* of founder CEOs. In my setup, variations in career concerns stem from restrictions on the *hiring* by another firm.

Table 2: Features of CEO Turnover in Founder and Professional-Managed Firms

The following table summarizes the types of CEO turnover during 1992-2005 for which turnover data are available from Eisfeldt and Kuhnen (2013). 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. CEO departure type consists of exogenous turnover, forced turnover, and unclassified turnover. 'Forced Turnover' indicates the turnover where the CEO was fired, or the corporate board or shareholders forced the CEO to resign/leave the company. 'Exogenous Turnover' indicates the turnover where a well-specified health problem causes the succession or departure. All other departures are defined as 'Unclassified Turnover.' 'IDD Adopting States' are states whose courts recognize the IDD. Panel A Column 1 reports departure types for all turnovers, Column 2 (3) reports CEO transition types for the 'founder to professional' ('professional to professional'). Panel B includes turnovers only in IDD adopting states. Column 4 includes the difference of means test for different types of CEO transition.

Panel A: Type of Departure in All States	% of Total Turnover	% of Founder to Professional Turnover	% Professional to Professional Turnover	t-test (2) v. (3)
	(1)	(2)	(3)	(4)
Exogenous Turnover	28%	31%	28%	1.133
Forced Turnover	14%	7%	15%	3.278***
Unclassified Turnover	58%	62%	57%	1.267
Panel B: Type of Departure in IDD Adopting States				
Exogenous Turnover	27%	33%	26%	1.507
Forced Turnover	15%	9%	16%	1.839*
Unclassified Turnover	58%	58%	58%	0.041

This specification in equation (1) is equivalent to a triple-difference approach in which the coefficient β_1 captures the effect of the adoption of IDD on firms that are *not* led by professional CEOs. β_2 captures the association between professional CEOs and corporate policies.[14] The coefficient on interactions term β_3 captures the *additional* impact of the adoption of IDD on corporate policies of firms led by professional CEOs relative to founder CEO-managed firms.

Here, firm-fixed effects control for fixed differences across firms, which would subsume any fixed differences between firms in the treated group and the control group. Year fixed effects capture time-related factors, such as macroeconomic condition, that could affect firms' corporate policies, especially financing decisions. I include industry-year fixed effects for mitigating any identification concern driven by differential trends across industries over time (see, Hovakimian, Opler, and Titman 2001). Finally, state-year fixed effects moderate any potential sources of bias related to the local business cycle. I estimate the baseline specification both with and without control variables to deal with plausibly endogenous controls.

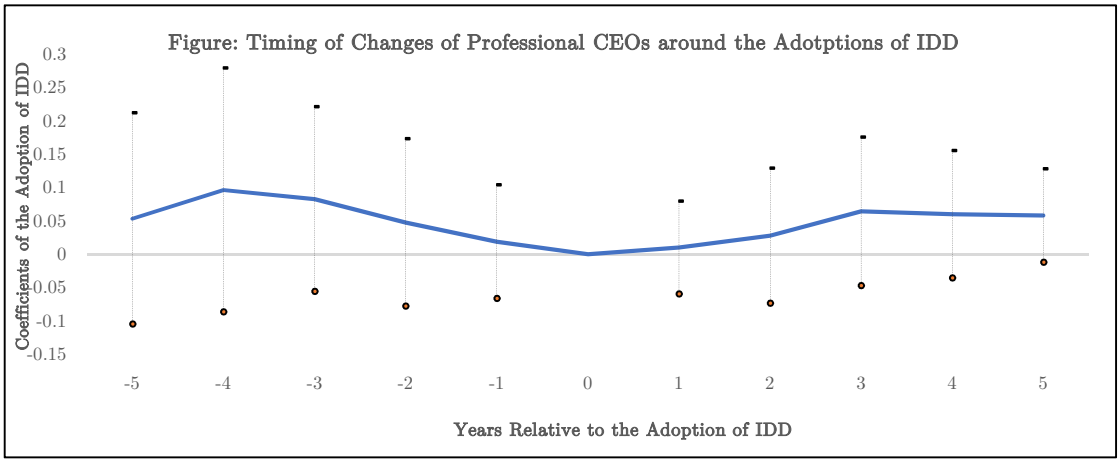
2.3.5 Adoption of IDD and Founder/Professional CEO Status

A fundamental requirement of the experimental setup of this study is that the treatment itself (IDD) would not directly affect the professional/founder CEO status. To maintain such a requirement, I explore whether the adoption of IDD explains founder/professional CEO status using a regression framework. I find that the effect of IDD on founder/professional CEO status is not statistically distinguishable from zero (unreported). In Graph 2, I plot the estimates from the fully-saturated model for 5-year before and 5-year after the adoption of IDD with 95% confidence intervals and t=0 as the reference period. The graph shows that the adoption of IDD does not affect the proportion of professional CEOs surrounding the adoption of IDD by the state court.

[14]However, β_2 cannot be interpreted causally since 'professional CEO' indicator likely suffers from endogenous matching (self-selection). To address this selection concern, in an augmented experiment (section 2.5.5), I introduce exogenous variations both in career concerns (through the adoption of IDD) and in professional CEO indicator (through exogenous CEO turnover).

Graph 2: Professional CEOs and Adoption of IDD

The figure plots the estimates from a fully saturated model of panel regression of 'Professional CEO' indicators on the adoption of IDD. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. '$IDD_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. Effects of IDD adoption on professional CEOs vary from year to year. 95% confidence intervals are also plotted.



2.4 Sample and Data

The primary dataset includes all firms from CRSP/Compustat dataset after excluding regulated utilities and financials, and firms with headquarters outside the U.S. and non-missing data for my main variable of interest- *Leverage.* After merging the primary dataset with ExecuComp, the final sample includes 2,420 S&P1500 firms and 21,648 firm-year observations where I could identify whether the CEO of the firm is a founder or professional. I collect financial data from Compustat and executive-level data from ExecuComp. The sample period is 1992 to 2011 since the first year of ExecuComp data coverage is 1992. Following Klasa et al. (2018), I extend analysis through 2011 which is five years after Kansas adopted the IDD in 2006.

2.4.1 Variable Construction

I identify CEOs from Execucomp and track CEO's biographical information, firm origin, founding history and identify founders from Funding Universe. Where Funding Universe explicitly mentions executives, who were key members of founding teams of firms, I also classify those executives as founders. If information on a firm's founders is not available from Funding Universe, I collect the biographies of CEOs from other relevant sources including Bloomberg's Business Week website, LinkedIn pages, Notable Names Data Base (NNDB), company websites, and other internet resources including Forbes, Wikipedia, Crunchbase.com among others. I construct an indicator variable 'Professional CEOs' equals one if the CEO is neither one of the founders of the firm, nor the CEO of the firm in the year of incorporation and zero otherwise.

Since a precedent-setting case becomes case law and the state court subsequently bases its ruling on the applicability of the IDD, dates of these cases identify the first year of the adoption of IDD. '$IDD_{Adoption}$' is an indicator variable which is equal to one if the headquarter of the firm is in states whose court recognizes the IDD and zero otherwise. '$IDD_{Rejection}$' is an indicator that equals one if the firm's headquarter state court rejects previously recognized IDD and zero otherwise. As a proxy for corporate policies, I use *Leverage* which is the book value of long-term debt and current liabilities divided by book value of assets.

I follow the existing literature to identify control variables.[15] The control variables include *Firm Size*[16], *Market to Book* (a proxy for a firm's growth), *Profitability* and *Tangibility*. Additionally, I include an indicator to identify whether the firm pays dividends. I also control for relevant CEO characteristics, for example, *Overconfidence* (Gervais, Heaton, and Odean 2011, Malmendier et al., 2011) and *Tenure* (Strebulaev and Yang 2013) since these CEO features can influence corporate policies. Finally, since the literature suggests that country-specific macroeconomic factors can affect *Leverage* (Mendoza 2010, Gomes, Jermann, and Schmid 2016), I control for *GDP Growth Rate* as a proxy for economic condition. I also control for the fraction of a state's Congress members representing their state in the US House of Representatives to capture political features of states.

2.4.2 Descriptive statistics

Table 3 presents the distributions of professional and founder CEOs in different industries. Using Fama-French 10 industry distribution in Panel A, I document that founder-run firms are more prevalent in business equipment (27%), telephone and television transmission (24%), wholesale, retail, and services (21%), healthcare, medical equipment, and drugs (23%) industries. The sample reasonable proportion of founder CEOs in both IDD adopting (16.84%) and non-adopting states (19.53%) (Panel B).

[15] See, for example, Harris and Raviv 1991, Rajan and Zingales 1995, Gilson 1997, Serfling 2016.
[16] I control the natural logarithm of firm's sales as the measure of firm size following Frank and Goyal (2003). Results are robust to measuring firm size using the natural logarithm of book value of assets (see, Table 16).

Table 3: Sample Distribution of Founder and Professional CEOs

This table presents distributions of professional and founder CEOs by industry groups and states. 'Professional CEO' is the CEO who is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation. 'IDD Adopting States' are states whose courts recognize the IDD.

Panel A: Distribution of Professional CEOs and Founder CEOs in the Fama-French 10 Industry Groups

Industry Distribution	Founder CEO	Professional CEO
Consumer Nondurables	8.570%	91.430%
Consumer Durables	14.048%	85.952%
Manufacturing	8.096%	91.904%
Oil, Gas, and Coal Extraction and Products	15.226%	84.774%
Business Equipment	26.644%	73.356%
Telephone and Television Transmission	23.628%	76.372%
Wholesale, Retail, and Some Services	20.473%	79.527%
Healthcare, Medical Equipment and Drugs	23.190%	76.810%
Others	19.817%	80.183%

Panel B: Distribution of Professional CEOs and Founder CEOs in the IDD Adopting and the Non-Adopting States

States	Founder CEO	Professional CEO
IDD Adoption=0	19.531%	80.469%
IDD Adoption=1	16.839%	83.161%

Table 4: Summary Statistics

Panel A reports summary statistics for various firm-, CEO- and state-level characteristics. Panel B reports correlation matrix of the adoption of IDD and control variables. 'Firm Size' is the log of total sales. 'Market-to-Book' is the market value of assets divided by book value of assets. 'Profitability' is the operating income divided by book value of assets. 'Tangibility' is the book value of property, plant, and equipment scaled by book value of assets. 'Dividend Payer' is an indicator equals one if the firm pays dividends, zero otherwise. 'Leverage' is the book value of long-term debt and current liabilities divided by book value of assets. 'CEO Overconfidence' is an indicator variable equals one if CEO's vested stock options are in the money. 'CEO Tenure' is the natural logarithm of one plus number of years the executive serves as the CEO in the firm. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'State GDP Growth' is the annual GDP growth rate in the state. 'Political Balance' is the fraction of a state's Congress members representing their state in the U.S. House of Representatives.

Panel A:

Variables	Mean	Median	P75	SD
Firm Features				
Firm Size	7.078	6.996	8.098	1.639
Market-to-Book	2.104	1.636	2.375	1.495
Profitability	0.069	0.082	0.134	0.153
Tangibility	0.285	0.227	0.402	0.215
Dividend Payer	0.491	0.000	1.000	0.500
Leverage	0.213	0.197	0.325	0.182
CEO Features				
Professional CEOs	0.819	1.000	1.000	0.385
CEO Overconfidence	0.646	1.000	1.000	0.478
CEO Tenure	2.008	1.946	2.565	0.743
State Features				
State GDP Growth	0.048	0.049	0.068	0.031
Political Balance	0.535	0.545	0.625	0.190

Panel B:

Variables	$IDD_{Adoption}$	Firm Size	Market to Book	Profitability	Tangibility	Dividend Payer	CEO Overconfidence	CEO Tenure	State GDP Growth	Political Balance
$IDD_{Adoption}$	1									
Firm Size	0.085*	1								
Market to Book	-0.022*	-0.167*	1							
Profitability	0.019*	0.229*	0.221*	1						
Tangibility	-0.033*	0.129*	-0.167*	0.012	1					
Dividend Payer	0.109*	0.396*	-0.108*	0.172*	0.177*	1				
CEO Overconfidence	-0.008	-0.039*	-0.094*	-0.079*	-0.01	-0.018*	1			
CEO Tenure	-0.017	-0.065*	0.039*	0.083*	-0.001	-0.003	-0.032*	1		
State GDP Growth	-0.077*	-0.044*	0.113*	0.075*	0.093*	0.018*	-0.063*	0.033*	1	
Political Balance	0.235*	-0.049*	0.062*	-0.031*	-0.197*	-0.067*	-0.057*	0.009	-0.129*	1

Table 4 Panel A presents the distributional properties (mean, median, 75th percentile and standard deviation) of the variables used in the baseline analysis. Moreover, 82% of the firm-year observations include professional CEOs. Firms pay dividends in almost half of the firm-year observations. Table 4 Panel B presents the pairwise correlation matrix. The matrix shows that firm size and profitability are positively associated with the adoption of IDD. On the other hand, tangibility and market to book are negatively associated with this legal restriction.

2.5 Main results

In Figure 1 (Graph 3), I plot a univariate chart that presents how the *Leverage* of firms changes around the adoption of IDD. I compare changes in *Leverage* with reference to *Leverage* in the year of IDD adoption (t=0) separately for firms led by founder CEO and professional CEO. For example, t=-1 shows the difference between *Leverage* at the periods t=-1 and t=0. To get a more precise pattern of how these two types of firms change *Leverage* in response to IDD adoption, I restrict the plotting to IDD adopting states. Figure 2 (Graph 3) shows the difference in change in *Leverage* between these two types of firms (plotted in Figure 1) with the 5% confidence interval around the difference in changes.

This graph serves two purposes. First, it shows that although leverage levels could be different, there is no divergence in the differences (or changes) in the financing structure of these two types of firms before the adoption of IDD relative to the year of IDD adoption (t=0). This pattern is indeed a visual confirmation of the parallel trends assumption- a crucial identifying assumption in a Difference-in-Differences (DiD) framework. Second, a clear divergence in the change in *Leverage* is apparent between these firm types only *after* the adoption of IDD. More precisely, compared to professional CEO-managed firms, founder-run firms increase *Leverage* significantly after the adoption of IDD. Hence, it visually confirms the differential responses by professional CEOs (compared to founder CEOs) just *after* the adoption of IDD. Moreover, this is a simple graph that is unlikely to produce any cosmetic differences emanating from the econometric artifact.

Graph 3: Heterogenous Financing Decisions in Response to the Adoption of IDD

These figures present the heterogenous financing decisions of firms for three years before and after the adoption of IDD. 'Professional CEO' is the CEO who is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation. '*Leverage*' is the book value of long-term debt and current liabilities divided by book value of assets at the period$_{(t+1)}$. Each data point in Figure 1 presents the difference between *Leverage* in the relevant year before or after the adoption of IDD (t=0). For example, at t = -3, Figure 1 shows the difference between *Leverage* at time t= -3 and time t=0. Figure 2 shows the difference in the change in *Leverage* (from Figure 1) between the professional and founder CEOs managed firms within 5% confidence intervals (Lower Bound/Upper Bound: LB/UB) with standard errors clustered at state level. For example, at t=-3, Figure 2 shows the difference of changes in *Leverage* between *Leverage* at time t= -3 and time t=0 between founder and professional CEO-managed firms (the difference between the dotted line and the solid line of Figure 1 at time t=-3).

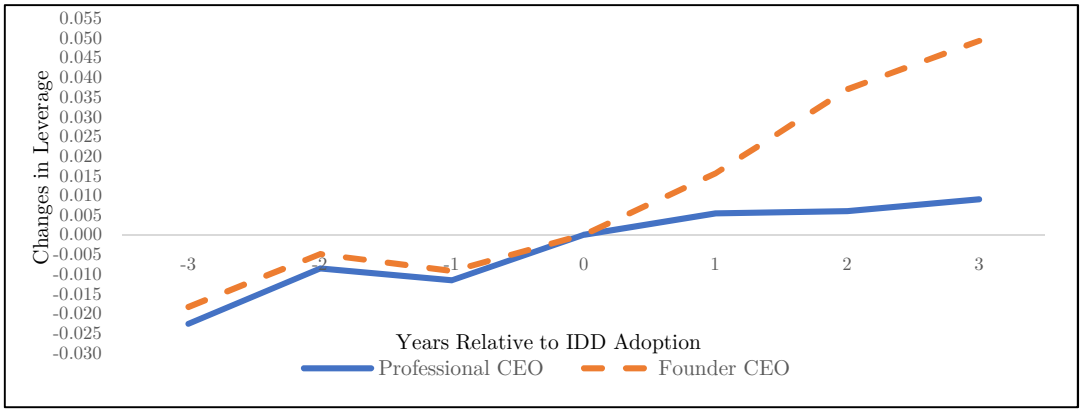
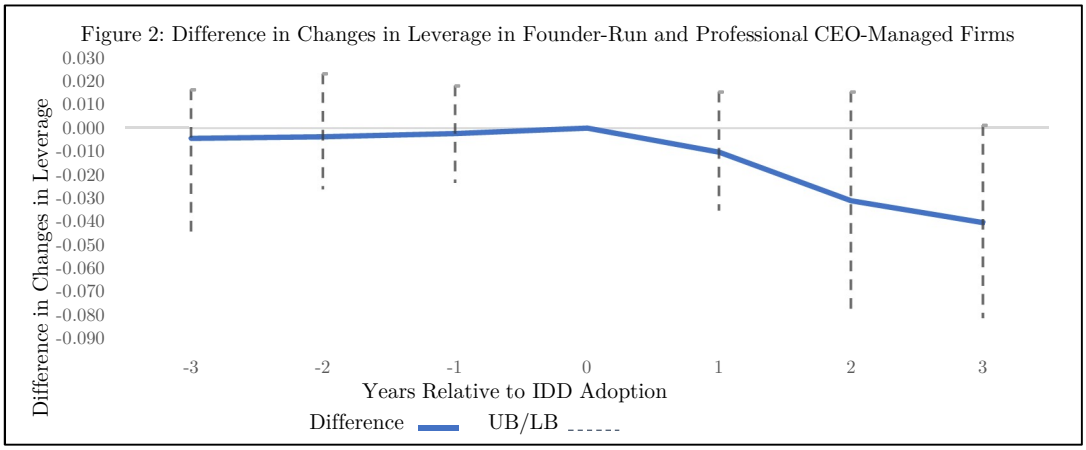


Figure 2: Difference in Changes in Leverage in Founder-Run and Professional CEO-Managed Firms



2.5.1 Baseline Results

After confirming the baseline findings of the study graphically, the main results are presented in Table 5 and document the effect of IDD adoption on corporate policies (proxied by *Leverage*) of different types of firms in a regression framework. Column (1) provides support for the 'trade secrets protection' channel. When state court adopts IDD, founder CEO-managed firms in affected states, on average, increase *Leverage* compared to unaffected firms in other states that did not recognize IDD by that time. However, since the main objective of the study is to disentangle the relative dominance of the 'trade secrets protection channel' and the 'exacerbated career concerns channel' in deciding the levels of leverage, I present the main results in column 2 through column 13 emphasizing the interaction terms between 'IDD x Professional CEOs'.

In column 2 through 4 of Table 5, I do not include any time-varying firm-level controls to avoid the 'bad controls' problem. However, I do incorporate a number of fixed effects. In column 2, I use firms fixed effects and year fixed effects. In column 3, I employ fixed effects at the firm-level, and industry interacted with year level. Column 4 includes state interacted with year fixed effects in addition to the set of fixed effects in column 3. No matter what level of fixed effects are imposed, I find that the interaction term 'IDD x Professional CEOs' loads negatively and is statistically significant at the 5% level.

Regarding economic significance, the 'career concerns channel' (see, column 2 of Table 5), suggests that relative to firms led by founder CEOs, firms run by professional CEOs decrease the ratio of total debt per dollar of book assets by 0.036 cents. This estimation represents a 16.9% decrease relative to the sample mean for *Leverage* of 0.213. Because the coefficient on IDD in column (2) is 0.038, on average, the positive effect through the 'trade secrets protection channel' is offset through the 'exacerbated career concerns channel.' The net impact of the adoption of IDD on *Leverage* for firms led by professional CEOs, captured by the sum of the coefficient for *IDD* and the coefficient for the *IDD x Professional CEOs,* is not significantly different from zero (t-statistic 0.523). I observe very similar effects in columns (3) and (4).

To check the robustness of my baseline findings, in columns (5) through (7), I also control for other firm-level and CEO level characteristics and some specific state-level

variables. Consistent with the prior literature, results show that, on average, market to book and profitability are negatively associated and tangibility and CEO overconfidence are positively associated with *Leverage* (see, Frank and Goyal 2009, Malmendier et al., 2011). I also control for lagged values of leverage in columns (8) through (10) since *Leverage* is sticky and changes in capital structure may depend on the existing or previous levels of *Leverage* (see, Lemmon, Roberts, and Zender 2008). In columns (11) through (13), I also include interactions of all the other control variables with the IDD variable to address the potential concern that the adoption of IDD may influence other firm or CEO-level features. Overall, I continue to find consistent results that exacerbated managerial career concerns due to a shock to their job mobility or outside employment options (exacerbated career concerns channel) may dampen the possibility of utilizing the unused debt capacity that comes when state courts adopt IDD (trade secrets protection channel).

Since there is a debate on the right measure in the setting of capital structure tests, I also use alternative measures of leverage, such as *Market Leverage*, *Net Book Leverage,* and *Net Market Leverage*.[17] I present results based on these alternative measures of leverage in Table 6. Importantly, my baseline findings are unaltered while utilizing alternative dependent variable. Overall, my empirical results support the view that managers actively seek to reduce risky borrowing since such financing invites unwanted monitoring by debt-holders and increases the likelihood of being penalized (Grossman and Hart 1982, Parrino, Poteshman, and Weisbach 2005). Thus, firms managed by CEOs who rely more on outside employment options trade the benefit of trade secret protection against the costs of risk-related agency conflicts.

[17]In practice, the book leverage is reported to be the base in financing decisions (see, Graham and Harvey 2002).

Table 5: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions-Baseline Results

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. 'Firm Size' is the log of total sales. 'Market-to-Book' is the market value of assets divided by book value of assets. 'Profitability' is the operating income divided by book value of assets. 'Tangibility' is the book value of property, plant, and equipment scaled by book value of assets. 'Dividend Payer' is an indicator equals one if the firm pays dividends, zero otherwise. 'Lagged Leverage' is *Leverage* at the period$_{(t)}$. 'CEO Overconfidence' is an indicator variable equals one if CEO's vested stock options are in the money. 'CEO Tenure' is the natural logarithm of one plus number of years the executive serves as the CEO in the firm. 'State GDP Growth' is the annual GDP growth rate in the state. 'Political Balance' is the fraction of a state's Congress members representing their state in the U.S. House of Representatives. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	Leverage$_{(t+1)}$						
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Professional CEOs x IDD$_{\text{Adoption}}$ (β_3)		-0.036**	-0.037**	-0.032**	-0.036**	-0.037**	-0.033**
		(0.014)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
Professional CEOs		0.032***	0.026**	0.025*	0.027**	0.023*	0.024*
		(0.012)	(0.013)	(0.014)	(0.013)	(0.014)	(0.014)
IDD$_{\text{Adoption}}$ (β_1)	0.008**	0.038***	0.034**		0.036***	0.033**	
	(0.004)	(0.013)	(0.014)		(0.013)	(0.013)	
Firm Size					0.005	0.008	0.007
					(0.004)	(0.005)	(0.006)
Market to Book					-0.005***	-0.004***	-0.004***
					(0.001)	(0.001)	(0.001)
Profitability					-0.133***	-0.123***	-0.120***
					(0.021)	(0.020)	(0.021)
Tangibility					0.011	0.025	0.032
					(0.022)	(0.027)	(0.027)
Dividend Payer					-0.000	-0.003	-0.002
					(0.005)	(0.005)	(0.006)
Lagged Leverage							
CEO Overconfidence					0.011**	0.010*	0.010**
					(0.004)	(0.005)	(0.004)
CEO Tenure					0.001	0.001	0.001
					(0.002)	(0.002)	(0.002)
State GDP Growth					-0.041	-0.058	
					(0.053)	(0.061)	
Political Balance					0.012	0.003	
					(0.013)	(0.014)	
Controls X IDD$_{\text{Adoption}}$	N	N	N	N	N	N	N
Firm FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	N	N	Y	N	N
Industry (SIC-2)-Year FE	N	N	Y	Y	N	Y	Y
State-Year FE	N	N	N	Y	N	N	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$		0.523	0.573	N/A	0.896	0.371	N/A
Observations	21,648	21,648	21,648	21,648	21,648	21,648	21,648
R-squared	0.728	0.729	0.750	0.762	0.737	0.756	0.768

Variables	Leverage$_{(t+1)}$					
Models	(8)	(9)	(10)	(11)	(12)	(13)
Professional CEOs x IDD$_{\text{Adoption}}$ (β_3)	-0.022***	-0.023***	-0.021***	-0.026***	-0.027***	-0.029***
	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)
Professional CEOs	0.016**	0.012	0.014	0.018**	0.014*	0.017*
	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)
IDD$_{\text{Adoption}}$ (β_1)	0.022***	0.020***		0.039**	0.048**	
	(0.006)	(0.006)		(0.018)	(0.020)	
Firm Size	-0.001	-0.001	-0.001	-0.001	-0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Market to Book	-0.000	0.000	0.000	-0.000	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Profitability	-0.013*	-0.010	-0.009	-0.020***	-0.016**	-0.014*
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
Tangibility	0.019*	0.031**	0.037***	0.020*	0.036**	0.044***
	(0.010)	(0.013)	(0.013)	(0.012)	(0.015)	(0.016)
Dividend Payer	0.013***	0.011***	0.011***	0.012***	0.009**	0.009**
	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)
Lagged Leverage	0.641***	0.631***	0.627***	0.628***	0.618***	0.611***
	(0.010)	(0.011)	(0.012)	(0.011)	(0.013)	(0.014)
CEO Overconfidence	0.005**	0.005*	0.006**	0.011***	0.012***	0.013***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
CEO Tenure	0.000	0.001	0.001	0.002*	0.002*	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
State GDP Growth	0.032	-0.006		0.022	-0.012	
	(0.034)	(0.033)		(0.034)	(0.036)	
Political Balance	0.007	0.005		0.010	0.009	
	(0.006)	(0.006)		(0.008)	(0.009)	
Controls X IDD$_{\text{Adoption}}$	N	N	N	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	N	N	Y	N	N
Industry (SIC-2)-Year FE	N	Y	Y	N	Y	Y
State-Year FE	N	N	Y	N	N	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$	0.839	0.356	N/A	0.336	0.198	N/A
Observations	21,648	21,648	21,648	21,648	21,648	21,648
R-squared	0.840	0.849	0.856	0.840	0.849	0.856

Table 6: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Using Alternative Measures of Leverage

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011. 'Market Leverage$_{(t+1)}$' is the book value of long-term debt and current liabilities divided by market value of assets. 'Net Book Leverage$_{(t+1)}$' is the book value of long-term debt and current liabilities less cash divided by book value of assets. 'Net Market Leverage$_{(t+1)}$' is the book value of long-term debt and current liabilities less cash divided by market value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables				Market Leverage$_{(t+1)}$			
Professional CEOs x IDD$_{Adoption}$ (β_3)		-0.018**	-0.021**	-0.020**	-0.013***	-0.013***	-0.013**
		(-2.193)	(-2.425)	(-2.146)	(-2.859)	(-2.882)	(-2.395)
Professional CEOs		0.011	0.008	0.010	0.007	0.004	0.006
		(1.367)	(0.958)	(1.148)	(1.637)	(0.858)	(1.059)
IDD$_{Adoption}$ (β_1)	0.008**	0.023***	0.021**		0.015***	0.014***	
	(2.098)	(2.840)	(2.469)		(3.161)	(3.007)	
Baseline Controls	N	Y	Y	Y	Y	Y	Y
Lagged Leverage	N	N	N	N	Y	Y	Y
Controls X IDD$_{Adoption}$	N	N	N	N	N	N	N
Firm FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	N	N	Y	N	N
Industry-Year FE	N	N	Y	Y	N	Y	Y
State-Year FE	N	N	N	Y	N	N	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$		0.192	0.828	N/A	0.291	0.811	N/A
Observations	21,648	21,648	21,648	21,648	21,648	21,648	21,648
R-squared	0.729	0.748	0.775	0.786	0.831	0.848	0.855

Models	(8)	(9)	(10)	(11)	(12)
Variables	Market Leverage$_{(t+1)}$			Net Book Leverage$_{(t+1)}$	Net Market Leverage$_{(t+1)}$
Professional CEOs x IDD$_{Adoption}$ (β_3)	-0.019***	-0.020***	-0.022***	-0.032***	-0.024***
	(-3.885)	(-3.958)	(-3.875)	(-3.198)	(-3.979)
Professional CEOs	0.010**	0.006	0.009	0.022**	0.011*
	(2.138)	(1.389)	(1.634)	(2.390)	(1.929)
IDD$_{Adoption}$ (β_1)	0.024	0.037**			
	(1.646)	(2.312)			
Baseline Controls	Y	Y	Y	Y	Y
Lagged Leverage	Y	Y	Y	Y	Y
Controls X IDD$_{Adoption}$	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year FE	Y	N	N	N	N
Industry-Year FE	N	Y	Y	Y	Y
State-Year FE	N	N	Y	Y	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$	0.733	0.278	N/A	N/A	N/A
Observations	21,648	21,648	21,648	21,648	21,648
R-squared	0.831	0.848	0.855	0.888	0.865

2.5.2 Test of Parallel Trends and Reverse Causality

I examine the parallel-trends in a regression framework and report results in Table 7. The primary objective here is to confirm the concordance of the timing in changes in trade secrets protection and exacerbated career concerns channels and the timing of observed changes in *Leverage*. The test also helps to rule out the reverse causality concern that may drive the findings that I document. If an increasing or decreasing trend in heterogeneous responses by professional CEO-led firms in affected states are observed in pre-IDD adoption period, then this might expose my primary economic argument to reverse causality concerns. This pattern would also indicate a violation of the parallel trend assumption. The main variables of interest in this test are timing indicators leading up to the adoption of IDD and following its adoption and the respective interaction terms. For example, $Professional\ CEOs\ x\ IDD_{Adoption}^{-2}$ is an indicator variable that equals one if the firm is headquartered in a state that adopts IDD in two years and a professional CEO leads the firm. Similar timing indicators and their respective interaction terms are analogously defined.

The timing indicators and their respective interactions terms in pre-IDD periods are statistically indistinguishable from zero. This evidence supports the key economic mechanism behind the exacerbated career concerns hypothesis to explain observed heterogeneities in managerial responses. For example, in column 1, the coefficient on $Professional\ CEOs\ x\ IDD_{Adoption}^{-1}$ is -0.006 (t-stat=-0.319). However, the coefficient on $Professional\ CEOs\ x\ IDD_{Adoption}^{+2}$ is -0.060 (t-stat=-2.871).[18] When I control for the baseline firm-, CEO- and state-level characteristics, these patterns are largely unaffected. Thus, the results in this section suggest that reverse causality is unlikely to be a serious concern for the observed heterogeneous effects in the financial structure of professional CEO-led firms.

[18]This coefficient in year (t=+2) is approximately 10 times the coefficient in year (t=-1).

Table 7: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions-Parallel Trend Examination

This table reports estimates from firm-panel OLS regressions exploring the pre and post-treatment trends of the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}^{-2}$', 'IDD$_{\text{Adoption}}^{-1}$', and 'IDD$_{\text{Adoption}}^{0}$' are equal to one if the firm is headquartered in a state that will adopt the IDD in two years, one-year, current year, respectively and zero otherwise. IDD$_{\text{Adoption}}^{3+}$', 'IDD$_{\text{Adoption}}^{2}$', and 'IDD$_{\text{Adoption}}^{1}$' are equal to one if the firm is headquartered in a state that adopted the IDD three or more years ago, two years ago, and one year ago, respectively, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	$Leverage_{(t+1)}$			
Models	(1)	(2)	(3)	(4)
Professional CEOs x $IDD_{Adoption}^{-2}$	-0.007	-0.006	-0.009	-0.007
	(-0.376)	(-0.311)	(-0.476)	(-0.361)
Professional CEOs x $IDD_{Adoption}^{-1}$	-0.006	-0.005	-0.008	-0.007
	(-0.319)	(-0.272)	(-0.402)	(-0.388)
Professional CEOs x $IDD_{Adoption}^{0}$	-0.016	-0.012	-0.024	-0.022
	(-0.694)	(-0.560)	(-1.321)	(-1.230)
Professional CEOs x $IDD_{Adoption}^{1}$	-0.040*	-0.043**	-0.034**	-0.039**
	(-1.719)	(-2.488)	(-2.024)	(-2.644)
Professional CEOs x $IDD_{Adoption}^{2}$	-0.060***	-0.061***	-0.059***	-0.059***
	(-2.871)	(-3.264)	(-3.455)	(-3.578)
Professional CEOs x $IDD_{Adoption}^{3+}$	-0.042*	-0.044**	-0.037**	-0.038**
	(-1.939)	(-2.018)	(-2.240)	(-2.375)
Professional CEOs	0.037**	0.031*	0.026*	0.021
	(2.378)	(1.962)	(1.982)	(1.666)
$IDD_{Adoption}^{-2}$	0.020	0.018	0.019	0.016
	(1.153)	(1.175)	(1.216)	(0.965)
$IDD_{Adoption}^{-1}$	0.014	0.011	0.008	0.005
	(0.811)	(0.722)	(0.402)	(0.345)
$IDD_{Adoption}^{0}$	0.026	0.021	0.028	0.024
	(1.192)	(1.175)	(1.551)	(1.549)
$IDD_{Adoption}^{1}$	0.046*	0.047***	0.040**	0.039**
	(1.900)	(2.705)	(2.189)	(2.590)
$IDD_{Adoption}^{2}$	0.064***	0.065***	0.058***	0.055***
	(2.840)	(3.332)	(3.275)	(3.369)
$IDD_{Adoption}^{3+}$	0.042*	0.042*	0.034*	0.031*
	(1.788)	(1.777)	(1.878)	(1.708)
Baseline Controls	N	N	Y	Y
Firm FE	Y	Y	Y	Y
Year FE	Y	N	Y	N
Industry (SIC-2)-Year FE	N	Y	N	Y
Observations	21,648	21,648	21,648	21,648
R-squared	0.729	0.750	0.776	0.790

2.5.3 Changes in Leverage: Channel Tests

I explore whether differential risk-preferences after the adoption of IDD lead professional CEO-led firms to actively rebalance capital structure differentially from founder-run firms. In other words, whether differences in capital structure (or levels of *Leverage*) come through cumulative differences in financing (or changes in *Leverage*) in the aftermath of IDD adoption. The objective of this test is to provide evidence on the mechanism or channel behind changes in the levels of *Leverage.*

Specifically, I examine if the *Net Debt Issuance*, defined as the difference between long-term debt issuance and long-term debt reduction scaled by lagged assets, is affected by the adoption of IDD and importantly if there is any heterogeneous effect across the two subsamples. The results are reported in Table 8. In column 1, controlling for firm and year fixed effects, I find that debt-aversion in professional CEO-managed firms after the adoption of IDD reflects itself in a reluctance to issue *net* debt. While such an impact for firms run by benchmark firms (founder CEO-led firms) is positive and significant, the net impact of IDD on the issuance of net new debt by professional CEO-led firms is indistinguishable from zero. Additionally, I control for time-varying industry and local shocks in columns 2 and 3, respectively and find a qualitatively similar pattern. To ensure that the evidence from these tests are not driven by other potentially omitted standard covariates employed in the literature, I use the control variables employed by Frank and Goyal (2003) (following Malmendier et al. 2011, Bernile et al. 2017): specifically changes in profitability, in tangibility, in market to book ratio, in the logarithm of sales and lagged leverage in columns 4 through 6. Results are qualitatively unaltered.

Shyam-Sunder and Myers (1999) show that the Financing Deficit, *FD*, can explain financing decisions quite well lending support for the pecking order theory (Myers 1984, Myers and Majluf 1984). However, contrary to the pecking order theory, Frank and Goyal (2003) show that the financing deficit does not eliminate the effects of the conventional control variables. To ensure that the *FD* does not drive my results, I interact all the controls with *FD* in columns 6 through 9. I also include firm fixed effects and their interactions with FD. Additionally, year effects, time-varying industry, and time-varying local shocks are also included, alternatively. I continue to find consistent

results. Moreover, in columns 10 through 12, I also control for the cost of debt and the interactions of the cost of debt with *FD* to rule out any concern that the cost of debt drives the debt issuance pattern in this study. The main interpretations of results are unaffected. Overall, the tests in this section suggest that after the adoption of IDD, benchmark firms have incentives to increase the issuance of net debt, while exacerbated career concerns negate the incentives to raise net debt in professional CEO-managed firms.[19]

2.5.4 Reversal of the Original Shock

The rejection of IDD in some states increases the mobility of employees of firms in affected states and thus, facilitates assortative matching. The exogenous increase in mobility improves signaling incentives and signaling quality of executives and likely reduces their career concerns. However, the enhanced incentives are likely to be a more meaningful shock for professional CEOs who rely more on outside employment options.

To test the above conjecture, I rerun the baseline tests replacing $IDD_{Adoption}$ with $IDD_{Rejection}$. Results are reported in Table 10. I find that in column 1 of Table 10, there is an independent effect of the rejection of IDD on *Leverage* for firms in general. This effect of the rejection of IDD suggests that firms are moving from an equilibrium of high trade secrets protection and high *Leverage* to weaker trade protection and a lower *Leverage* equilibrium. However, the negative effect from weaker trade secrets protection is counterbalanced significantly by the positive effect on *Leverage* stemming from alleviated career concerns of the professional CEOs.

[19]Consistent with Malmendier et al. (2011) and Bernile et al. (2017), I find that the FD is highly correlated with *Net Debt Issuance* (column 2 of Table 9). Consistent with dynamic rebalancing, I also find that *Net Equity Issuance* follows somewhat reverse pattern compared to the Net Debt Issuance (Table 9). Column 1 shows that the IDD does not directly affect the FD and thus, limits the 'endogenous control' concern.

Table 8: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions-Channel Test

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on net debt issuance during 1992-2011. 'Net Debt Issuance$_{(t+1)}$' is the difference between long-term debt issuance and long-term debt reduction scaled by lagged assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. '$IDD_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Frank and Goyal (2003) control variables include changes in profitability, in tangibility, in logarithm of sales, in market to book and lagged leverage. 'FD'-Financial Deficit- is cash dividends plus net investment plus change in working capital minus cash flow after interest and taxes, normalized by lagged assets. 'Cost of Debt' is the reported annual interest expenses scaled by lagged debt. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	Net Debt Issuance$_{(t+1)}$					
Models	(1)	(2)	(3)	(4)	(5)	(6)
Professional CEOs x IDD$_{Adoption}$	-0.017**	-0.023***	-0.018**	-0.021**	-0.027***	-0.024**
	(-2.329)	(-3.431)	(-2.607)	(-2.407)	(-3.096)	(-2.548)
Professional CEOs	0.003	0.004	0.005	0.013	0.012	0.013
	(0.358)	(0.596)	(0.655)	(1.411)	(1.303)	(1.316)
IDD$_{Adoption}$	0.017**	0.023***		0.022**	0.025***	
	(2.382)	(3.248)		(2.443)	(2.971)	
Frank and Goyal (2003) Control Variables	N	N	N	Y	Y	Y
Frank and Goyal (2003) Control Variables x FD	N	N	N	N	N	N
Cost of Debt	N	N	N	N	N	N
Cost of Debt x FD	N	N	N	N	N	N
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	N	N	Y	N	N
Firm FE x FD	N	N	N	N	N	N
Industry (SIC-2)-Year FE	N	Y	Y	N	Y	Y
State-Year FE	N	N	Y	N	N	Y
Observations	21,648	21,648	21,648	20,749	20,749	20,749
R-squared	0.154	0.193	0.225	0.212	0.249	0.280
Models	(7)	(8)	(9)	(10)	(11)	(12)
Professional CEOs x IDD$_{Adoption}$	-0.020**	-0.027***	-0.024**	-0.022**	-0.027**	-0.024**
	(-2.134)	(-2.832)	(-2.456)	(-2.156)	(-2.418)	(-2.033)
Professional CEOs	0.014	0.013	0.014	0.016	0.014	0.015
	(1.397)	(1.341)	(1.334)	(1.392)	(1.231)	(1.199)
IDD$_{Adoption}$	0.021**	0.026**		0.023**	0.026**	
	(2.113)	(2.674)		(2.236)	(2.241)	
Frank and Goyal (2003) Control Variables	Y	Y	Y	Y	Y	Y
Frank and Goyal (2003) Control Variables x FD	Y	Y	Y	Y	Y	Y
Cost of Debt	N	N	N	Y	Y	Y
Cost of Debt x FD	N	N	N	Y	Y	Y
Firm FE	N	N	N	N	N	N
Year FE	Y	N	N	Y	N	N
Firm FE x FD	Y	Y	Y	Y	Y	Y
Industry (SIC-2)-Year FE	N	Y	Y	N	Y	Y
State-Year FE	N	N	Y	N	N	Y
Observations	20,749	20,749	20,749	20,749	20,749	20,749
R-squared	0.332	0.368	0.396	0.346	0.383	0.414

Table 9: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts: Further Evidence on Channel Test

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on net debt and net equity issuance during 1992-2011. 'Net Debt Issuance$_{(t+1)}$' is the difference between long-term debt issuance and long-term debt reduction scaled by lagged assets. 'Net Equity Issuance' is the sale of common and preferred stocks net of repurchases scaled by the lagged assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state (firm)-level in models 1, 4, 5, and 6 (2 and 3). t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Financial Deficit (FD)	Net Debt Issuance$_{(t+1)}$	Net Equity Issuance$_{(t+1)}$			
Financial Deficit (FD)		0.827***	0.324***			
		(3.740)	(10.102)			
Professional CEOs x IDD$_{\text{Adoption}}$	-0.000			0.003***	0.002**	0.002**
	(-0.363)			(2.714)	(2.499)	(2.099)
Professional CEOs	-0.003***			-0.003***	-0.002**	-0.002**
	(-3.963)			(-3.722)	(-2.550)	(-2.112)
IDD$_{\text{Adoption}}$	0.000			-0.002**	-0.002*	
	(0.584)			(-2.283)	(-1.966)	
Frank and Goyal (2003) Control	N	N	N	Y	Y	Y
Frank and Goyal (2003) Control x FD	N	N	N	Y	Y	Y
Firm FE	Y	N	N	N	N	N
Year FE	Y	N	N	Y	N	N
Firm FE x FD	N	N	N	Y	Y	Y
Industry (SIC-2)-Year FE	N	N	N	N	Y	Y
State-Year FE	N	N	N	N	N	Y
Observations	21,648	21,648	21,648	20,746	20,746	20,746
R-squared	0.289	0.005	0.081	0.479	0.510	0.529

Table 10: Non-Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts: Reversal of IDD Adoption

This table reports estimates from firm-panel OLS regressions exploring the net effect of non-enforceability of post-employment restrictions on financing decisions during 1992-2011. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDDRejection' is an indicator equals one if the focal firm is headquartered in a state whose courts reject previously adopted IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	Leverage$_{(t+1)}$						
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Professional CEOs x IDD$_{Rejection}$		0.020**	0.018*	0.021*	0.011***	0.010*	0.010*
		(2.399)	(1.783)	(1.953)	(2.690)	(1.814)	(1.897)
Professional CEOs		0.009	0.004	0.006	0.005	0.001	0.002
		(0.653)	(0.287)	(0.437)	(0.700)	(0.079)	(0.330)
IDD$_{Rejection}$	-0.016***	-0.028***	-0.019		-0.015***	-0.011*	
	(-3.347)	(-3.372)	(-1.369)		(-4.434)	(-2.006)	
Baseline Controls	N	Y	Y	Y	Y	Y	Y
Lagged Leverage	N	N	N	N	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	N	N	Y	N	N
Industry (SIC-2)-Year FE	N	N	Y	Y	N	Y	Y
State-Year FE	N	N	N	Y	N	N	Y
Observations	21,648	21,648	21,648	21,648	21,648	21,648	21,648
R-squared	0.728	0.736	0.756	0.768	0.840	0.849	0.855

2.5.5 Concern for Non-Comparability: Identification Using Exogenous Turnovers

Since I explore the heterogeneity in manager's relative dependence on outside options, one could argue that firm-fixed effects may not fully capture fixed differences between professional CEO-managed firms and their founder CEO-led counterparts.[20] In this section, I deal with this additional concern. I design an experiment that includes only a subset of founder CEO-led firms, where some of these firms experience *exogenous* CEO turnovers in the post-IDD adoption period. The experiment excludes states that adopt IDD before the start of my sample (1992). This requirement ensures that the IDD shock is relatively strongly effective. This framework allows me to compare almost identical firms that have been managed by founder CEOs until the turnover date. Additionally, I could augment the quasi-natural experiment offered by staggered legal shocks (IDD adoption) with another set of quasi-natural shock from exogenous CEO turnovers.

In this set-up, all founder CEO-managed firms in a particular year are part of a *cohort* if these firms have headquarters in states that already have adopted IDD by that year. This requirement ensures that trade secrets protection hypothesis is 'switched on' for all firms. Within a cohort, *treated* firms are those that experience an exogenous CEO turnover where a professional CEO replaces a founder CEO, constituting a change in 'management style' (see, Bertrand and Schoar 2003). The assignment of firms to the treatment group is 'as good as random' since the decision to replace a founder CEO by

[20]I conduct a subsample analysis where I compare professional (founder) CEOs in IDD adopting states against professional (founder) CEOs in states that do not adopt IDD. Table 11 shows that IDD increases *Leverage* and issuance of new debt in founder-run firms only. The heterogeneous effects of IDD on founder-run firms compared to professional CEO-managed firms is statistically significant. I also follow Gormley and Matsa (2016) to design cohort-based subsamples. I use the matching DiD estimator and incorporate firm-cohort fixed effects, state-year-cohort fixed effects, and industry-year-cohort fixed effects in the cohort-based analysis (unreported). Both subsample analyses (cohort and non-cohort-based) show that the adoption of IDD increases leverage only in founder-run firms. The impact of IDD on Leverage of professional CEO-managed firms is not statistically significant. However, since the study explores the trade-off between the trade secrets protection channel and the exacerbated career concerns channel, in an ideal setting, one should compare between firms managed by founder against professional CEOs in the context of IDD.

professional CEO is, by construction, not a choice[21]and thus is not affected by "selected style hypothesis" discussed in Fee, Hadlock, and Pierce (2013).

Untreated firms are those remaining founder CEO-run firms that did not experience *any* CEO turnover (thus, holding 'management style' constant) in the same *cohort*. For example, in the year 1998, a founder CEO-led firm exogenously replaced by a professional CEO in the state of Arkansas (which adopted the IDD in the year 1997) would be considered as a *treated* firm. All other remaining founder CEO-managed firms located in states that adopted the IDD by the year 1998, but did *not* experience *any* founder CEO turnover in 1998 would be in the untreated group of that 1998 cohort.

Following the exogenous turnover of a founder CEO, the 'exacerbated career concerns channel' would 'switch on,' however, *only* for the treated firms (besides the already switched on 'trade secrets protection channel'), leaving all other aspects arguably unchanged. These changes in the applicability of the hypotheses are depicted in the figure below.

Firms' Assignment into	Pre-CEO Turnover Event	Post-CEO Turnover Event	Post-Pre
Treated Firms	(1) Trade secrets protection (YES) + Exacerbated career concerns (NO)	(2) Trade secrets protection (YES) + Exacerbated career concerns (YES)	(2)-(1): Exacerbated career concerns
Control Firms	(3) Trade secrets protection (YES) + Exacerbated career concerns (NO)	(4) Trade secrets protection (YES) + Exacerbated career concerns (NO)	(4)-(3): No Change
Difference	(1)-(3): No Difference	(2)-(4): Exacerbated career concerns	Exacerbated career concerns (DiD)

Figure: Career Concerns and Trade Secrets Protection Channel for Treated and Control Firms

[21]This test does not include any firms where co-founders replace founders. This is implausible to replace a founder CEO by another founder CEO following the exogenous CEO turnover, even if the firm wants to since the available number of founders is exhaustive.

Table 11: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Further Evidence on Heterogenous Effects

This table reports estimates from firm-panel OLS regressions exploring the heterogenous effects of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011. 'Leverage$_{(t+1)}$' is the book value of long-term debt and current liabilities divided by book value of assets. 'Net Debt Issuance$_{(t+1)}$' is the difference between long-term debt issuance and long-term debt reduction scaled by lagged assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Models (3), (4), (7), and (8) include interaction terms of all control variables with sample split indicator-'Professional CEOs'. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)
Variables	Leverage$_{(t+1)}$			
Founder CEOs x IDD$_{\text{Adoption}}$ (γ)	0.038***	0.034**	0.030**	0.028**
	(2.953)	(2.461)	(2.474)	(2.071)
Professional CEOs x IDD$_{\text{Adoption}}$ (δ)	0.003	-0.003	0.001	-0.004
	(0.644)	(-0.568)	(0.273)	(-0.760)
Professional CEOs	0.032***	0.026**	0.053	0.024
	(2.727)	(2.028)	(0.933)	(0.411)
Baseline Controls	N	N	Y	Y
Joint Hypothesis: $\gamma - \delta = 0$	0.018	0.018	0.043	0.034
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	N	N
Industry (SIC-2)-Year FE	N	N	Y	Y
Observations	21,648	21,648	21,648	21,648
R-squared	0.729	0.750	0.737	0.756

Models	(5)	(6)	(7)	(8)
Variables	Net Debt Issuance$_{(t+1)}$			
Founder CEOs x IDD$_{\text{Adoption}}$ (γ)	0.017**	0.023***	0.021**	0.025***
	(2.382)	(3.248)	(2.329)	(2.703)
Professional CEOs x IDD$_{\text{Adoption}}$ (δ)	0.000	-0.000	0.000	-0.002
	(0.122)	(-0.182)	(0.031)	(-1.052)
Professional CEOs	0.003	0.004	0.016	0.013
	(0.358)	(0.596)	(1.168)	(0.915)
Baseline Controls	N	N	Y	Y
Joint Hypothesis: $\gamma - \delta = 0$	0.024	0.001	0.030	0.007
Firm FE	Y	Y	Y	Y
Year FE	Y	Y	N	N
Industry (SIC-2)-Year FE	N	N	Y	Y
Observations	21,648	21,648	21,648	21,648
R-squared	0.154	0.193	0.215	0.252

In this context, the *treated* firms are 'as if' founder CEO-managed firms 'wrapped up' in a professional CEO 'package' only because of the exogenous transition in the CEO position. This is essentially a small sample study comprising only 39 *treated* firms where professional CEOs in the post-IDD regime exogenously replace founder CEOs. However, the number of firms is not crucial *per se* since the objective of this experimental design is to achieve a plausible near-randomness in the assignment of firms in the treatment group and the control group. However, to deal with any residual concerns regarding comparability, I use a DiD ME approach that incorporates both observable firm characteristics and accounts for unobservable, idiosyncratic firm effects and allows me to conduct a 'design-based' test.

Among the available number of matching estimators, I use the Abadie and Imbens (2006), (2011) estimator which minimizes the 'Mahalanobis distance' between the vector of observed covariates across treated and non-treated firms, finding nearest matches for which distance between vectors is the least. Specifically, I estimate Abadie-Imbens average treatment effect on the treated (ATT). I compare the *changes* in *Leverage* across groups rather than *levels* of *Leverage* since levels of *Leverage* could be different in the pre-shock period (exogenous CEO turnover).

I match treated firms with counterfactual firms (controls firms) from the pool of untreated firms based on exact matching on cohort (and thus on the year, by construction), industry and then on firm size.[22] I match one control firm for each treated firm and perform matching without replacement. I end up finding 29 matched firms for treated firms. I report the *ex-ante* balance of covariates in the pre-treatment period (at, t-1) for treated, untreated, and control firms in Table 12. Note that, the pre-event period for untreated (or control) firms have been defined based on the timing of the event (CEO turnovers) in a cohort. Though these non-treated (control) firms do *not* experience any actual CEO turnover event (no treatment), the demarcation of the pre- and the post

[22]I use Fama-French 10 industry classification to ensure that I have a reasonable number of matched firms since this is a small sample study and using more narrowly defined industry classification sacrifices the quality of the match. However, results are robust to using other conventional industry classification such as SIC-2.

CEO turnover period is benchmarked against the actual CEO turnover event of treated firms in the same cohort.

Panel A of Table 12 shows that in the pre-treatment period (at, t-1), treated, and untreated firms do not have statistically significant median differences across observable dimensions, but they do differ in firm size. However, as reported in Panel C (*Treated v. Non-Treated*), Kolmogorov-Smirnov tests suggest that in the pre-treatment period, treated and control firms have reasonably good distributional overlap, including the firm size variable. Panel B shows that in the pre-treatment period, treated and controls firms do not have any statistically significant median difference across observable dimensions including the firm size suggesting that the matching procedure is effective in identifying appropriate counterfactuals.

Panel A of Table 13 shows that *Leverage* levels in the post-CEO turnover period for treated firms and untreated firms from the same cohort after the adoption of IDD by the state court. Note that, levels of *Leverage* of treated firms decline by 4% (-0.04) after exogenous CEO turnover, suggesting that the 'exacerbated career concerns channel' dominates the trade secrets protection channel (see, the column Post-Pre in Panel A). This estimation implies a 16.33% decline in *Leverage* (statistically significant at the 5% level) from the pre-turnover period *Leverage* level.[23] For non-treated firms, there is an increase of 0.8% in the average *Leverage* level. This increase is through the trade secrets protection channel that has been activated by the already adopted IDD. Overall, Panel A shows a net 19.59% decline in the pre-turnover *Leverage* level for treated firms.[24] The pre-CEO turnover differences in *Leverage* levels between the treated and control firms (0.065 with t-statistics=1.72, see Panel A column 1) is most likely due to differences in firm size.

[23](-0.04/0.245) = -0.1633 or 16.33% decline in the levels of leverage for the treated firms.
[24](-0.048/0.245) = -0.1959 or 19.59% net decline in the levels of leverage for the treated firms.

Table 12: Distributional Properties of Treated, Non-Treated, and Control Firms in the Exogenous Turnover Analysis following the Adoption of IDD

This table compares the distributional properties of Treated, Non-Treated, and Control firms. All firms in this test are headquartered in IDD adopting states. *Treated* firms are founder-run firms where founder CEOs are exogenously replaced by professional CEOs constituting a change in 'management style'. *Non-Treated* firms are founder-run firms that do not experience any CEO turnover. *Control* firms are a subset of Non-Treated firms matched from Fama-French (10) industry groups and the same cohort and then on Firm Size using the Abadie and Imbens (2006, 2011) matching estimator methodology. Each *Treated* firm is matched to one *Untreated* firm without replacement. Panel A and B report the test for a difference in the means of firm characteristics across two groups. Panel C presents the distributional properties of firm characteristics across both *Treated* and *Non-Treated* firms and *Treated* and *Control* Firms. The test of differences in distribution across two comparison groups is conducted by the Kolmogorov-Smirnov test. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	Firm Size	Market to Book	Profitability	Tangibility	Cashflow Volatility
Panel A: Medians for Treated vs Non-Treated Firms in Pre-Exogenous Turnover Period					
Treated	6.307	1.648	0.082	0.219	0.035
Non-Treated	6.160	2.006	0.094	0.188	0.032
Difference	0.147	-0.358	-0.012	0.030	0.002
Difference of Means Test p-value	0.067*	0.217	0.806	0.989	0.842
Panel B: Medians for Treated vs Control Firms in Pre-Exogenous Turnover Period					
Treated	5.739	1.347	0.037	0.219	0.035
Control	5.569	1.403	0.017	0.188	0.023
Difference	0.170	-0.056	0.020	0.030	0.011
Difference of Means Test p-value	0.274	0.804	0.785	0.568	0.411

Panel C: Distributional Differences of Firm-Characteristics between Treated v. Non-treated and Treated v. Control Firms in the Pre-Turnover period

	Treated v. Non-Treated Firms					Treated v. Control Firms				
		25th %	Median	75th %	Kolmogorov-Simonov Test p-value		25th %	Median	75th %	Kolmogorov-Simonov Test p-value
Firm Size	Treated	5.739	6.307	7.598	0.358	Treated	5.739	6.307	7.598	0.564
	Non-Treated	5.243	6.160	7.127		Control	5.569	6.287	6.919	
Market to Book	Treated	1.347	1.648	2.697	0.405	Treated	1.347	1.648	2.697	0.782
	Non-Treated	1.406	2.006	3.293		Control	1.403	1.846	2.967	
Profitability	Treated	0.037	0.082	0.151	0.601	Treated	0.037	0.082	0.151	0.782
	Non-Treated	0.043	0.094	0.166		Control	0.017	0.089	0.136	
Tangibility	Treated	0.158	0.219	0.296	0.169	Treated	0.158	0.219	0.296	0.564
	Non-Treated	0.099	0.188	0.317		Control	0.103	0.188	0.256	
Cashflow Volatility	Treated	0.018	0.035	0.062	0.800	Treated	0.018	0.035	0.062	0.220
	Non-Treated	0.020	0.032	0.063		Control	0.019	0.023	0.055	

Panel B of Table 13_presents the results from a full-fledged implementation of the Abadie-Imbens DiD Matching Estimator. Here, I compare firms in treatment groups with the closest matched counterfactuals. More importantly, treated and control firms do not show any statistically significant difference (t-statistics=0.76) in *Leverage* levels before the turnover events (see, the pre-CEO turnover column in Panel B). The estimate suggests that corporate capital structure of the treated and control firms differ significantly after the 'exacerbated career concerns channel' is 'switched on' by the transition from founder CEO-run firms to professional CEO-run firms. Specifically, the estimate in the 'post-pre' column suggests that levels of *Leverage* decrease by 6.5% more for treated firms relative to otherwise similar founder CEO-run firms that did not experience any CEO turnover in IDD adopting states.

Panel B also presents the key results of this experimental design- the Abadie-Imbens Matching Estimator of the average treatment effect on the treated (ATT). The ATT difference is equal to -6.2% (see, the last cell in the last column of Panel B) indicating that *Leverage* of treated firms after the exogenous transition to professional CEO declines by 6.2% or by one-fourth of their pre-turnover levels[25]and is statistically significant at the 1% level. Given the similarity between firms in treated and control groups, the results presented in Panel B of Table 13 are suggestive of a causal effect of exacerbated career concerns on *Leverage*.

Nevertheless, to strengthen the causal interpretation of these results, I re-run precisely the same exogenous CEO turnover experiment that I run for IDD adopting states for states that do NOT recognize/adopt IDD. Hence, the 'exacerbated career concerns channel' and 'trade secrets protection channel' are both 'switched off.' This falsification test (reported in Panel C of Table 13) is aimed at ruling out alternative explanations for results reported in Panel B. There is no statistically significant difference in financing behavior of the treated and control group in the post-CEO turnover period despite the differences in the management style after such exogenous CEO transition for treated firms.

[25]0.062/0.245= .253 or 25.3% decline from the pre-turnover levels of 24.5%.

Table 13: Difference-in-Differences Matching Estimator (DiD-ME) Analysis of Exogenous CEO Turnovers

This table presents estimates based on a matching estimator analysis of exogenous CEO turnovers in founder-run firms in IDD adopting states. The outcome variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. The pre(post)-turnover period is 1 year prior (after) to the exogenous turnover year. Panel A (B) includes an analysis of the change in *Leverage* from the *pre-turnover* to the *post-turnover period* (the difference-in-difference), for *Treated* and *Non-Treated* (*Control*) firms. *Treated* firms are the founder-run firms where founder CEOs are exogenously replaced by professional CEOs constituting a change in 'management style'. *Non-Treated* firms are founder-run firms that do not experience any CEO turnover. *Control* firms are a subset of the Non-Treated firms matched from Fama-French (10) industry groups and the same cohort and then on Firm Size using the Abadie and Imbens (2006, 2011) matching estimator methodology. Panel C includes a falsification test where *Treated* and *Control* firms are headquartered in states that *do not* recognize IDD before the exogenous CEO turnover. ATT is the Abadie and Imbens (2006, 2011) bias-corrected average treatment effect on the treated matching estimator. Standard errors are corrected for heteroskedasticity. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Leverage before and after exogenous CEO Turnovers (Treated v. Non-Treated)			
	Pre-Turnover	Post-Turnover	Post-Pre
Treated Firms	0.245***	0.205***	-0.040**
	(6.38)	(5.27)	(2.39)
Non-Treated Firms	0.180***	0.188***	0.008**
	(28.46)	(29.28)	(2.05)
Difference	0.065*	0.017	-0.048**
(*t*-statistic)	(1.72)	(0.47)	(-2.14)
Panel B: Leverage before and after exogenous CEO Turnovers (Treated v. Control)			
	Pre-Turnover	Post-Turnover	Post-Pre
Treated Firms	0.245***	0.205***	-0.040**
	(6.38)	(5.27)	(2.39)
Control Firms	0.197***	0.222***	0.025
	(4.69)	(5.16)	(1.13)
Difference	0.048	-0.017	-0.065*
(*t*-statistic)	(0.76)	(-0.25)	(-2.02)
Matching Estimator (ATT)			-0.062***
			(-2.67)
Panel C: Falsification Test on Leverage before and after exogenous CEO turnovers (Treated v. Control)			
	Pre-Turnover	Post-Turnover	Post-Pre
Treated Firms	0.166***	0.182***	0.016
	(5.36)	(6.02)	(1.48)
Control Firms	0.210***	0.197***	-0.013
	(5.25)	(5.08)	(-0.69)
Difference	-0.044	-0.015	0.029
(*t*-statistic)	(-0.97)	(-0.34)	(1.52)
Matching Estimator (ATT)			0.030
			(1.50)

2.5.6 Alternative Interpretations and Cross-Sectional Variations

An investigation of several alternative explanations for managers' heterogenous financing responses to heightened career risk deserve a careful consideration. Table 14 includes some additional tests that help to address several plausible alternative explanations.

2.5.6.1 Effects of Other Firm-Level Determinants of Leverage?

First, although the adoption of IDD does not, on average, directly affect stock volatility or cash-flow volatility of firms (Klasa et al., 2018), nevertheless heterogeneous responses by professional CEOs could be correlated with a firm's risk profile. Thus, one could argue that heterogeneity at the firm-risk level could explain the observed debt-aversion. Finding the observed debt-aversion of professional CEOs in the samples of firms that have both high stock volatility and low stock volatility would go to some length to dismiss such an alternative story. Indeed, I find that the documented effect is discernible in both riskier and relatively less risky firms. More precisely, after the adoption of IDD, while firms with high stock volatility, on average, increase leverage by 16.38% (mean value of Leverage in column 1 subsample 1 of Table 14 Panel A is 0.201), professional CEO-managed firms on average decrease Leverage by 18.37%. Similarly, while firms with low stock volatility, on average, increase Leverage by 23.30% (mean value of Leverage in column 1 subsample 2 of Panel A is 0.232), professional CEO-managed firms decrease Leverage by 25.13% (see Table 14 Panel A Column 1). To further address this risk-related alternative interpretation, I also split the sample based on cash-flow volatility. Again, I find that the baseline results hold for both firms with high and low cash-flow volatility (see Table 14 Panel A Column 2). Thus, I conclude that levels of firm risk are not the primary driver of my baseline results.

Second, one might argue that after IDD adoption, limited access to the debt market can partly explain the documented effect of debt financing in professional CEO-managed firms. Notably, there is no apparent reason to expect access to the debt market to be systematically affected, especially for professional CEO-managed firms following IDD adoption. I use debt rating as a measure of access to debt financing (see, Faulkender and Petersen 2006). My analysis also suggests that under-utilization of debt capacity by professional CEO-managed firms after IDD adoption is pervasive across a broad-

spectrum of firms in different debt rating classes: Highly rated, low rated and unrated (see, Table 14 Panel A Column 3).

Third, a firm's investment profile and the nature of its assets may influence its financing policy. Thus, exploring whether the baseline evidence is driven by the firm's investment, per se, is worthwhile. However, using research and development (R&D) expenditures as a measure of a firm's investment, I find that the firm's investment does not drive under-utilization of debt capacity by professional CEO-managed firm in the post-IDD period (see, Table 14 Panel A Column 4).

Fourth, Chen et al. (2018) show that the adoption of IDD can influence the firm's acquisitions activities. Thus, one may argue that financing decisions of professional CEOs following IDD adoption could be influenced by a firm's acquisition activities (or a lack thereof) and the financing choices related to such acquisitions (such as a debt-financed acquisition). However, evidence in Table 14 Panel A Column 5 suggests that baseline results are evident across the two subsamples of firms with high and low acquisition intensities.

Fifth, the literature suggests that a firm's growth potential can influence capital structure (Frank and Goyal 2009). Since founder-run firms are generally growth-focused firms, financing requirements could explain disproportionately more utilization of unused debt capacity by founder-run firms. A similar concern may arise due to differences in the firm's life cycle. However, it is unclear why the adoption of IDD will systematically affect growth (as opposed to non-growth) or older (as opposed to younger) firms. To further investigate whether the firm's maturity (life cycle) or growth profile could influence my baseline findings, I split the sample based on median firm age and the change in the log of firm assets, respectively. My baseline findings remain unaltered in these sub-samples (see, Table 14 Panel A Columns 6-7).

Sixth, if diversified firms are more likely to be managed by professional CEOs and more risk-averse CEOs choose to work for more diversified firms, then this correlation could partly explain my baseline results. However, the evidence in Table 14 Panel A Column 8 is inconsistent with this alternative interpretation. More precisely, I find that my baseline results are discernible in both stand-alone firms and diversified firms.

Table 14: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Cross-Sectional Analyses

This table reports estimates from cross-sectional analyses exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions. The dependent variable is 'Leverage(t+1)'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDDAdoption' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. 'Stock Volatility' is the firm's annual stock volatility calculated from daily stock returns. High stock volatility firms are firms with above median stock volatility. 'Cashflow Volatility' is the annual standard deviation of firms' quarterly ratio of cash flow to sales. High cash-flow volatility firms are firms with an above median cash-flow volatility. High debt rating firms are firms with S&P debt rating higher than B. No high debt rating firms are firms with S&P debt rating lower than A- and unrated firms. 'R&D/Asset' is R&D expenditures scaled by assets. R&D/Asset 'No' group includes firms with below quartile R&D/Asset. 'Acquisitions' is total acquisition expenditures scaled by assets. Acquisition 'No' group includes firms with below quartile acquisitions. Older firms are firms with an above median firm age. Diversified firms are firms with more than one business segments. Growth firms are firms with an above median change in log assets. 'Specialist CEOs' are CEOs with GAI score less than the sample median GAI. 'Younger CEOs' are CEOs who are less than 64 years old. 'Not Retirement Aged CEOs' are CEOs who are less than 60 years old. 'High CEO-Ownership' includes CEOs with ownership more than the median CEO ownership of the sample. 'High E-Index Firms' are firms with an above median E-Index. 'Low Institutional Ownership' presents firms with a below median yearly institutional ownership Herfindahl-Hirschman Index. The coefficient of 'IDDAdoption' is absorbed by state-year fixed effects. All models include 'Professional CEOs'. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Firm-Level Heterogeneity

Variables	$Leverage_{(t+1)}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Models	High Stock Volatility	High Cash-Flow Volatility	High Debt Rating	High R&D/Asset	High Acquisitions	Older Firms	Growth Firms	Diversified Firms
Subsample 1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Professional CEOs x $IDD_{Adoption}$	-0.035**	-0.046**	-0.101**	-0.060***	-0.046*	-0.067***	-0.029*	-0.056***
	(-2.064)	(-2.408)	(-2.099)	(-3.069)	(-1.815)	(-3.110)	(-1.940)	(-2.778)
Observations	10,854	10,829	3,149	5,375	5,045	11,066	10,361	9,903
R-squared	0.811	0.783	0.837	0.683	0.853	0.798	0.812	0.809
Subsample 2	No	No	No	No	No	No	No	No
Professional CEOs x $IDD_{Adoption}$	-0.047**	-0.039**	-0.027*	-0.028*	-0.029*	-0.028*	-0.055***	-0.033***
	(-2.570)	(-2.092)	(-1.729)	(-1.923)	(-2.012)	(-1.710)	(-2.959)	(-2.799)
Observations	10,788	10,819	18,499	16,273	15,274	10,582	10,389	11,745
R-squared	0.814	0.818	0.775	0.799	0.789	0.823	0.814	0.817
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry (SIC-2)-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
State-Year FE	Y	Y	Y	Y	Y	Y	Y	Y
p-Value of difference	0.604	0.781	0.129	0.179	0.496	0.168	0.258	0.250

Panel B: Role of Governance

Variables	$Leverage_{(t+1)}$	
	(1)	(2)
Models	High E-Index	Low Institutional Ownership
Subsample 1	Yes	Yes
Professional CEOs x $IDD_{Adoption}$	-0.086**	-0.040**
	(-2.608)	(-2.607)
Observations	3,585	8,754
R-squared	0.919	0.825
Subsample 2	No	No
Professional CEOs x $IDD_{Adoption}$	-0.016	0.007
	(-1.672)	(0.428)
Observations	11,189	7,949
R-squared	0.805	0.857
Firm FE	Y	Y
Industry (SIC-2)-Year FE	Y	Y
State-Year FE	Y	Y
p-Value of difference	0.044	0.033

Panel C: CEO-Level Heterogeneity

Variables	$Leverage_{(t+1)}$			
	(1)	(2)	(3)	(4)
Models	Specialist CEOs	Young CEOs	Not Retirement-Aged CEOs	High Ownership CEOs
Subsample 1	Yes	Yes	Yes	Yes
Professional CEOs x $IDD_{Adoption}$	-0.028**	-0.033**	-0.036*	-0.034**
	(-2.365)	(-2.212)	(-1.898)	(-2.497)
Observations	7,539	18,862	15,408	10,226
R-squared	0.843	0.778	0.798	0.841
Subsample 2	No	No	No	No
Professional CEOs x $IDD_{Adoption}$	0.011	0.038	-0.044	-0.079**
	(0.378)	(0.773)	(-1.295)	(-2.246)
Observations	7,736	2,745	6,199	10,686
R-squared	0.808	0.934	0.868	0.800
Firm FE	Y	Y	Y	Y
Industry (SIC-2)-Year FE	Y	Y	Y	Y
State-Year FE	Y	Y	Y	Y
p-Value of difference	0.350	0.090	0.833	0.231

2.5.6.2 Can Governance Mitigate Risk-Related Conflicts?

Can managers undertake documented suboptimal actions, which are seemingly value-destroying, in all firms? In other words, can better governance mitigate such risk-related agency conflicts? Theory suggests that CEOs are less likely to pursue sub-optimal decisions in firms with better corporate governance (Jensen and Meckling 1976). To test this conjecture, I split the sample, using sample medians as cut-offs, based on widely used measures in the literature that arguably capture aspects of governance quality. These measures include the Entrenchment Index (E-Index) (Bebchuk, Cohen, and Ferrell 2009) and Institutional Ownership. I report these subsample results in Table 14 Panel B.

Theories suggest that entrenched managers have greater discretion over a firm's capital structure (see, Fama 1980). In a similar vein, one might argue that manager entrenchment can explain the underutilization of debt by professional CEO-managed firms (see, Berger, Ofek, and Yermack 1997). Contradicting this view, I find that after IDD adoption, even firms managed by entrenched CEOs who rely relatively less on outside employment opportunities increase Leverage. However, firms managed by entrenched professional CEOs reduce Leverage. Such evidence is not observed in firms with below median E-Index. This result suggests that managerial discretion amplifies these risk-related agency conflicts.

Next, I show that the differential response of professional CEO-managed firms in the post-IDD period is prevalent in the absence of concentrated institutional ownership. The governance literature suggests that concentrated institutional ownership is often an effective alternative governance mechanism for disciplining managers (Edmans 2009). Consistent with the prior literature, this study provides corroborating evidence that less monitoring by institutional investors amplifies risk-related agency conflicts. Thus, the evidence documented in Table 14 Panel B highlights the importance of well-functioning corporate governance mechanisms in effectively constraining managers are exposed to serious career risk due to major shocks in the legal environment regarding labor mobility.

2.5.6.3 Cross-Sectional Variations in Managerial Incentives

I now further explore the nature of the intensified career concern channel from the perspective of managerial incentives. First, I examine cross-sectional variations in CEOs' general managerial ability. Jensen and Meckling (1976) argue that agency conflicts should be observed if managers have substantial firm-specific human capital or if managers face substantial adjustment costs in finding new employment. This is exactly the situation that occurs when IDD adoption restricts the mobility of employees (CEOs) to competing firms where their skills developed while working for incumbent firms are more directly applicable or relevant. However, mobility in unrelated firms or industries (that are not direct rivals) is not restricted after IDD adoption.

I exploit the fact that specialist CEOs' skills and talent are transferable primarily to related industries or rival firms (Becker 1964, Neal 1995, Donangelo 2014). On the other hand, more transferrable human skills enlarge a manager's outside options. Generalist CEOs, due to transferability of their general managerial skills across a broader set of firms and industries, can work for other firms even in the IDD adopting states, provided that these firms are not direct competitors. Understandably, IDD adoption is less binding or is deemed to be ineffective for generalist CEOs. Thus, the documented effect of risk-related conflicts would be less observable among Generalist CEOs (as opposed to Generalist CEOs) if career concerns are the primary drivers behind my documented findings.

Additionally, younger managers may realize greater career benefits in retaining their jobs which becomes less likely when debtor-initiated liquidation/reorganization can threaten their positions (Milbourn, Shockley, and Thakor 2001). On the other hand, older CEOs can have less risk-taking incentives given their difficulty in finding alternative employment (Serfling 2014). Since prior literature is inconclusive regarding how a CEO's age affects corporate policies, I conduct a cross-sectional analysis considering whether CEOs are older or close to their retirement age (see, Gibbons and Murphy 1992, Jenter and Lewellen 2015).

I split the sample based on whether CEOs are specialist or generalist using the data in Custódio and Metzger (2013). Additionally, I split the sample of CEOs into

'Retirement Age CEOs' ('Older CEOs') that includes CEOs aging 60 (64) and onwards and other relatively young CEOs into the 'Not Retirement Age CEOs' ('Younger CEOs') sample. I report these subsamples-based results in columns 1 through 3 in Table 10 Panel B. I find that the effect is discernible only in subsamples of specialist CEOs, CEOs not near retirement, and CEOs who are younger, while no such effect is observed for generalist CEOs or CEOs nearing retirement or older CEOs, although the differences across the first set of subsamples are not always statistically significant at conventional levels.

I also split the sample based on the median CEO's ownership level in the firm. May (1995) argues that managers who have more wealth tied up in firm equity may have stronger incentives for playing safe. If a manger's risk aversion, rather than career concerns, per se, primarily drives the heterogeneity of my findings, then our baseline findings should be more visible among the subsample of managers who hold above median CEO ownership. However, I find that the documented effect is visible among both the subsamples of high and low CEO ownership firms. I report these results in column 4 in Table 14 Panel C.

2.5.6.4 Other Robustness Checks

Since capital structure literature suggests that many other factors can influence firm's *Leverage* (Frank and Goyal 2009), I include some additional relevant capital structure determinants to the baseline specification and report the results in Table 16. Particularly, I control for the log of assets (as an alternative measure of firm size), cash (Jensen 1986), R&D (Titman 1984), capital expenditures, cost of debt and average tax rate. Additionally, I control for the strength of NCC that also imposes post-employment restrictions. My baseline findings remain unaltered even after controlling for these additional determinates of *Leverage*. Jensen and Meckling (1976) argue that agency conflicts would be observed if managers have firm-specific human capital or if they face substantial adjustment costs in finding new employment. Specialist CEOs' skills and talent are transferable only to related industry or rival firms (Becker 1964, Neal 1995, Donangelo 2014). On the other hand, generalist CEOs, due to transferability of their

general managerial skills across a broader set of firms and industries, can work for other firms. Understandably, specialist CEOs may influence a firm's capital structure differently. However, the baseline results are robust to controlling for 'Specialist CEOs' in the analysis.

Another potential concern is that one may argue that the evidence documented in the study is emanating from 'CEO style' rather than a CEO's career concerns. To deal with this possibility, I design an experimental setting to study the same professional CEOs before and after the adoption of IDD in the same firm (thus, holding the CEO fixed).[26]More precisely, to relate the observed heterogeneity in the capital structure meaningfully to the relevant CEOs, I rerun the baseline tests after excluding firms from the sample that have experienced any CEO turnover event in the IDD adopting states within 3 years around the adoption of IDD (that is for whom the CEO in t=-1 is different from the CEO in t=1). Baseline results remain unaltered. Results are also robust to exclusion of firms experiencing CEO turnovers within 5 and 7 years around the adoption of IDD. I report the results in Table 17.

Next, California, a leader in the start-up firm world, is a unique state that promotes competition and did not recognize IDD. Since firms headquartered in California are in the control group in this study, I also examine whether my results are robust to the exclusion of all firms in California. I document the results of Table 5 in after excluding California. Results in Table 18 suggest the 'California effect does not drive that baseline evidence'.

[26] One plausible way to deal with this additional selection concerns is the inclusion of CEO-fixed effects. However, this study is not amenable to CEO fixed effects since founder CEOs do not join other firms in the sample.

Table 15: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Governance Features

This table reports estimates from cross-sectional analyses exploring the effect of stricter enforceability of post-employment restrictions on firm-level governance. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. '$IDD_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. 'E-Index' includes six entrenchment provisions: staggered boards, poison pill, golden parachutes, supermajority requirements for charter amendments, supermajority requirements for bylaws amendments, and supermajority requirements for mergers. 'Institutional Ownership' is measured by yearly institutional ownership Herfindahl-Hirschman Index. 'Board Independence' represents a firm's number of independent board members dividend by board size. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% levels, respectively.

Variables	E-Index		Institutional Ownership		Board Independence	
Models	(1)	(2)	(3)	(4)	(5)	(6)
Professional CEOs x $IDD_{Adoption}$	0.063	0.083	0.006	0.006	-0.005	-0.009
	(0.937)	(1.094)	(1.072)	(0.957)	(-0.362)	(-0.715)
Professional CEOs	0.200***	0.178***	-0.005	-0.006	0.013	0.013
	(3.485)	(3.112)	(-1.676)	(-1.596)	(0.961)	(1.147)
$IDD_{Adoption}$	-0.123*	-0.110	-0.008	-0.010	0.010	0.012
	(-1.835)	(-1.501)	(-1.255)	(-1.449)	(0.818)	(1.092)
Firm FE	Y	Y	Y	Y	Y	Y
Year FE	Y	N	Y	N	Y	N
Industry (SIC-2)-Year FE	N	Y	N	Y	N	Y
Observations	14,774	14,774	16,703	16,703	9,447	9,447
R-squared	0.833	0.847	0.612	0.638	0.756	0.776

Variables	CEO Ownership		Executive's Age	
Models	(7)	(8)	(9)	(10)
Professional CEOs x $IDD_{Adoption}$	-0.002	-0.002	-0.024	-0.018
	(-0.241)	(-0.263)	(-0.969)	(-0.769)
Professional CEOs	-0.064***	-0.062***	-0.128***	-0.136***
	(-6.869)	(-7.342)	(-10.852)	(-12.141)
$IDD_{Adoption}$	0.005	0.006	0.007	0.005
	(0.878)	(1.045)	(0.329)	(0.218)
Firm FE	Y	Y	Y	Y
Year FE	Y	N	Y	N
Industry (SIC-2)-Year FE	N	Y	N	Y
Observations	20,912	20,912	21,607	21,607
R-squared	0.768	0.786	0.627	0.658

Table 16: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Omitted Variables

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011 after including additional control variables that may cause omitted variable bias problem. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Models (1) and (10) include Log(Assets): the natural logarithm of book value of assets instead of baseline firm size and include all other baseline controls. 'Cash' is firm's total cash holdings scaled by assets. 'Bankruptcy Risk' is Altman Z-Score: working capital x 1.2 + retained earnings x 1.4 + operating earnings x 3.3 + sales x 0.999)/total assets + (market Capitalization x 0.6 /total liabilities). 'R&D/Asset' is research and development expenditures scaled by book value of assets. 'CAPX/Asset' is capital expenditures scaled by book value of assets. 'Tax' is calculated by tax expenses scaled by pre-tax income. 'Cost of Debt' is annual interest expenditures scaled by lagged debt. 'Strength of NCC' is an index of the strength of NCC enforcement by state courts. 'Specialist CEOs' are CEOs with General Ability Index (GAI) score less than sample median GAI. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables						Leverage$_{(t+1)}$				
Professional CEOs x $IDD_{Adoption}$	-0.038***	-0.038**	-0.034**	-0.039***	-0.037**	-0.037**	-0.044***	-0.037**	-0.038***	-0.041***
	(-2.741)	(-2.682)	(-2.370)	(-2.783)	(-2.600)	(-2.650)	(-2.827)	(-2.602)	(-2.733)	(-2.799)
Professional CEOs	0.023*	0.024*	0.021	0.024*	0.023*	0.023*	0.025	0.023*	0.022	0.022
	(1.729)	(1.771)	(1.540)	(1.783)	(1.695)	(1.725)	(1.630)	(1.734)	(1.426)	(1.270)
$IDD_{Adoption}$	0.034**	0.034**	0.032**	0.034**	0.032**	0.033**	0.037**	0.032**	0.033**	0.036**
	(2.609)	(2.592)	(2.494)	(2.640)	(2.456)	(2.532)	(2.446)	(2.423)	(2.534)	(2.634)
Log(Assets)	0.019***									0.016***
	(4.512)									(3.700)
Cash		-0.108***								-0.131***
		(-5.886)								(-4.460)
Bankruptcy Risk			-0.001**							-0.002**
			(-2.061)							(-2.369)
R&D/Asset				-0.194***						-0.131
				(-4.142)						(-1.438)
CAPX/Asset					-0.031					-0.026
					(-1.256)					(-0.574)
Tax						-0.004				-0.004
						(-1.188)				(-0.738)
Cost of Debt							-0.000*			-0.000*
							(-1.769)			(-1.768)
Strength of NCC								-0.000		0.005*
								(-0.076)		(1.875)
Specialist CEOs									-0.004	-0.003
									(-0.641)	(-0.471)
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry (SIC-2)-Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	21,648	21,642	21,065	21,648	21,499	21,647	18,034	21,421	15,275	12,216
R-squared	0.757	0.758	0.752	0.757	0.756	0.756	0.739	0.756	0.762	0.748

Table 17: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: Excluding Firms Experiencing CEO-Turnover Around the Adoption of IDD

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011 after excluding firms experiencing CEO turnover around the adoption of IDD. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. Columns 1-3 exclude firms in IDD adopting states where CEOs of the pre-event period (at, t=-1) are not the same as CEOs of the post-event period (at, t=1) (that is, no CEO turnover events within these 3 years). Columns 4-6 exclude firms in IDD adopting states where CEOs of the pre-event period (at, t=-2) are not the same as CEOs of the post-event period (at, t=2) (that is, no CEO turnover events within these 5 years). Columns 7-9 exclude firms in IDD adopting states where CEOs of the pre-event period (at, t=-3) are not the same as CEOs of the post-event period (at, t=3) (that is, no CEO turnover events within these 7 years). Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Leverage$_{(t+1)}$								
Professional CEOs x IDD$_{Adoption}$	-0.039***	-0.039***	-0.035**	-0.042**	-0.040**	-0.037**	-0.043**	-0.042**	-0.042**
	(-2.787)	(-2.744)	(-2.443)	(-2.528)	(-2.325)	(-2.079)	(-2.445)	(-2.247)	(-2.088)
Professional CEOs	0.031**	0.027**	0.028*	0.036***	0.033**	0.033**	0.037**	0.034**	0.035**
	(2.378)	(2.011)	(1.948)	(2.707)	(2.518)	(2.315)	(2.648)	(2.419)	(2.257)
IDD$_{Adoption}$	0.034***	0.032**		0.026*	0.025		0.028*	0.027	
	(2.769)	(2.381)		(1.752)	(1.541)		(1.815)	(1.544)	
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	N	N	Y	N	N	Y	N	N
Industry (SIC-2)-Year FE	N	Y	Y	N	Y	Y	N	Y	Y
State-Year FE	N	N	Y	N	N	Y	N	N	Y
Observations	20,768	20,768	20,768	19,118	19,118	19,118	18,262	18,262	18,262
R-squared	0.738	0.758	0.770	0.743	0.764	0.778	0.744	0.766	0.781

Table 18: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Financing Decisions: California Effect?

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on financing decisions during 1992-2011 after excluding all firms headquartered in California from the sample. The dependent variable is 'Leverage$_{(t+1)}$'- the book value of long-term debt and current liabilities divided by book value of assets. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. 'IDD$_{\text{Adoption}}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. $*$, $**$, and $***$ denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables				Leverage$_{(t+1)}$				
Professional CEOs x IDD$_{Adoption}$ (β_3)		-0.036**	-0.037**	-0.040**	-0.038**	-0.039**	-0.042**	-0.036***
		(-2.153)	(-2.116)	(-2.370)	(-2.365)	(-2.336)	(-2.650)	(-3.025)
Professional CEOs		0.036**	0.029	0.035*	0.032*	0.026	0.031	0.027*
		(2.159)	(1.604)	(1.861)	(1.776)	(1.347)	(1.598)	(1.929)
IDD$_{Adoption}$ (β_1)	0.008**	0.039**	0.035**		0.038**	0.036**		0.036***
	(2.223)	(2.596)	(2.193)		(2.673)	(2.397)		(3.350)
Baseline Controls	N	N	N	N	Y	Y	Y	Y
Lagged Leverage	N	N	N	N	N	N	N	Y
Controls X IDD$_{Adoption}$	N	N	N	N	N	N	N	N
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	N	N	Y	N	N	Y
Industry (SIC-2)-Year FE	N	N	Y	Y	N	Y	Y	N
State-Year FE	N	N	N	Y	N	N	Y	N
Joint Hypothesis: $\beta_1 + \beta_3 = 0$		0.523	0.573	N/A	0.896	0.371	N/A	0.994
Observations	18,341	18,341	18,341	18,341	18,341	18,341	18,341	17,483
R-squared	0.733	0.734	0.759	0.773	0.743	0.766	0.779	0.783

Models	(9)	(10)	(11)	(12)	(13)
Variables			Leverage$_{(t+1)}$		
Professional CEOs x IDD$_{Adoption}$ (β_3)	-0.036***	-0.039***	-0.041***	-0.042***	-0.048***
	(-2.926)	(-3.303)	(-3.282)	(-3.326)	(-3.961)
Professional CEOs	0.021	0.025	0.029**	0.022	0.029*
	(1.364)	(1.597)	(2.118)	(1.564)	(1.872)
IDD$_{Adoption}$ (β_1)	0.033***		0.037	0.058*	
	(3.069)		(1.322)	(1.886)	
Baseline Controls	Y	Y	Y	Y	Y
Lagged Leverage	Y	Y	Y	Y	Y
Controls X IDD$_{Adoption}$	N	N	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Year FE	N	N	Y	N	N
Industry (SIC-2)-Year FE	Y	Y	N	Y	Y
State-Year FE	N	Y	N	N	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$	0.267	N/A	0.801	0.366	N/A
Observations	17,483	17,483	17,483	17,483	17,483
R-squared	0.800	0.811	0.784	0.801	0.812

I also investigate whether the corporate policy of professional CEO-managed firms after the adoption of IDD has any value implications for shareholders. If underutilization of debt capacity is not driven by a manager's career concerns or risk-related agency conflicts, such capital structure decision should be reflected through an increase in the value of firm shareholders. If, by contrast, the firm's underutilization of debt capacity, even when trade secrets are protected, is not an optimal strategy, the firm's capital structure decision should not increase shareholder's value. In Table 19 column 1, I first report the marginal benefit of Leverage on the market value of equity. Consistent with literature (Masulis 1983), I find a positive link between changes in leverage and changes in shareholder value. Next, I estimate how market value changes for professional CEO managed firms relative to founder-managed firms after the adoption of IDD. Columns 3-4 show that the increase in market value of equity due to change in leverage is lower in professional CEO-managed firms after the adoption of IDD. I also find that at the post-IDD period, change in leverage of professional CEO-managed firms leads to lower dividends for shareholders (unreported). This evidence further supports the conjecture that capital structure decision of professional CEO managed firms after the adoption of IDD is suboptimal.

Table 19: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts and Value of Financing Decisions

This table reports estimates from firm-panel OLS regressions exploring the value of financial decision in the context of stricter enforceability of post-employment restrictions during 1992-2011. The dependent variable is 'Change in Equity Market value'-the market value of equity scaled by book value of assets at the $period_{(t+1)}$ divided by market value of equity scaled by book value of assets at the $period_{(t)}$. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. '$IDD_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. 'Change in Leverage' is book value of leverage at the $period_{(t)}$ scaled by book value of leverage at the $period_{(t)}$. Control variables include the change in firm size, change in profitability, change in tangibility, dividend payer, CEO overconfidence, dividend payer, CEO tenure, state GDP growth, political balance. In columns 2 and 3 include fully-interacted models where all control variables are interacted with 'Professional CEOs' and 'IDDAdoption'. Baseline effects are omitted from when fully-interacted models absorb them. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)
Variables	Change in Market Value of Equity		
Professional CEOs x $IDD_{Adoption}$ x Change in Leverage		-0.014***	-0.013**
		(-4.011)	(-2.194)
$IDD_{Adoption}$ x Change in Leverage		0.012***	0.011*
		(3.721)	(1.925)
Professional CEOs x Change in Leverage		0.011***	0.011*
		(3.516)	(1.862)
Change in Leverage	0.0003**		
	(2.513)		
Control Variables (Interacted)	N	Y	Y
Firm FE	Y	Y	Y
Year FE	Y	Y	N
Firm FE (Interacted)	N	Y	Y
Year FE (Interacted)	N	Y	N
Industry (SIC-2)-Year FE (Interacted)	N	N	Y
Observations	17,981	17,981	17,981
R-squared	0.177	0.227	0.384

I also examine heterogeneities in strategic investments such as in R&D (i.e., risky and failure-intensive investments with distant skewed payoffs) by the professional CEO-managed firms following the adoption of IDD (Nelson and Winter 1982). Since the adoption of IDD stabilizes a firm's key human capital, one may expect more strategic risky investments (Eisfeldt and Papanikolaou 2013). However, consistent with the main claim of my study, I find that professional CEO-managed firms do not increase investments in arguably risky projects since failure in such investments might jeopardize a manager's career outcomes (Aghion et al. 2013) in a legal environment that recognizes post-employment restrictions (Table 20). Notably, the evidence of differential response by professional CEO managed firms in R&D investments may raise the concern that whether underinvestment of R&D could potentially explain the underutilization of debt by professional CEO-managed firms after the adoption of IDD. Though the evidence reported in Table 14 Panel A column 4 rules out that concern, I do further analysis. More precisely, I re-estimate the baseline evidence after including lagged, contemporaneous, and future R&D (unreported) and the baseline evidence remains unchanged. The results provide corroborating evidence that managerial career concerns drive risk-related agency conflicts.

Table 20: Stricter Enforceability of Post-Employment Restrictions, Risk-Related Agency Conflicts, and Strategic Investments

This table reports estimates from firm-panel OLS regressions exploring the net effect of stricter enforceability of post-employment restrictions on other corporate outcomes during 1992-2011. '$(R\&D/Assets)_{(t+1)}$' is R&D expenditures scaled by total Assets. '$Ln(1+R\&D)_{(t+1)}$' is natural logarithm of one plus R&D expenditures. 'Professional CEO' is an indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. '$IDD_{Adoption}$' is an indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD, and zero otherwise. Standard errors are corrected for heteroskedasticity and clustered at the headquarter state-level. t-statistics are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	$(R\&D/Assets)_{(t+1)}$				$Ln(1+R\&D)_{(t+1)}$			
Professional CEOs x $IDD_{Adoption}$ (β_3)	-0.006**	-0.006**	-0.006**	-0.007*	-0.148**	-0.136**	-0.144**	-0.146**
	(-2.037)	(-2.012)	(-2.091)	(-1.962)	(-2.197)	(-2.210)	(-2.143)	(-2.389)
Professional CEOs	0.005*	0.005*	0.004	0.004	0.059	0.047	0.060	0.065*
	(1.897)	(1.749)	(1.496)	(1.388)	(1.106)	(1.210)	(1.047)	(1.714)
$IDD_{Adoption}$ β_1)	0.005**	0.006**	0.005*	0.006*	0.157***	0.108	0.183***	0.148***
	(2.178)	(2.069)	(1.813)	(1.767)	(2.786)	(1.653)	(3.024)	(2.890)
Baseline Controls	N	N	Y	Y	N	N	Y	Y
Joint Hypothesis: $\beta_1 + \beta_3 = 0$	0.449	0.851	0.175	0.316	0.746	0.549	0.207	0.958
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	N	Y	N	Y	N	Y	N
Industry (SIC-2)-Year FE	N	Y	N	Y	N	Y	N	Y
Observations	21,647	21,647	21,647	21,647	21,647	21,647	21,647	21,647
R-squared	0.787	0.793	0.792	0.798	0.958	0.962	0.961	0.965

2.6 Conclusion

In this study, I explore the impact of exacerbated career concerns on corporate policies. I exploit the staggered adoption of IDD as a quasi-natural experiment that creates frictions in the labor market. This legal doctrine protects a firm's trade secrets by restricting the mobility of key employees with access to the firm's trade secrets to rival firms. Since a competitive labor market incentivizes executives to signal their ability to potential employers and to sell their expertise to the highest bidders, the adoption of IDD exogenously aggravates an executive's career concerns. Using a difference-in-difference research design and a unique hand-collected dataset on founder CEOs, I highlight managers' suboptimal responses due to career risk following increased labor market rigidity.

This study shows that professional CEO-managed firms (as opposed to founder-led firms) experience acute risk-related agency conflicts in the post-IDD period since outside employment options are arguably more lucrative for professional CEOs. I use *Leverage* as a proxy for corporate policy and show that founder-run firms utilize unused debt capacity by increasing debt financing, while increasing *Leverage* is a firm's optimal response. However, professional CEO-managed firms, where CEOs career concerns are aggravated due to this legal shock, do not increase *Leverage*, even after including firm and industry-year fixed effects and controlling for lagged leverage, suggesting that they are adopting suboptimal corporate policies. Using a matched sample of exogenous CEO turnover events, I find robust evidence of this baseline finding. Further evidence suggests that career concerns that induce risk-related agency conflicts, are apparent only in weakly governed firms. This suggests that governance could be a substitute for market-driven discipline.

My findings are consistent with theories (Holmström 1999) suggesting that career concern induces risk-related agency conflicts. I use a unique setup where firms become exogenously safer through the stricter enforceability of post-employment restrictions. However, such changes in the legal environment aggravate risk-related agency conflicts. Thus, my study also supports theories (Becker 1962, Gabaix and Landier 2008) that

emphasize the importance of an accommodating and flexible labor market that facilitates optimal risk-taking by managers.

Table A1: Variable Definitions

This table provides the definition and data source for variables of the analysis. All continuous variables are winsorized at 1% levels.

Variables	Definitions
CEO Variables	
Professional CEOs	An indicator variable equals one if the CEO is neither one of the founders of the firm nor the CEO of the firm at the year of incorporation and zero otherwise. Source: Hand-Collected data
High (Low) Ownership CEOs	An indicator equals one if the CEO's ownership is at least equal to (less than) the median of the CEOs' ownership distribution. Source: Execucomp
Retirement-Aged CEO	An indicator equals one if the age of CEO is at least equal to 64 and zero otherwise. Source: Execucomp
Older CEOs	An indicator equals one if the age of CEO is at least equal to 60 and zero otherwise. Source: Execucomp
CEO Overconfidence	An indicator variable equals one if the CEO's vested stock options are in the money. Source: Execucomp
CEO Tenure	The natural logarithm of one plus number of years the executive serves as the CEO in the firm. Source: Execucomp
Specialist (Generalist) CEOs	An indicator equals one if the CEO's GAI score is less than (at least equal to) the median of the GAI (see, Custódio and Metzger 2013). Source: https://sites.google.com/site/claudiapcustodio/research
Firm-Level Variables	
Firm Size	The log of total sales. Source: Compustat
Market-to-Book	The market value of assets divided by book value of assets. Source: Compustat
Profitability	The operating income divided by book value of assets. Source: Compustat
$\text{Leverage}_{(t+1)}$	The book value of long-term debt and current liabilities divided by book value of assets at the period (t+1). Source: Compustat
Market $\text{Leverage}_{(t+1)}$	The book value of long-term debt and current liabilities divided by market value of assets at the period (t+1). Source: Compustat
Net Book $\text{Leverage}_{(t+1)}$	The book value of long-term debt and current liabilities less cash divided by book value of assets at the period (t+1). Source: Compustat
Net Market $\text{Leverage}_{(t+1)}$	The book value of long-term debt and current liabilities less cash divided by market value of assets at the period (t+1). Source: Compustat
Net Debt Issuance	The difference between long-term debt issuance and long-term debt reduction scaled by lagged assets. Source: Compustat (See, Malmendier et al. 2011)

Net Equity Issuance	The difference between sales of common stocks and common stock repurchase scaled by lagged assets. Source: Compustat (See, Malmendier et al. 2011)
Financial Deficit (FD)	The sum of total cash dividends, net investments and change in working capitals less cash-flow from interest and taxes scaled by lagged assets. Source: Compustat (See, Malmendier et al. 2011)
Cost of Debt	The annual interest expenses scaled by lagged debt. Source: Compustat
Stock Volatility	The annualized standard deviation of daily returns-the square root of the sum of squared daily returns over the year. Following Gormley and Matsa (2016), the number of trading days are adjusted. The raw sum is multiplied by 252 and divided by the number of trading days. Source: CRSP
Cash-flow Volatility	The Annual standard deviation of firms' quarterly ratio of cash flow to assets. Source: Compustat (see, Gormley and Matsa 2016)
High Debt Rating	An indicator equals one if the S&P debt rating is higher than B and zero otherwise. Source: Compustat
R&D/Asset	The R&D expenditures scaled by assets. Source: Compustat
CAPX/Asset	The capital expenditures scaled by assets. Source: Compustat
Cash/Asset	The total cash scaled by assets. Source: Compustat
Firm Age	The difference between the year of incorporation and the current fiscal year. Source: CRSP
Firm Growth	The change in the natural logarithm of assets. Source: Compustat
Business Segments	The natural logarithm of one plus the number of firm's business segments. Source: Compustat
Acquisitions	The acquisition expenditures scaled by assets. Source: Compustat
Bankruptcy Risk	Measured by Altman Z-Score. Formula: (Working Capital x 1.2 + Retained Earnings x 1.4 + Operating Earnings x 3.3 + Sales x 0.999)/Total Assets + (Market Capitalization x 0.6 /Total Liabilities). Source: Compustat
Tax	The tax expenses scaled by pre-tax income. Source: Compustat
Governance Variables	
Classified Board	An indicator equals one for firms having classified board. Source: Institutional Shareholder Services (ISS)
Poorly (Better) Governed Firms	An indicator equals one for firms with above (below) median E-Index. Source: Institutional Shareholder Services (ISS) (See, Bebchuk et al. 2009)
Low (High) Institutional Ownership	An indicator equals one for firms with below (above) median institutional ownership Herfindahl-Hirschman Index. Source: Thomson Reuters Institutional (13f) Holdings
State-level Variables	
State GDP Growth	The annual GDP growth rate in the state. Source: Klasa et al. (2018)

Political Balance	The fraction of a state's Congress members representing their state in the U.S. House of Representatives. Source: Klasa et al. (2018)
$IDD_{Adoption}$	An indicator equals one if the focal firm is headquartered in a state whose courts recognize the IDD and zero otherwise.
$IDD_{Rejection}$	An indicator equals one if the focal firm is headquartered in a state whose courts rejects the IDD and zero otherwise.
Strength of NCC	An index of the strength of NCC enforcement by state courts.

Chapter 3

Powerful CEOs and Corporate Governance

3.1 Introduction

Prior studies suggest that powerful CEOs negatively affect corporate outcomes[27]. Although top executives need some level of power to lead their organizations (Bennis and Nanus 1985, Pfeffer 1993), as powerful CEOs gain more control, agency problems may lead to empire-building and complacency, resulting in overinvestment in low-quality projects and a reduction in shareholder wealth (Pan, Wang, and Weisbach 2016). Given the widespread negative views of powerful CEOs in the literature and media, it is difficult to reconcile the non-trivial number of successful U.S. firms led by powerful CEOs. We focus on the role of the board of directors as a governance mechanism that may effectively rein in powerful CEOs and mitigate distorted investment policies.

The board of directors is a credible mechanism for restraining and disciplining CEOs. The board could be particularly important in the context of powerful CEOs since powerful CEOs may have more ability to control the board, more authority to make decisions and adopt policies that may not be in the best interest of shareholders. An empowered board could potentially reduce the incentives to make sub-optimal investments (Mace 1979, Fama and Jensen 1983). Directors may also block CEOs' proposals when they are not in the best interest of the firms' shareholders (Tang, Crossan, and Rowe 2011, Knyazeva, Knyazeva, and Masulis 2013, Masulis and Mobbs 2014, Fogel, Ma, and Morck 2014). This benefit would concentrate in independent directors, who are less beholden to CEOs than are executive directors.

A complicating factor, however, is that board governance is endogenous,[28] particularly in the context of powerful CEOs. Powerful CEOs can use their influence to select pliable directors (Fama 1980, Mace 1986, Shivdasani and Yermack 1999), and increase firm-specific information asymmetry to reduce board scrutiny (Hermalin and Weisbach 1998, Raheja 2005, Adams and Ferreira 2007, Masulis and Mobbs 2011, Baldenius, Melumad,

[27] See, for example, Belliveau, O'Reilly, and Wade 1996, Bebchuk, Fried, and Walker 2002, Ryan and Wiggins 2004, Grinstein and Hribar 2004, Adams, Almeida, and Ferreira 2005, Faulkender and Yang 2010, Bebchuk, Cremers, and Peyer 2011, Morse, Nanda, and Seru 2011, Landier, Sauvagnat, Sraer, and Thesmar 2013, Khanna, Kim, and Lu 2015, Han, Nanda, and Silveri 2016.

[28] See, for example, Demsetz and Lehn 1985, Hermalin and Weisbach 1988, Hermalin and Weisbach 1998, Becht, Bolton, and Röell 2003, Adams, Hermalin, and Weisbach 2010, Morse et al., 2011, Coles, Daniel, and Naveen 2014.

and Meng 2014). As powerful CEOs may have higher bargaining power and influence, directors could be less diligent in monitoring (Zajac and Westphal 1996, Hermalin and Weisbach 1988, Cohen, Frazzini, and Malloy 2012, Bebchuk and Hamdani 2017). Additionally, a lack of a financial stake in the firm may further trigger a free-rider problem among board members (Harris and Raviv 2008) resulting in passive corporate boards.

We investigate the moderating effect of improved governance on the corporate policies of powerful CEO led firms. We use the concurrent passage of regulations targeting independent corporate boards (Sarbanes-Oxley Act and NYSE/NASDAQ listing regulations, collectively referred to as "SOX") as a quasi-exogenous natural experiment [29]. These regulations force some, but not all, U.S. companies to change their board composition to (inter alia) have a majority independent board and a fully independent audit committee[30]. Some firms had already satisfied these requirements before the regulatory change, whereas others had not. The change in regulations is unlikely to be an "exogenous shock" for the pre-regulation *Compliant Firms*[31]. Thus, these firms, irrespective of whether they are managed by a powerful CEO, are unlikely to experience significant moderation in governance after these regulations.

We focus on pre-regulation *Non-Compliant Firms*. Since the *non-compliant firms* were, presumably, more exposed to agency conflicts due to the absence of independent boards, the transition to an independent board is more likely to bring an exogenous

[29] Guo and Masulis (2015) argue that SOX is an exogenous shock due to the mandatory adoption of an independent board which substantially altered board structure and that SOX should substantially improve a board's monitoring role. Average board independence is shown to have increased following the introduction of SOX (see, Linck, Netter, and Yang 2008, Linck, Netter, and Yang 2009, Balsmeier, Fleming, and Manso 2017, Graham, Kim, and Leary 2018.

[30] See, Song and Thakor 2006, Chhaochharia and Grinstein 2007, Linck et al., 2008, 2009, Duchin, Matsusaka, and Ozbas 2010, Faleye, Hoitash, and Hoitash 2011, Armstrong, Core, and Guay 2014, Banerjee, Humphery-Jenner, and Nanda 2015, Guo, Lach, and Mobbs 2015, Guo and Masulis 2015, Balsmeier et al., 2017, Graham et al., 2018.

[31] For example, the directors of the Archer-Daniels-Midland Company approved a series of proposals to turn majority control of the board over to a group of outside directors in 1996 in response to widespread criticism of insider domination of the company's board (Kurt Eichenwald, New York Times, Business Week, January 16, 1996). Similarly, companies, such as Amazon had a fully independent audit committee and majority board independence before the enactment of SOX.

variation in their governance in the post-regulation period [32]. We argue that the impact of this shock to *non-compliant firms* will differ depending on whether the firm is managed by a powerful CEO and thus needed additional monitoring and governance control [33].

We examine the impact of CEO power on potentially value-accretive long-term strategic investments of the pre-regulation *non-compliant firms*. We hypothesize that improvements in board governance brought about by more independent boards, will encourage powerful CEOs to focus on long-term value-creation. Specifically, we find that among the *non-compliant firms*, powerful CEO managed firms increase R&D investment after the regulatory changes. While suggestive, increased investment in R&D may not result in value enhancement for shareholders. Therefore, we examine the innovation success of the powerful CEO managed *non-compliant firms* relative to other *non-compliant firms*. We find that, in the post-regulation period, *non-compliant firms* run by powerful CEOs obtain more patents that are scientifically more valuable. The patents of powerful CEO managed firms are cited more often, on average, and are more likely to be radical or breakthrough in nature. More importantly, from the shareholders' perspective, these patents are economically more valuable (more positive market reaction to the grant of patents). The value creation is also supported by the market reaction to the announcements of new products by powerful CEO managed firms. We find that product announcements made by powerful CEO run firms have more positive abnormal market returns in the post-regulation period.

We also explore whether powerful CEO managed *non-compliant firms* moderate misaligned corporate policies through the reallocation of resources. In particular, we analyze the firm's investment in capital expenditures and dividend payout policy. We find that exogenous improvements in board governance help to rein in powerful CEOs' capital expenditures (CAPEX), suggesting a reduction in empire building. We also

[32] Armstrong et al. (2014) confirm that compliant firms experienced virtually no change in their proportion of independent directors, whereas non-complaint firms have a 45% increase in the mean proportion of independent directors after the board independence rule.

[33] Banerjee et al. (2015) follow a similar identification strategy but do not explicitly consider pre-SOX heterogeneity in firm's governance structure in their main tests. More importantly, their main variables of interest differ markedly from those used in this paper.

document a higher likelihood of paying dividends to shareholders in *non-compliant firms* led by powerful CEOs in the post-regulation period. The evidence implies that improved board governance encourages powerful CEOs to repatriate cash to shareholders rather than hoard it.

We find further evidence that the takeover performance of powerful CEO managed firms in the post-regulation period has significantly improved, relative to that of other *non-compliant firms*. The evidence on takeover performance suggests that the post regulation increased board oversight encourages powerful CEOs to focus more on value-creating investments and less on marginal investments.

There are at least two plausible issues that may impact our identification strategy. First, exogenous changes in board structure may directly restrain a CEO's power. Thus, CEOs who were powerful in the pre-regulatory period may moderate their corporate policies because of their weakening power of influence after the transition to outsider-dominant boards. We deal with this concern by constructing our measure of CEO power from sources that are unlikely to be meaningfully affected by board-composition. Specifically, we do not include any source of CEO power that emanates directly from board structure (e.g., board co-option or CEO connectedness, dual-class stock structure, and anti-takeover provision among others) as the CEO power measure would then mechanically be affected by these regulatory changes. Nonetheless, we control for other sources of CEO power such as issuance of dual-class stock (Masulis, Wang, and Xie 2009), extracting a higher pay slice by the CEO (Bebchuk, Cohen, and Ferrell 2009), and whether the CEO is the only insider on the board (Adams et al., 2005) in our robustness tests and find similar results. In addition, we control for external governance quality (e.g., institutional holdings) following Aghion, Reenen, and Zingales (2013) as another plausible catalyst of CEO power. Second, outside dominated boards may remove the CEO in the post-regulation period (Weisbach 1988). Thus, changes in corporate policies may be driven by new CEOs where the power structure, leadership style and choice of corporate policies differ significantly from those of the replaced powerful CEO from the pre-regulation period. We address this concern in a robustness test and show that our

main results are similar after excluding firms from our analysis that experience turnover of CEOs around the regulation change in 2002.

We consider additional tests to demonstrate identification and causality. These include placebo and falsification tests. We find that the regulatory changes had less of an impact on non-powerful CEOs, who arguably were less apt to directly benefit from its exogenous improvements in corporate governance as they were already more susceptible to board scrutiny. We also do not observe any discernible strategic shift in resource reallocation for powerful CEOs in firms that had already complied with the requirements of the regulations before their passage. These results support our conjecture that regulation-driven improvement in firm-level governance is beneficial for firms that were more in need of such an exogenous shock, that is, pre-regulation *non-compliant firms* with powerful CEOs. The analysis of the effect of regulatory changes on powerful CEOs in *non-compliant firms* vis-à-vis *compliant firms* in a triple-difference test further supports our argument.

A relevant concern in this study is that some powerful CEOs could also be overconfident CEOs. Although the measures of CEO overconfidence used in the literature (such as holding *in-the-money options* and presence in media[34]) differ from the standard measures of CEO power[35], suboptimal corporate policies of powerful CEOs in the absence of board oversight could be driven by CEO overconfidence. As a robustness test, we control for CEO overconfidence in the specifications. We also exclude highly overconfident CEOs from the analysis (included in appendix). We find similar results in both cases suggesting that our results are not significantly driven by CEO overconfidence.

Our study contributes to the unsettled debate on whether CEO power is always detrimental to shareholders[36]. We argue that powerful CEOs coupled with poor

[34] See, Malmendier and Tate 2008, Hirshleifer, Low, and Teoh 2012.

[35] See, Finkelstein 1992, Daily and Johnson 1997, Bebchuk et al., 2002, Adams et al., 2005, Morse et al., 2011, Li, Lu, and Phillips 2018, Graham et al., 2018.

[36] Previous literature suggests that powerful CEOs may influence the board to extract high compensation (Belliveau et al., 1996, Bebchuk et al., 2002, Ryan and Wiggins 2004, Bebchuk and Fried 2005, Faulkender and Yang 2010, Morse et al., 2011, Bebchuk et al., 2011), private benefits from more and less valuable M&A deals (Grinstein and Hribar 2004), and can affect board

governance drives the negative views about powerful CEOs. We show that the presence of an empowered board can help to maximize the upside potential of a powerful CEO, while curbing their downside risk (consistent with Tang et al. (2011)). As a measure of the upside potential, we provide robust evidence of discernible improvement in innovativeness and takeover performances of firms led by powerful CEOs. Additionally, as a measure of downside risk, we provide evidence on curtailing wasteful expenditures that are, presumably, symptomatic of managerial entrenchment and empire building[37]. Thus, contrary to the popular perception of the self-serving nature of CEO power, we argue that powerful CEOs are not necessarily always detrimental but may use their power for organizational success[38]. The evidence on channelling or diverting the misaligned efforts of powerful CEOs to value-enhancing projects of the firm is limited. Our study fills this gap by showing that the improvement in governance induced by exogenous regulatory changes benefits poorly governed firms with powerful CEOs in the post-regulation period.

We contribute to the innovation literature where previous studies show the impact of CEO overconfidence (Galasso and Simcoe 2011, Hirshleifer et al., 2012) and risk-taking (Sunder, Sunder, and Zhang 2017) on corporate innovation. We show that powerful CEOs governed by the independent oversight of an empowered board can generate value-enhancing innovation. Thus, we extend the literature that discusses how managerial preferences and interaction between CEOs and the board influence corporate investment decisions (Bertrand and Schoar 2003, Malmendier and Nagel 2011, Malmendier, Tate, and Yan 2011, Graham, Harvey, and Puri 2013).

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decision, firm performance and firm's governance adversely (Adams et al., 2005, Landier et al., 2013, Khanna et al., 2015, Han et al., 2016).

[37] For example, Worldcom reported $1.4 billion profit in 2001 and $130 million in first quarter of 2001. However, in the first quarter of 2001, Worldcom classified $797 million normal expenditures as capital expenditures and the powerful CEO of Worldcom, Bernard Ebbers was criticised for using corporate money to buy the world's largest private ranch (see, the reports by Kaplan and Granelli (2002), Chicago Tribune and Ingram (2002), The Globe and Mail).

[38] Bennis and Nanus (1985) argue that "power [is] the basic energy to initiate and sustain action translating intention into reality, the quality without which leaders cannot lead". Li et al. (2018) also claim that powerful CEOs are beneficial for firms operating in dynamic and competitive markets.

Finally, we contribute to the corporate governance literature by analyzing how the regulatory changes forcing the mandatory adoption of an independent board, impacts a set of firms that could benefit from improved governance: those run by powerful CEOs. While considered to be powerful, the empirical evidence on the effect of these regulatory changes in board structure on corporate policies is inconclusive and contextual (Romano 2005, Song and Thakor 2006, Coates 2007, Hochberg, Sapienza, and Vissing-Jørgensen 2009, Duchin et al., 2010). The inconclusive findings may be potentially attributable to the failure to consider explicitly the heterogeneity in underlying firm governance mechanisms at the time of enactment of these regulations. We focus on powerful CEOs in poorly governed firms in the pre-regulation period and provide evidence that the exogenous improvement in corporate decision-making or reduction in self-serving behavior by powerful CEOs was concentrated among pre-regulation *non-compliant firms*. The result does not consistently hold for pre-regulation *compliant firms*. Thus, we argue that the enactment of these regulations has had a significant impact in governing the unbridled power of CEOs in poorly governed firms.

The rest of the paper is organized as follows: Section 2 represents the motivation of the study. We describe variable construction, methodology, and sample in Section 3. Empirical analyses are in Section 4. Section 5 includes robustness checks of our main analysis and Section 6 concludes the paper.

3.2 Motivation and Hypothesis Development

Managers may act self-interestedly, especially in the presence of ineffective oversight. The classical agency conflicts due to lack of monitoring may take several forms, for example, “shirking”, whereby managers exert less effort than is desirable (Bertrand and Mullainathan 2003). Managers could also involve in over-investment or value-destroying investments due to the well-documented evidence that managers are disproportionately rewarded from investment successes but are not penalized for failures (Harford and Schonlau 2013).

The enactment of regulatory changes around 2002 (the Sarbanes-Oxley Act and the changes to the NYSE/NASDAQ listing rules, hereafter, "SOX") introduces a quasi-exogenous variation to the board composition of pre-regulation *non-compliant firms*. Since prior literature suggests that pre-regulation *non-compliant firms* experience a significant change in board composition (see, Harris and Raviv 2008, Armstrong et al., 2014, Balsmeier et al., 2017), we expect that increased board independence will benefit *non-compliant firms*, especially those with powerful CEOs. While independent directors can be co-opted and thus can be friendly towards CEOs, they are incrementally less so than are executive directors, who are tautologically the CEO's subordinates. Evidence suggests that the introduction of board independence regulations has improved disclosure, and subsequently, governance and monitoring; and thus, is beneficial to individual investors and investor groups[39]. These changes in regulatory requirements have also increased the personal responsibility of corporate leaders (Faleye et al., 2011, Baloria, Marquardt, and Wiedman 2017) and have increased the diversity of opinion at board level (Linck et al., 2009). Thus, the regulatory change is likely to have a stronger disciplining effect on powerful CEOs of *non-compliant firms*. In this study, we explore whether the regulatory changes initiate a strategic shift in the investment decisions of powerful CEOs *in non-compliant firms*. We outline the ways in which the regulatory changes could specifically influence powerful CEOs' decisions in the following sections.

3.2.1 Innovation Inputs and Outputs

Innovation can drive corporate growth (Geroski, Machin, and Reenen 1993). However, R&D investments, the input of innovation, is often risky with distant and uncertain cash flows, and has a high failure rate (Nelson and Winter 1982, Fleming 2001). This is especially so when seeking 'breakthrough' innovations (Sanders and Hambrick 2007). Overinvestment in R&D and failed innovations can lead the market to discount innovative investments (Martin 2012, Ahuja and Novelli 2017). Nevertheless, breakthrough innovations-measures of R&D success and valuable intangible assets,

[39] See, for example, Coates 2007, Chhaochharia and Grinstein 2007, Li, Pincus, and Rego 2008, Karolyi 2009, Hochberg et al. 2009, Ashbaugh-Skaife, Collins, Kinney, and Lafond 2009.

especially, have a strategic importance that may improve long-term corporate performance (Tushman and Anderson 1986, Schilling and Hill 1998, Ahuja and Lampert 2001).

CEO characteristics such as tenure, stock ownership, preferences, and incentives can shape a firm's commitment to R&D investments and innovation (Barker and Mueller 2002). Successful innovation also requires a corporate culture that allows for the freedom to experiment, tolerance for failure and diversity in the top management team to motivate innovation among employees (Finkelstein and Hambrick 1996, Sutton 2002, Manso 2011).

Since substantial firm-specific knowledge is required for undertaking innovative projects (Coles et al., 2008), powerful CEOs, particularly those who are founders or long-tenured, may possess better firm-specific knowledge and be more likely to invest in innovative projects. Moreover, a powerful CEOs' ability to deter fraud may drive 'stealing effect' motivated R&D overinvestment (Denicolò and Zanchettin 2014). In contrast, powerful CEOs with larger ownership stakes might drive underinvestment in R&D and innovation due to the high probability of failure (Holmstrom 1989, Kim and Lu 2011). R&D investment and innovation may not be compatible with the inflexible strategies which are more often prevalent in powerful (long-tenured) CEOs managed firms (Grimm and Smith 1991). Thus, the opposing findings in the literature on the impact of powerful CEOs on R&D investment and innovation is an open empirical question.

We explore the exogenous variation in board governance and analyze the impact of powerful CEOs on innovation inputs and outputs. The prior literature provides mixed evidence on the effects of board independence on R&D and innovation. Bargeron, Lehn, and Zutter (2010) show that SOX discourages risk-taking of the firm leading to a reduction in R&D investments. However, Balsmeier et al. (2017) show that the exogenous transition to board independence is unrelated to the level of R&D investment though it improves innovation. Faleye et al. (2011) claim that intense board monitoring after SOX reduces the firm's R&D and innovations.

We suggest that compared to their non-powerful peers, powerful CEOs might derive more disutility from R&D investment and innovation as they value control over larger resources. Failed investments in R&D and innovation may dissipate those resources. Nevertheless, an independent board can discipline managerial discretions and thus mitigate agency problems in *non-compliant firms*. Thus, we expect that the enhanced board oversight resulting from the regulatory change, will increase R&D investment and innovation in *non-compliant firms* with powerful CEOs, bringing them more in line with that of other CEOs.

Improved governance should also improve the quality of the innovation investment, in addition to the quantity of investment. We expect that improved oversight would encourage CEOs to focus the firm's innovative activities on value-creating and beneficial R&D investments, rather than enabling a disorganized approach to innovation. This should manifest in greater patenting activity and improved patent quality. Ultimately, this should result in an improved market reaction to new product announcements. Thus, we make the following hypotheses.

Hypothesis 1: Improved governance increases powerful CEOs' expenditure on innovation (i.e., R&D expenditure).

Hypothesis 2: Improved governance increases powerful CEOs' patent output and patent quality.

Hypothesis 3: Improved governance is associated with powerful CEOs' new product announcements experiencing higher announcement returns.

3.2.2 Investments in Tangible Assets, Payout Policy, and Takeovers

Powerful CEOs have a stronger incentive to engage in empire building (Baldenius et al., 2014) as they, arguably, would like to lead larger firms (Jensen 1986). The empire-building motive may distort corporate capital allocations via increased spending in capital expenditures (CAPEX) (Jensen and Meckling 1976) and value destroying M&A deals (Grinstein and Hribar 2004). For example, CEO power increases with CEO tenure (Pan et al., 2016) and the board often permits long-tenured powerful CEOs to overinvest or engage in empire building (Jensen 1993). A lack of oversight and stronger disciplining

mechanism could enable managers to spend money on acquisitions and CAPEX (Harford, Mansi, and Maxwell 2008, Harford and Schonlau 2013). Weaker governance might encourage empire building, especially for powerful CEOs who are less likely to be removed for doing so. This could also cause powerful CEOs to overpay for targets or select targets that they erroneously believed were synergistic. Such decision failures may at least partially explain why powerful CEOs' takeovers underperform (Grinstein and Hribar 2004).

A firm's payout policy may also reflect agency conflicts. Limited payout of dividends leads to the availability of free cash flows which could result in distorted corporate investments, e.g., wasteful investments. Jensen (1986) argues that managers have incentives to grow their companies by exploiting the free cash flows of the firms. Because, manager's compensation package is often linked to the size of firms. Thus, managers often make limited payout of free cash flows to pursue their empire building incentives. This problem could be more dramatic in the context of powerful CEOs given that powerful CEOs have a strong incentive for empire building. So, they could retain free cash flow rather than distribute it as dividends. Further, whereas CEOs might use dividends to placate activist investors and stave off disciplinary action (e.g., Zwiebel 1996, Fluck 1999), powerful CEOs will be less motivated to pay dividends because they would be less vulnerable to such disciplinary action. For example, Allen, Bernardo, and Welch (2000) argue that institutional investors, who often monitor managers, prefer dividend paying firms to invest.

The increased oversight and accountability of CEOs brought about by regulatory change could discourage overinvestment in CAPEX and takeovers. Further, independent board members are less likely to be co-opted by powerful CEOs. Thus, they are more likely to critically evaluate investment policies and expose CEOs to independent viewpoints. In contrast, lack of monitoring by independent board, especially where the needs for monitoring is higher, (for example, firms managed by powerful CEOs) leads to lower M&A returns (Schmidt 2015). Thus, we expect that the *non-compliant firms* led by powerful CEOs will reduce investments in CAPEX relative to firms led by less powerful CEOs in the post-regulation period. The regulatory changes will also improve

takeover quality and increase the value of takeovers undertaken by powerful CEOs in *non-compliant firms*. We also expect that improvements in board governance will mitigate the overinvestment problem and encourage higher dividend payments. Reducing investment gives firms more cash to pay as dividends. Further, increased oversight will encourage CEOs to engage in shareholder focused policies such as increased dividend payments. Often, better-governed firms generally pay higher dividends (La Porta, Lopez-de-Silanes, Shleifer, and Vishny 2000). Therefore, we expect that increased independent oversight will help to encourage powerful CEOs to pursue shareholder focused policies and increase dividend payout.

Hypothesis 4: Improved governance is associated with a reduction in powerful CEOs' capital expenditure.

Hypothesis 5: Improved governance increases powerful CEOs' dividend payout ratios.

Hypothesis 6: Improved governance increases powerful CEOs' takeover announcement returns.

3.3 Variable Construction, Sample, and Methodology

3.3.1 Variable Construction: CEO Power

CEOs may derive power from their status as a founder of the firm or from retaining significant holdings of the firm's equity (See, Finkelstein 1992, Daily and Johnson 1997, Adams et al., 2005, Han et al., 2016, Li, et al., 2018). Prior studies show that CEOs, through their status as founders or with significant shareholdings can influence firm's operating, capital allocation and strategic decision, prevent involuntary dismissal and thus are likely to be more powerful (see, Holderness and Sheehan 1988, Daily and Johnson 1997, Villalonga and Amit 2006, Anderson, Duru, and Reeb 2009, Fahlenbrach 2009).

We hand-collect information on founders such as names and number of founders of each firm and founding year. We use several sources, including 10-K filings of the firms with the SEC available in Electronic Data-Gathering, Analysis, and Retrieval (EDGAR), the Funding Universe website, company websites, and other internet resources including Wikipedia, Forbes pages, Bloomberg's Business Week website, among others. 'Founder-

CEO' in a given year is an indicator variable that equals one if any source explicitly mentions that the current CEO is one of the original founders of the firm or was the main executive at the time the company was founded (Adams, Almeida, and Ferreira 2009). Additionally, using Execucomp ownership data, we construct 'CEO Ownership above Industry Median' variable that represents CEOs with ownership above the industry (2-digit) median (See: Han et al., 2016).

Prior research posits that CEOs may increase their power through holding the position of chairman of the board and/or holding the titles of other top corporate executives such as President or Chief Operating Officer thereby dominating the decision-making forum[40]. These sources capture a CEO's structural power and thus reflect their influential leadership ability within the firm (Finkelstein 1992). Morck, Shleifer, and Vishny (1988) define CEOs as powerful when no other person holds the title of president or chairman and no other person co-signs the letter to the shareholders in the annual report. The regulatory changes of 2002 do not contain provisions directly targeting CEO-Chair duality or title concentration. As such these components of CEO power are not expected to be affected by these regulations. Although these sources of power could reduce the presence or influence of independent directors (Westphal and Zajac 1995, Morse et al., 2011)[41], this is less of a concern in our study as we concentrate on *non-compliant firms* who had to comply with the mandatory adoption of independent directors after the regulatory changes.

A CEO's experience, firm-specific knowledge, and expertise accumulated with tenure can influence a firm's corporate policy (Hermalin and Weisbach 1991). CEO's tenure allows us to capture both expert and prestige power (Finkelstein 1992). CEOs with tenure that is longer than the median tenure of the managers of the same industry would be more powerful than other CEOs (see: Han et al., 2016). This is in part because they

[40] See, for example, (Finkelstein 1992, Jensen 1993, Finkelstein and D'aveni 1994, Westphal and Zajac 1995, Grinstein and Hribar 2004, Adams et al., 2005, Morse et al., 2011, Li et al., 2018, Han et al., 2016.

[41] Even if powerful CEOs limit the bargaining power of directors, the strategic shift in the corporate policy of powerful CEO managed firms after these regulations are expected to be underestimated.

gather firm-specific knowledge and influence corporate development to cater to their own personal expertise, thereby making them more difficult to replace. Longer-tenured CEOs may hire supportive executives, form a co-opted board and influence firm policy, further entrenching them. Graham et al. (2018) show that CEOs with high bargaining power due to their longer tenure significantly reduce board independence. However, after the regulatory changes of 2002, they document an insignificant effect of long-tenured CEOs on board independence. Thus, the director's bargaining power in *non-compliant firms* is less likely to be affected by long-tenured CEOs. We collect CEO tenure data from Execucomp. However, CEO-tenure constructed using the Execucomp data (variable '*became CEO*') could be problematic for a set of CEOs who leave their managerial position and return to the focal firms of analysis later during the sample period. For these CEOs, we use hand-collected tenure data from a variety of sources including those described above.

We construct the measure of CEO power index ('CEO Power') which consists of 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median'. Additionally, we also use a binary measure of CEO power – 'CEO Power TOP-Q', which equals one if 'CEO Power' index is in the top 25% of the industry-year distribution of 'CEO Power'.

Our identification strategy involves mandatory changes in board composition that moderates CEO action. The difference of means tests on CEO power measures between pre and post-shock periods is not statistically significant in our sample. This evidence mitigates the concern that these regulations are directly affecting CEO Power. Additionally, while dual-class structures can increase CEO power (Masulis et al., 2009), the mandatory adoption of board independence reduced firms' incentives to use a dual-class structure (Arugaslan, Cook, and Kieschnick 2010). Similarly, the presence of staggered boards or anti-takeover provisions (ATP) could be altered through board monitoring and a strong board could be a potential substitute for the takeover market

(Bebchuk and Cohen 2005)[42]. Thus, we do not include dual-class structures, staggered boards or anti-takeover provisions in constructing the 'CEO Power' index. as these sources of power could be meaningfully affected by the regulatory requirements of 2002.

3.3.2 Sample and Data Description

We construct our primary dataset combining the universe of firms contained in the Standard and Poor's Executive Compensation (Execucomp) database and Compustat. Following the standard literature, we exclude financial firms (Standard Industrial Classification [SIC] codes 6000-6999) and regulated industries (SIC codes 4900-4949). The Centre for Research in Security Prices (CRSP) dataset provides stock price information. Most of the CEO characteristics are from Execucomp. We collect corporate board data from the Institutional Shareholder Services (ISS) Directors database. The primary dataset includes 2,622 unique firms and 27,585 firm-year observations during 1992-2011 for which we have data on 'CEO Power' measures[43]. We merge the primary dataset with ISS dataset to identify pre-regulation *non-compliant firms*.

To identify pre-regulation *non-compliant firms,* we first focus on the firms with available data on both fully independent audit committee and majority board independence during 1998-2001. We then use the pre-regulation 4-year rolling average of these indicators to track firms that had complied with the requirements of these regulations[44]. The merged primary-ISS dataset consists of 1,070 unique firms. Among these firms, we identify 524 pre-regulation *non-compliant firms*.

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[42] Our CEO power measure also excludes any SOX reform requirements directed at CEOs, e.g. certification requirements of financial reports, restrictions on loans and trading (see (Li et al., 2008) for details).

[43] The Year 1992 is the first year for available data in ExecuComp. We end the sample in 2011 in order to have a balanced pre (10 years) and post-regulation (10 years) period.

[44] The rolling average of indicators reluctant our exposure to any of the pre-shock period while identifying *non-compliant firms*. Though Chhaochharia and Grinstein (2009) and Duchin et al. (2010) discuss the timelines of these regulations, prior studies use different periods to identify the *non-compliant firms* (See, Armstrong et al., 2014, Guo and Masulis 2015, Balsmeier et al. 2017).

3.3.2.1 Dependent Variables

As the measure of innovation inputs, we use the firm's R&D expenditures$_{(t+1)}$ scaled by total assets$_{(t)}$. Following prior literature (e.g. Hirshleifer et al., 2012), we use the natural logarithm of one plus number of patents applied for (and subsequently granted) as a proxy for the quantity of innovation. To distinguish major technological breakthroughs from incremental technological improvements, we use the citations received by these patents to measure the quality of innovation.[45] Since citations may only reflect technological value rather than market value of innovation (Almeida, Hsu, Li, and Tseng 2017), we also explore the economic value of innovation through the market reaction to patent grants. Finally, we examine whether powerful CEOs can spur radical innovation of firms in the presence of a powerful board. To measure radical innovation, we first identify the patents of the firms cited in the 90th (95th) percentile of technology-class-year citation distribution. Then, we construct a continuous variable 'Radical_90' ('Radical_95') that distinguishes the firm's radical innovation by adding the patents of the firms cited in the 90th (95th) percentile of technology-class-year citation distribution. We use these innovation measures to analyze whether powerful CEO managed firms experience better innovation after the improvement in board governance.

The patent data are from the Kogan, Papanikolaou, Seru, and Stoffman (2017) (henceforth KPSS) patent dataset. The KPSS patent dataset provides data for all patents that are granted by the U.S. Patent and Trademark Office (USPTO) over 1926-2010. We follow the innovation literature and date the patents by the year of their application (Hall, Griliches, and Hausman 1986). We restrict the sample to patents applications up to 2008 as patents applied for after 2008 may not appear in the dataset because of the time lag in granting patents. We use the KPSS (2017) patent data instead of the NBER patent data as it allows us to identify comprehensive patent portfolios up to 2008, compared to 2004 for the NBER patent data. After merging our final dataset with KPSS (2017), the sample consists of 1,049 unique firms. Out of the 1,049 matched firms, 510 firms are non-compliant firms. Since innovation outputs (i.e., patents and citations

[45]Studies employing these two variables to measure innovation performance include among others (Hirshleifer et al., 2012, Atanassov 2013, He and Tian 2013, Tian and Wang 2014).

generated from R&D investment) require considerable time to occur, we examine the effect of powerful top executives on innovation outcomes at the time t+2.

We also analyze the product market conditions of the firms which could be influenced by corporate innovation. We use '75th Percentile Return' and 'Product Announcement Return' to measure the market reaction to the announcement of new products. The variable 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '75th Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75th percentiles. This allows us to analyze the product market conditions of the firms which could be influenced by corporate innovation.

We obtain new product data from Mukherjee, Singh, & Žaldokas, (2017) during 1992-2006. Mukherjee et al. (2017) created this dataset by searching the LexisNexis News database for company press releases that are tagged under the subject "New Products" and where their headlines include keywords (with the roots of words) such as "Launch," "Product," "Introduce," "Begin," "Unveil". They use a standard event study methodology to calculate cumulative abnormal returns (CARs) over the three (-1, 1) day period around the press release of the product announcement. Due to data constraints, our merged dataset includes 711 unique firms for which we could obtain the market reaction to a product announcement. The data includes 328 unique *non-compliant firms* with 1,762 firm-year observations.

We examine a firm's investment in capital expenditures measured by capital expenditures$_{(t+1)}$ scaled by assets$_{(t)}$ and the likelihood of paying dividend-an indicator equals one if the firm pays the dividend in the year (t+1). We also calculate the market reaction to the takeover announcement using CARs over the three-day event window (we check that the results are robust to longer 4-day event window). We measure buy and hold return where the estimation window starts 210 days prior to the announcement date and ends 11 days prior to the announcement date (-210, -11) since the market may react prior to the announcement of merger (see: Harford et al., 2012). We calculate abnormal return based on the difference between the market's predicted return and actual stock return. Following Masulis, Wang, and Xie (2007), we only include completed

deals with a value of more than one million dollars in the analysis. The target firms used in the analysis are US firms. We exclude government, joint-venture and mutual targets. We also require that the acquirers must control less than 50% of the target company before acquisition and control 100% of the target after the acquisition. We exclude deals with missing transaction value and CRSP price data. Finally, we require that the deal value must be at least 1% of the acquirer's market value of equity measured on the 11th trading day prior to the announcement date. The merged dataset includes 3,638 unique deals for which we had a market reaction to M&A deals. Out of 3,638 firms, we find 1,706 unique deals initiated by *non-compliant firms*.

3.3.2.2 Independent Variables

We control for variables that are standard in the literature. The firm-level controls include firm size, as proxied by the natural logarithm of the book value of assets. We also control for firm age in all our specifications as older firms' may experience less growth through takeovers, explore different technological innovation and pay more dividends. Firm's age may also influence the propensity to continue to have powerful (founder) CEOs. Firm's profitability, market performance, and debt ratio influence the firm's access to funds and subsequent investment (Kaplan and Zingales 1997, Fama and French 2016). Thus, we also control for profitability, Tobin's Q and leverage in our specifications.

3.3.3 Summary Statistics

We report descriptive statistics of the variables in Table 1. Panel (A) of Table 1 reports descriptive statistics for the full sample. The average firm size in our sample is large since the sample consists of S&P1500 firms. As in Armstrong et al. (2014) and Balsmeier et al. (2017), we find that *non-compliant firms* are smaller compared to compliant firms. The average age of *non-compliant firms* is 24 years, which is significantly lower than that of compliant firms. *Compliant* and *non-compliant firms* are similar in terms of profitability, Tobin's Q, capital expenditures, R&D, dividend and leverage (consistent with Armstrong et al., 2014, Balsmeier et al., 2017, Duchin et al., 2010). *Compliant firms*, on average, have higher patents, citations and patent value.

The percentage of founder CEOs in *non-compliant firms* is 22.4% compared to 12.9% in *compliant firms*. We document the prevalence of CEO-Chair duality and title concentration in *compliant firms*. The average tenure of the CEOs in *non-compliant* (*compliant*) firms is around 9 (8) years. Moreover, CEOs of *non-compliant firms* have greater ownership and are more powerful.

Panel (B) of Table 1 reports summary statistics of dependent variables used in the study for the pre-regulation *compliant* and *noncompliant firm* samples. *Compliant firms* have statistically and economically indistinguishable R&D expenditures, but around 39.47% more patents, 54.43% more citations and 58.60% more valuable innovation in the pre-regulation period[46]. The higher innovations of compliant firms without necessarily overspending in R&D, suggests that the agency problem is less of a concern for *compliant firms* (Balsmeier et al., 2017). In addition, *compliant firms* have a significantly higher likelihood of paying dividends rather than hoarding cash which also suggests less pronounced agency problems. Hence, these firms are unlikely to benefit from the regulatory changes targeting better governance. Panel (C) of Table 1 reports the correlation matrix of the individual sources of power and the CEO power index. 'CEO Tenure above Industry Median' has the highest correlation (0.679) (among other sources of managerial power) with CEO power index[47].

[46] The difference of patents in the noncompliant and compliant firm is (1.117 -1.619) =-0.502 which indicates $(e^{-0.502}-1)x100=-39.49\%$ fewer patents. Similarly, the difference of citations (value of innovation) in noncompliant and compliant firm is 1.935 -2.721 =-0.786 (1.834-2.716=-0.882) which indicates $(e^{-0.786}-1)x100=-54.43\%$ $((e^{-0.882}-1)x100=-58.60\%)$ fewer citations (value of innovation).

[47] Later, we show that our results are not influenced by any component of 'CEO Power' index *solely*.

Table 1: Summary Statistics

This table reports summary statistics of the firms. The sample consists of publicly traded, non-regulated S&P1500 firms from1992 to 2011. The non-compliant firm sample is a sub-sample of the full sample and consists of firms without a fully independent audit committee or majority board independence before the year 2002. 'Founder-CEO' in a given year is an indicator variable that equals one if any source explicitly mentions that the current CEO is one of the original founders of the firm or was the main executive at the time the company was founded. 'CEO-Chair' is an indicator of powerful-CEO and equals one if CEO is also the chairman of the board. 'CEO Title Concentration' is a dummy variable which is one if CEO holds more than two titles. The percentage of ownership held by CEOs is represented by 'CEO Ownership'. 'CEO Ownership above the Industry Median' is an indicator equals one if the CEO's ownership is above the median ownership of CEOs in the industry-year distribution of ownership. 'CEO Tenure' is the number of years the CEO has served as 'CEO' of the firm. 'CEO Tenure above the Industry Median' is one if the CEO's tenure is above the median tenure of CEOs in the industry-year distribution of tenure. 'CEO Power' is an index which is an aggregate measure of the five components of CEO power and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by total assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. '$R\&D_{(t)}$' is the value of $R\&D\ expenditures_{(t)}$ scaled by $assets_{(t-1)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time (t+2). 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time (t+2). 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of $patents_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of $patents_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t)}$' is the firm's capital expenditures scaled by $assets_{(t-1)}$. '$Dividend_{(t)}$' is the total dividend scaled by $asset_{(t-1)}$. '$RD_{(t+1)}/Asset_{(t)}$' is the $R\&D\ expenditures_{(t+1)}$ scaled by $assets_{(t)}$. '$CAPX_{(t+1)/}Asset_{(t)}$' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. '$Dividend\ Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day (-1,1) cumulative abnormal return calculated using the market model. Standard errors are clustered at the firm-level for the t-test. Panel A reports summary statistics of non-compliant and compliant firms. Panel B reports summary statistics of the dependent variables in the pre-regulatory period. Panel C reports Pearson correlation coefficients of the components of CEO power in non-compliant firms.

Panel A: Summary Statistics							
	Non-compliant Firm Sample			Compliant Firm Sample			t-test
Variables	Mean	Median	SD	Mean	Median	SD	
Firm Characteristics							
Firm Size	7.119	6.967	1.557	7.368	7.282	1.578	-2.74**
Firm Age	24.108	20.000	17.885	28.929	24.000	21.707	-3.93***
Profitability	0.040	0.055	0.117	0.039	0.054	0.113	0.33
Leverage	0.181	0.150	0.196	0.192	0.173	0.173	-1.31
Tobin's Q	0.592	0.497	0.515	0.589	0.491	0.502	0.11
$R\&D_{(t)}$	0.040	0.000	0.099	0.045	0.014	0.087	-1.14
$CAPX_{(t)}$	0.069	0.048	0.074	0.065	0.047	0.069	1.60
$Dividend_{(t)}$	0.013	0.003	0.046	0.014	0.006	0.031	-0.78
CAR	0.003	0.002	0.064	0.001	0.00	0.058	-1.24
Measures of Innovation							
Patents	0.945	0.000	1.538	1.366	0.000	1.770	-4.14***
Citations	1.385	0.000	2.259	1.937	0.000	2.555	-4.08***
Value of Innovation	1.498	0.000	2.500	2.205	0.000	2.862	-4.72***
Radical_90	0.151	0.000	0.625	0.175	0.000	0.639	-0.69
Radical_95	0.111	0.000	0.510	0.130	0.000	0.516	-0.67
75^{th} Percentile Return	0.599	0.693	0.712	0.529	0.000	0.674	1.32
Product Announcement Return	0.097	0.037	0.153	0.083	0.030	0.139	1.12
Measures of CEO Power							
Founder CEO	0.224	0.000	0.417	0.129	0.000	0.336	4.73***
CEO-Chair	0.607	1.000	0.488	0.649	1.000	0.477	-2.07**
Title Concentration	0.233	0.000	0.423	0.275	0.000	0.446	-2.38**
CEO Tenure	9.494	7.000	8.794	7.866	6.000	6.977	4.39***
CEO Ownership	0.037	0.005	0.075	0.017	0.003	0.045	6.58***
CEO Power	2.076	2.000	1.438	1.940	2.000	1.326	2.38**

Panel B: Summary Statistics of Dependent Variables in the Pre -regulation Period							
	Non-compliant Firm Sample			Compliant Firm Sample			t-test
Variables	Mean	Median	SD	Mean	Median	SD	
$RD_{(t+1)}/Asset_{(t)}$	0.039	0.000	0.071	0.045	0.013	0.073	-1.53
Patents	1.117	0.000	1.622	1.619	1.099	1.855	-4.15***
Citations	1.935	0.000	2.587	2.721	2.197	2.852	-4.25***
Value of Innovation	1.834	0.000	2.693	2.716	1.709	3.042	-4.78***
Radical_90	0.175	0.000	0.684	0.201	0.000	0.683	-0.59
Radical_95	0.131	0.000	0.560	0.151	0.000	0.559	-0.58
75^{th} Percentile Return	0.671	0.693	0.736	0.593	0.693	0.706	1.34
Product Announcement Return	0.110	0.045	0.166	0.094	0.036	0.154	1.13

$CAPX_{(t+1)/}Asset_{(t)}$	0.081	0.060	0.075	0.077	0.059	0.068	1.30
Dividend $Payer_{(t+1)}$	0.501	1.000	0.500	0.583	1.000	0.493	-2.70**
CAR	0.005	0.002	0.074	-0.000	0.000	0.066	1.41

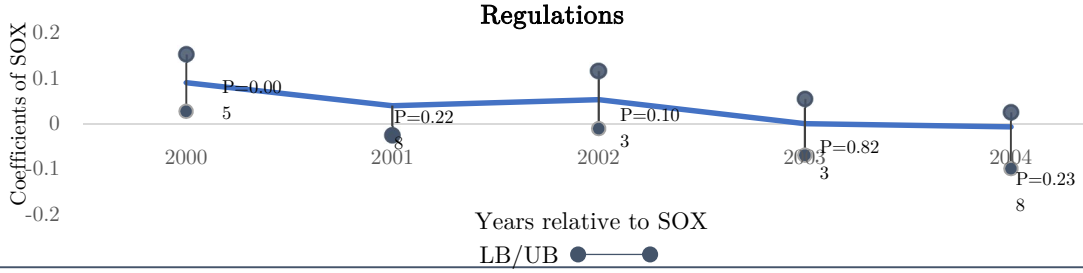
Panel C: Correlation Metrics of the Components of Powerful CEO Index in Non - compliant Firms

Variables	Founder CEO	CEO-Chair Duality	Title Concentration	CEO Tenure above the Industry Median	CEO Ownership above the Industry Median	CEO Power
Founder CEO	1					
CEO-Chair duality	0.160* (0.000)	1				
Title Concentration	0.011 (0.316)	0.444* (0.000)	1			
CEO Tenure above the Industry Median	0.307* (0.000)	0.279* (0.000)	0.086* (0.000)	1		
CEO Ownership above the Industry Median	0.345* (0.000)	0.166* (0.000)	0.051* (0.000)	0.353* (0.000)	1	
CEO Power	0.574* (0.000)	0.671* (0.000)	0.495* (0.000)	0.679* (0.000)	0.642* (0.000)	1

Graph 1: Distribution of Powerful CEOs

Figure 1 represents the timing of changes in the powerful CEO index around the changes in regulations. The sample consists of publicly traded, non-regulated firms with available data from Execucomp. The CEO power index includes five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. Standard errors are clustered at the firm-level.

Figure 1: Timing of Changes in Powerful CEO Index around the Regulations



Since we use the regulatory changes as an identification strategy, the causal inference could be confounded if the treatment limits CEO power. To further address this concern, we plot the estimates from a fully saturated model of CEO power proxy on the *regulatory shocks* with standard errors clustered at the firm level in Figure 1. The estimates show that these quasi-exogenous regulations do not significantly curb CEO power in the post-regulation period.

3.3.4 Methodology

In our study, we use a Difference-in-Difference (DID) continuous design (Atanasov and Black 2016). We examine whether the exogenous shock to governance due to the mandatory adoption of the board independence requirements, has a differing effect on the corporate policies of the pre-regulation *non-compliant firms* with powerful CEOs compared to *non-compliant firms* without powerful CEOs[48]. We estimate the following panel DID for our analysis:

$$Y_{i,t+1} = \alpha + \beta SOX_{i,t} x\ CEOPower_{i,t} + \vartheta CEOPower_{i,t} + \tau SOX_{i,t} + \delta\ \gamma_{i,t} + \lambda_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

Here, $Y_{i,t+1}$ represents the corporate policy of firm *i* in year *t+1*. SOX is an indicator variable (treatment) that is equal to one for years after the passage of the Sarbanes-Oxley Act and NYSE/NASDAQ listing regulation changes and zero otherwise. τ captures the average change in corporate policies the *non-compliant firms* from pre to post-regulations periods. CEO power, a time-variant measure of managerial power is proxied by the CEO-power Index. ϑ measures the average difference in corporate policies between the powerful (treatment group) and non-powerful (control group) CEO managed firms. β is the DID continuous estimates that capture the average differential change in corporate policies from the pre to post regulation periods for the powerful CEO led firms compared to the firms without powerful CEOs. $\gamma_{i,t}$ is the vector of firm-level controls. λ_i is firm (or industry) fixed effect, that mute the concern for the firm (industry) specific

[48] Though in our main results we focus on the sample of *non-compliant* firms, we also explore a triple-interaction test that uses the full sample of all firms in robustness tests.

omitted variable bias by controlling for any unobserved time-invariant cross-sectional heterogeneity across firms (industries). λ_t is time fixed effect, that controls for any unobserved year specific features[49]. $\varepsilon_{i,t}$ represents error terms. We cluster standard errors at the firm-level.

The fundamental requirements of a DID design are the homogeneity of the shock and comparability of treatment and control groups in the pre-regulation period. Previous studies use SOX as a novel source of exogenous variation to corporate governance. We deal with the second requirement by focusing our study on the *non-compliant firms* where our treatment and control firms are comparable at least in terms of board features or regulatory compliance in the pre-treatment period[50]. Moreover, the parallel trend assumption of the DID setup requires similar attrition in both groups but for treatment. Using a reasonably balanced panel, we also address attrition in our setup (Atanasov and Black 2015).

Since the pre-treatment parallel trend assumption is an important condition for shock-based causal inference, we test the covariate balance between the treated and control groups in the pre-regulation period to deal with any concern for selection bias in the methodology. Using the baseline control variables used in the study (Table 2), we confirm that our treated (powerful CEOs led *non-compliant firms*) and control groups (*non-compliant firms* without powerful CEOs) are similar in the pre-regulation period and thus the treatment is quasi-random for these groups.

Then, by matching the firms based on pre-regulation governance structure (and also on firm characteristics), we examine the sensitivity of corporate policies to exogenous governance variation in the context of managerial power. We argue that regulations driven governance variation would bring a better strategic shift in the firms with powerful CEOs.

[49] Since our methodology is based on a single shock, when we use the treatment variable 'SOX', λ_t will be meaningless as it will not vary across firms.

[50] We also introduce placebo shocks in the pre-treatment period and the analysis supports the parallel trend assumption.

Table 2: Covariate Balance Test

This table reports the balance of covariates between treatment and control firms during the pre-regulatory period. The sample consists of publicly traded, non-regulated, non-compliant S&P1500 firms. The non-compliant firms are the firms without a fully independent audit committee or majority board independence before the year 2002. The CEO power index includes five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'Treatment Firms' are the non-compliant firms with positive value of powerful CEO index. 'Control Firms' are the non-compliant firms with powerful CEO index equals zero. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. Standard errors are clustered at the firm-level for t-test.

	Treatment Firms			Control Firms			t-test
Variables	Mean	Median	SD	Mean	Median	SD	
Firm Size	6.985	6.779	1.462	6.838	6.741	1.456	1.08
Firm Age	20.811	15.000	17.801	19.126	15.000	13.944	1.48
Profitability	0.036	0.052	0.125	0.037	0.050	0.127	-0.05
Leverage	0.197	0.169	0.189	0.195	0.164	0.195	0.08
Tobin's Q	0.647	0.528	0.603	0.674	0.535	0.628	-0.41

3.4 Empirical Analysis

3.4.1 Innovation

We start by exploring whether enhanced governance can improve powerful CEOs' innovativeness. We look at the impact on innovation inputs (i.e., R&D), innovation outputs (i.e., patents, and patent quality), and new product announcements.

3.4.1.1 Innovation Inputs

We first analyze whether the innovation inputs of the powerful CEO managed *non-compliant firms* change after the improvement in corporate governance of the firm. We report the results in Table 3, Columns 1–4. The dependent variable is R&D expenditures. The coefficients of 'CEO Power' are negative and significant in all specifications suggesting that powerful CEOs, generally, invest less in R&D than other CEOs. As in Balsmeier at al. (2017), we do not find any discernible pattern in the R&D investments among the *non-compliant firms* after the transition to independent boards. However, the coefficients on the interaction terms, 'SOX x CEO Power' are positive and economically and statistically significant in all models. For example, the results in column 1 (with firm fixed effects) show that powerful CEOs' R&D intensity is 0.153 points below that of other CEOs (i.e., they spend around 3.83% less on R&D than other CEOs[51]). However, in the post-regulation period, powerful CEOs increase investment in R&D by 1.6%[52].

[51] For non-compliant firms, the average R&D intensity is 0.04. The coefficient related to powerful CEOs in Table 3 column 1 is 0.153 and the dependent variable is R&D intensity multiplied by 100. This implies that powerful CEOs spent 0.00153/0.04, or 3.83%%, less on R&D than other CEOs.

[52] The coefficients on CEO Power, and its interaction with SOX, in Column 1 are respectively -0.153 and 0.217. Thus, in the post-regulation period, powerful CEOs invest 0.064 more in R&D than their peers. Given that the average R&D intensity is around 4.0%, powerful CEOs spent around 0.00064/0.04=1.6% more on R&D than other CEOs.

Table 3: Powerful CEOs and R&D Investment

This table represents the results of the impact of improved governance on the R&D investments of non-compliant firms with powerful CEOs. The sample consists of publicly traded, non-regulated, non-compliant S&P1500 firms from 1992 to 2011. '$RD_{(t+1)}/Asset_{(t)}$] x 100' is R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. '$R\&D_{(t)}$' is the value of R&D $expenditures_{(t)}$ scaled by $assets_{(t-1)}$. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent Variable	**$[RD_{(t+1)}/Asset_{(t)}]$ x 100**			
Models	**(1)**	**(2)**	**(3)**	**(4)**
SOX x CEO Power	0.217***	0.157***	0.172***	0.131**
	[0.005]	[0.008]	[0.004]	[0.014]
CEO Power	-0.153**	-0.134***	-0.143***	-0.141***
	[0.034]	[0.009]	[0.006]	[0.004]
SOX	-0.280	-0.138		
	[0.180]	[0.427]		
Firm Size	-1.310***	-0.974***	-1.052***	-0.322***
	[0.000]	[0.000]	[0.000]	[0.000]
Firm Age	0.044**	0.049***	0.014**	0.009**
	[0.023]	[0.002]	[0.019]	[0.048]
Profitability	-0.423	-1.528*	-1.469*	-4.027***
	[0.685]	[0.066]	[0.077]	[0.000]
Leverage	-0.286	-0.619*	-0.634*	-0.375
	[0.714]	[0.097]	[0.096]	[0.349]
Tobin's Q	0.676***	0.567***	0.580***	1.162***
	[0.005]	[0.003]	[0.003]	[0.000]
$R\&D_{(t)}$		33.054***	32.917***	57.729***
		[0.000]	[0.000]	[0.000]
Firm FE	Y	Y	Y	N
Year FE	N	N	Y	Y
Industry FE	N	N	N	Y
Observations	7,128	7,128	7,128	7,128
R-squared	0.848	0.858	0.859	0.771

3.4.1.2 Innovation Outputs

R&D can generate competitive advantages (Barker and Mueller 2002). But this is largely premised on R&D translating into innovation outputs. Patents – especially highly cited patents – are key innovation outputs. We anticipate that improvements in governance will spur powerful CEOs to engage in higher quality R&D, which we expect will manifest in more patents, and higher quality patents. The results for innovation outputs reported in Table 4[53] are consistent with our expectations[54]. Powerful CEOs have, on average, a negative impact on innovation performance although the effect is not always statistically significant. For example, the coefficient of the powerful CEO indicator in model 1 (4) of Panel A suggest that firms with powerful CEOs had 3.54% (4.30%) fewer patents[55]. After the quasi-exogenous improvement in board governance, the number of patents of powerful CEO managed firms improve significantly in models 1-4. For example, we find that *non-compliant firms* with powerful CEOs generate 8% (5.44%) more patents than firms with non-powerful CEOs in the post-regulation period in models 1 and 2 (4)[56].

We next consider the quality of innovation, as measured by patent's 'Citations'. We find that, on average, the coefficients of powerful CEOs on 'Citations' are negative although the effect is only statistically significant in model 8 where we use industry and

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[53] Since firms generally require significant time to produce patentable innovations, we measure the innovation variables at the time (t+2). However, we show that our results are robust when we measure innovation at the time (t+1).

[54] We control for contemporaneous R&D expenditure (He and Tian, 2013) in some models following innovation literature. However, since we argue that powerful CEO run firms increase R&D investment in the post-shock period, R&D intensity could be a *bad control* in the analysis focusing on innovation (Angrist and Pischke 2009). However, excluding R&D intensity in the experiment of innovation output may lead to omitted variable bias problem. So, we report analysis on innovation after controlling R&D. In unreported results, we show that our results are robust to excluding R&D intensity. On the other hand, we also didn't control CAPX in reported innovation analysis considering it as a *bad control*. However, our results are robust to controlling CAPX in innovation analysis.

[55] Since patents measures are one plus the natural logarithm, while calculating economic magnitude, we use the exponential of the coefficients less 1. Thus, for model (1) Panel A of Table 4, CEO power coefficient is -0.036 that indicates that powerful CEO led firms are associated with $(e^{-0.036} - 1)x100 = -3.54\%$ less patents, on average. Similarly, the magnitude is $(e^{-0.044} - 1)x100 = -4.30\%$ in the model (4) of Panel A.

[56] In models 1 and 2 of Table 4, the coefficient of the interaction term 'CEO power x SOX' is 0.077 which indicates that patents increase by $(e^{0.077} - 1)x100 = 8\%$. Similarly, patents of model 4 increases by $(e^{0.053} - 1)x100 = 5.44\%$.

year fixed effects. On the other hand, powerful CEOs are associated with higher citations where the magnitude varies from 9.75% (model 7) to 14.91% (model 6) in the post-regulation period[57].

To further support our findings on innovation quality in powerful CEO managed firms in the post-regulation period, we use the market reaction to patent grants. The results in panel B show that powerful CEO managed firms introduce impactful innovation when governance structures become stronger. Model 1 of panel B shows that the patent value of powerful CEO managed firms is, on average, \$0.143 $(e^{0.134} - 1)$ million higher than those of other firms in the post-regulation period.

Further, we explore whether powerful CEOs are associated with radical innovation in models 5-8 of panel B Table 4. We find that, on average, powerful CEOs do not increase radical innovation. However, powerful CEOs may pursue radical innovation when they receive diverse opinions from expert board members. Particularly, we find that in the post-regulation period, powerful CEO managed *non-compliant firms* introduce more radical innovation relative to other *non-compliant firms*[58].

One explanation for the success in innovation could be the improvement of a sense of teamwork in the organization through better governance and monitoring in the post-regulation period. An independent board may contribute to moderating agency conflicts within the organization and encourage powerful CEOs to implement policies that achieve corporate goals of value maximization. It could also be argued that the post-regulation increase in innovation productivity of firms with powerful CEOs could come from other firm-level changes due to regulatory changes. Using alternative fixed effects (firm, industry, year), we address this concern and show that powerful CEOs' R&D expenditure becomes more productive and is more apt to translate into better innovation in the post-regulation period.

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[57] In models 7 of Table 4 Panel A, the coefficient of interaction term 'CEO power x SOX' is 0.093 which indicates that citations of powerful CEO managed firms are $(e^{0.093} - 1)x100 = 9.75\%$ higher. Similarly, citations of powerful CEO managed firms in model 6 are $(e^{0.139} - 1)x100 = 14.91\%$ higher.

[58] We do not use industry fixed effects while estimating radical innovation as radical innovation is calculated by summing up the total number of patents with the citation at a certain percentile from technology-class-year citations distribution.

Table 4: Powerful CEOs and Innovation

This table represents results of examining the effect of improved governance on the innovation of non-compliant firms with powerful CEOs. Models include publicly traded, non-regulated, non-compliant S&P1500 firms from 1992 to 2008. The dependent variables of panel A are 'Patents' and 'Citations'. The dependent variables of panel B are 'Value of Innovation', 'Radical_90' and 'Radical_95'. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time$_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time$_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of patents$_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90th percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95th percentile of the technology-class-year citations distribution. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by assets$_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. 'R&D$_{(t)}$' is the value of R&D expenditures$_{(t)}$ scaled by assets$_{(t-1)}$. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Panel A:

Dependent Variables	Patents				Citations			
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOX x CEO Power	0.077***	0.077***	0.046**	0.053**	0.137***	0.139***	0.093**	0.117***
	[0.002]	[0.001]	[0.048]	[0.037]	[0.002]	[0.002]	[0.032]	[0.004]
CEO Power	-0.036**	-0.036**	-0.027	-0.044*	-0.048	-0.047	-0.035	-0.082**
	[0.028]	[0.029]	[0.117]	[0.062]	[0.131]	[0.137]	[0.261]	[0.032]
SOX	-0.418***	-0.418***			-1.117***	-1.115***		
	[0.000]	[0.000]			[0.000]	[0.000]		
Firm Size	0.122**	0.128**	0.222***	0.375***	-0.012	0.008	0.243***	0.367***
	[0.035]	[0.026]	[0.000]	[0.000]	[0.906]	[0.932]	[0.005]	[0.000]
Firm Age	-0.039***	-0.039***	0.000	0.001	-0.051**	-0.052**	0.013**	0.004
	[0.007]	[0.007]	[0.959]	[0.716]	[0.033]	[0.033]	[0.026]	[0.319]
Profitability	-0.808**	-0.780**	-0.151	-0.737*	-0.375	-0.285	-0.205	-0.887*
	[0.011]	[0.014]	[0.608]	[0.052]	[0.426]	[0.544]	[0.651]	[0.081]
Leverage	0.217	0.226	-0.119	-0.487**	-0.029	0.001	-0.193	-0.711***
	[0.220]	[0.202]	[0.486]	[0.015]	[0.921]	[0.996]	[0.489]	[0.008]
Tobin's Q	0.207***	0.194***	0.012	0.354***	0.183*	0.141	0.096	0.460***
	[0.001]	[0.002]	[0.848]	[0.000]	[0.068]	[0.168]	[0.350]	[0.000]
$R\&D_{(t)}$		0.606***	0.804***	2.496***		1.943***	2.052***	3.552***
		[0.006]	[0.000]	[0.000]		[0.001]	[0.000]	[0.000]
Firm FE	Y	Y	Y	N	Y	Y	Y	N
Year FE	N	N	Y	Y	N	N	Y	Y
Industry FE	N	N	N	Y	N	N	N	Y
Observations	5,472	5,472	5,472	5,472	5,472	5,472	5,472	5,472
R-squared	0.798	0.799	0.827	0.648	0.733	0.735	0.757	0.618

Panel B

Dependent Variables	Value of Innovation				Radical_90		Radical_95	
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SOX x CEO Power	0.134***	0.134***	0.079**	0.078*	0.020**	0.020**	0.018**	0.018**
	[0.000]	[0.000]	[0.026]	[0.086]	[0.042]	[0.042]	[0.037]	[0.037]
CEO Power	-0.024	-0.023	-0.005	-0.029	-0.007	-0.006	-0.006	-0.006
	[0.361]	[0.400]	[0.854]	[0.491]	[0.391]	[0.407]	[0.364]	[0.375]
SOX	-0.575***	-0.569***			-0.077***	-0.077***	-0.065**	-0.065**
	[0.000]	[0.000]			[0.007]	[0.008]	[0.010]	[0.011]
Firm Size	0.057	0.070	0.108	0.600***	0.031*	0.033*	0.021	0.022*
	[0.478]	[0.381]	[0.109]	[0.000]	[0.079]	[0.065]	[0.106]	[0.090]
Firm Age	-0.067***	-0.067***	-0.014**	0.003	-0.007***	-0.007***	-0.005**	-0.005**
	[0.001]	[0.001]	[0.011]	[0.531]	[0.010]	[0.009]	[0.019]	[0.019]
Profitability	-0.987**	-0.925**	-0.298	-0.536	-0.331***	-0.324***	-0.251***	-0.246**
	[0.024]	[0.033]	[0.478]	[0.310]	[0.005]	[0.006]	[0.009]	[0.011]
Leverage	0.076	0.097	-0.305	-0.539**	0.003	0.005	0.019	0.020
	[0.769]	[0.707]	[0.221]	[0.031]	[0.963]	[0.933]	[0.727]	[0.705]
Tobin's Q	0.434***	0.398***	0.219***	0.912***	0.091***	0.087***	0.064***	0.061**
	[0.000]	[0.000]	[0.007]	[0.000]	[0.002]	[0.003]	[0.009]	[0.011]
$R\&D_{(t)}$		1.615***	1.801***	3.723***		0.181		0.123
		[0.000]	[0.000]	[0.000]		[0.147]		[0.280]
Firm FE	Y	Y	Y	N	Y	Y	Y	Y
Year FE	N	N	Y	Y	N	N	N	N
Industry FE	N	N	N	Y	N	N	N	N
Observations	5,472	5,472	5,472	5,472	5,472	5,472	5,472	5,472
R-squared	0.781	0.782	0.803	0.655	0.745	0.745	0.729	0.729

Panel C: Robustness Test on Firm's Innovation $_{(t+1)}$

This table represents results of examining the effect of better governance on the innovation of the firms with powerful CEOs at the time$_{(t+1)}$.

Dependent variables	Patents	Citations	Value of Innovation	Radical_90	Radical_95
Model	(1)	(2)	(3)	(4)	(5)
SOX x CEO Power	0.044**	0.125***	0.070**	0.013*	0.015**
	[0.036]	[0.003]	[0.025]	[0.081]	[0.016]
CEO Power	-0.026*	-0.037	-0.002	-0.008	-0.010**
	[0.089]	[0.225]	[0.941]	[0.177]	[0.038]
SOX	-0.241***	-0.991***	-0.373***	-0.044**	-0.052***
	[0.002]	[0.000]	[0.001]	[0.032]	[0.003]
Baseline Controls	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y
Observations	5,609	5,609	5,609	5,609	5,609
R-squared	0.855	0.782	0.830	0.7835	0.7677

3.4.1.3 New Product Value

The previous results suggest that, in the post-regulation period, powerful CEOs increase R&D expenditure and generate more innovation outputs. If these patent portfolios are valuable, we would expect these firms to derive a higher market valuation of innovation and the market to respond more favorably to new product announcements (Chaney and Devinney 1992). Additionally, they may also introduce breakthrough products into the market.

The results in Table 5 summarize the market reaction to the announcement of new products. We find that in the post-regulation period, *non-compliant firms* led by powerful CEOs introduced more breakthrough products that earned positive abnormal announcement returns that were above the 75th percentile of the abnormal return distribution (columns 1 and 2 of Table 5). We also examine total cumulative abnormal returns in columns 3 and 4 of Table 5. In every model, in the pre-regulation period, the market reactions to powerful CEOs' new product announcements vary from significantly negative to insignificantly negative. However, for the *non-compliant firms*, in the post-regulation period, the market responds more positively to powerful CEOs' new product announcements.

The results are economically meaningful. For example, in column 1, powerful CEO managed firms are associated with 3.34% $(e^{-0.034} - 1)x100)$ fewer breakthrough product announcements than other firms. However, after the regulatory changes, powerful CEO managed firms have 6.3% $(e^{0.061} - 1)x100)$ more breakthrough product announcements relative to that of *non-compliant firms* without powerful CEOs. Column 3 shows that the product announcement returns of powerful CEO managed *non-compliant firms* are, on average, 0.70% lower than those of other *non-compliant firms*. In the post-regulation period, powerful CEO managed firms have a 1.11% greater positive market value from product announcement relative to firms without powerful CEOs[59]. This is consistent with

[59] The coefficient of 'CEO Power' in model 3 is -0.007, which indicates 'Product Announcement Return' is $(e^{-0.007} - 1)x100 = -0.698\%$. The coefficient of SOX interacted term is 0.011, which indicates $(e^{0.011} - 1)x100 = 1.106\%$ higher product announcement return.

our conjecture that improvements in governance encourage powerful CEOs to not only innovate more but to produce innovations that create value[60].

3.4.2 Investment in Tangible Assets, Dividend Policy, and Takeovers

3.4.2.1 Investment in Tangible Assets

As a measure of capital allocation policy, we examine a powerful CEO managed firm's investment in capital expenditures as a proxy for empire-building activities of CEOs (Xuan 2009, Chen, Lu, and Sougiannis 2012). We expect that powerful CEOs may prefer making tangible investments. However, the improvements in board governance help to mitigate this agency problem and shift the firm's focus towards long-term innovation-related investment.

In table 6, we report that *non-compliant firms* led by powerful CEOs demonstrate a significant reduction in capital expenditures in the post-regulation period. For example, in column 1 of Table 6, we find that powerful CEOs are associated with higher capital expenditures (coefficient 0.188). This is economically meaningful: they invest 2.7% more in capital expenditures. However, in the post-regulation period, powerful CEO managed firms invests 3.3 percentage points less capital expenditures[61].

3.4.2.2 Dividend Payout Policy

We also analyze the impact of the regulatory change on powerful CEOs' dividend payout policies. Given that persistently hoarding excess cash holdings tends to reduce corporate value ((Harford, 1999), (Harford et al., 2008)), we would expect that improvements in governance encourage firms to payout to shareholders as dividends.

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[60] Similar to innovation, product market reactions could be significantly affected by R&D investments. We control for R&D to account for the omitted variable bias problem. However, in unreported tests, we find similar results if we do not control R&D in the models of product market reactions.

[61] The mean value of the capital expenditures for non-compliant firms is 0.069. As we use '$[CAPX_{(t+1)}/Asset_{(t)}]$x100' as dependent variable in model 1, coefficient of 'CEO Power'= 0.188 in model 1 indicates 0.00188/.069=0.027. Similarly, the coefficient of SOX x CEO Power=-0.226 indicates 0.00226/0.069 = 0.033 less capital expenditures.

Table 5: Powerful CEO and Product Market Reaction

This table represents the results of examining the effect of better governance on the powerful CEO managed non-compliant firm's value creation through product announcements. Models include publicly traded, non-regulated, non-compliant S&P1500 firms from 1992 to 2006. The dependent variables are '75th Percentile Return' and 'Product Announcement Return'. '75th Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75th percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. '$R\&D_{(t)}$' is the value of R&D $expenditures_{(t)}$ scaled by $assets_{(t-1)}$. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	75th Percentile Return		Product Announcement Return	
Model	(1)	(2)	(3)	(4)
SOX x CEO Power	0.061***	0.046**	0.011**	0.009**
	[0.009]	[0.040]	[0.022]	[0.049]
CEO Power	-0.034**	-0.021	-0.007*	-0.005
	[0.047]	[0.161]	[0.067]	[0.151]
SOX	-0.460***		-0.088***	
	[0.000]		[0.000]	
Firm Size	0.110**	0.016	0.022*	0.006
	[0.022]	[0.725]	[0.058]	[0.593]
Firm Age	0.020*	0.006***	0.005*	0.001**
	[0.050]	[0.000]	[0.076]	[0.020]
Profitability	-0.952***	-0.810***	-0.257***	-0.212***
	[0.000]	[0.002]	[0.000]	[0.001]
Leverage	0.228	0.010	0.039	-0.003
	[0.164]	[0.951]	[0.123]	[0.891]
Tobin's Q	0.076	0.077	0.010	0.010
	[0.170]	[0.151]	[0.362]	[0.372]
$R\&D_{(t)}$	1.013**	0.984**	0.213*	0.195*
	[0.024]	[0.024]	[0.075]	[0.083]
Firm FE	Y	Y	Y	Y
Year FE	N	Y	N	Y
Observations	1,762	1,762	1,762	1,762
R-squared	0.615	0.651	0.687	0.718

Table 6: Powerful CEO, Capital Expenditures, and Dividend

This table represents results of examining the effect of improved governance on the capital expenditures and dividend payout policy of the non-compliant firms with powerful CEOs. Models include publicly traded, non-regulated, non-compliant S&P1500 firms from 1992 to 2011. The dependent variables are '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' and 'Dividend $Payer_{(t+1)}$'. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the firm's capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Dividend $Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends at the $period_{(t+1)}$, zero otherwise. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. 'Models (1)-(6) include OLS regressions. Model (7) includes logit regression. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	[CAPX$_{(t+1)}$/Asset$_{(t)}$] x 100			Dividend Payer$_{(t+1)}$			
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SOX x CEO Power	-0.226**	-0.201**	-0.189**	0.036***	0.036***	0.022*	0.202**
	[0.022]	[0.043]	[0.030]	[0.001]	[0.001]	[0.085]	[0.046]
CEO Power	0.188**	0.159*	0.110	-0.017**	-0.018***	-0.011	-0.114
	[0.026]	[0.063]	[0.147]	[0.016]	[0.008]	[0.210]	[0.119]
SOX	0.445			-0.057*			
	[0.108]			[0.058]			
Firm Size	-1.351***	-1.129***	-0.281***	0.063***	0.098***	0.064***	0.484***
	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.000]	[0.000]
Firm Age	-0.049*	0.007	-0.004	-0.003	0.005	0.004**	0.022**
	[0.069]	[0.695]	[0.446]	[0.338]	[0.192]	[0.011]	[0.024]
Profitability	2.454***	1.956***	2.243***	0.257***	0.213***	0.415***	6.872***
	[0.000]	[0.000]	[0.000]	[0.001]	[0.006]	[0.000]	[0.000]
Leverage	-6.302***	-5.854***	-1.890***	-0.115**	-0.105**	-0.139**	-1.310**
	[0.000]	[0.000]	[0.010]	[0.017]	[0.022]	[0.023]	[0.010]
Tobin's Q	2.382***	2.411***	1.898***	0.008	0.008	0.023	-0.150
	[0.000]	[0.000]	[0.000]	[0.653]	[0.662]	[0.375]	[0.545]
Firm FE	Y	Y	N	Y	Y	N	N
Year FE	N	Y	Y	N	Y	Y	Y
Industry FE	N	N	Y	N	N	Y	Y
Observations	7,184	7,184	7,184	7,122	7,122	7,122	5,529
R-squared	0.699	0.704	0.658	0.770	0.777	0.520	

The results are in Table 6 are consistent with expectations. Models 4 and 5 show that powerful CEO managed firms, on average, are less likely to pay dividends. However, in the post-regulation period, the likelihood of paying a dividend is higher for powerful CEO managed firms than other firms (the coefficient on the interaction term is positive and significant). For example, model (4) shows that after the enactment of regulatory changes, firms managed by powerful CEOs show a 3.6% higher probability of paying dividends. We find economically stronger results when we use a logit model (model 7) to estimate the likelihood of paying the dividend.

3.4.2.3 Takeovers

We further explore powerful CEOs' empire building through takeovers. We use a standard event study methodology and report the three-day announcement returns in Table 7. We find some evidence that the market reacted negatively (insignificantly) to M&A announcements by powerful CEO run firms in the pre-regulation period. However, the quality of takeovers by powerful CEO managed firms improved in the post-regulation period as the market reacted positively to M&A announcements by these firms.

The results in relation to the control variables are consistent with expectations. Large bidders experience lower acquirer announcement returns (per (Moeller, Schlingemann, and Stulz 2004, 2005). Acquisitions of public targets do worse relative to acquisitions of private targets, consistent with the idea that acquiring a private target could enable the bidder to capture an illiquidity discount; and thus, achieve more value (see e.g., (Chang 1998, Fuller, Netter, and Stegemoller 2002). Cash finance acquisitions perform better than stock-for-stock deals, consistent with the idea that deciding to pay with stock might signal to the market that the bidder is overpriced (per (Dong, Robinson, and Veld 2005), or potentially that the bidder might use its equity as a "cheap" source of capital with which it ultimately overpays (see Jensen 2005).

Table 7: Powerful CEO and M&A

This table represents the estimates of the effect of better governance on the market reaction to the announcement of M&A deals by the non-compliant firms with powerful CEOs. Models include publicly traded, non-regulated, non-compliant S&P1500 firms from 1992 to 2011. The dependent variable is 'CAR' which is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. All models include baseline controls. Models (4)-(6) additionally control for deal features. 'Relative Deal Size' is the transaction value over acquirer's market capitalization on 11 days before the announcement date. 'Friendly Deal' is an indicator equals one if the deal is friendly, zero otherwise. 'Subsidiary Target' is an indicator equals one if the target company is a subsidiary company, zero otherwise. 'Public Target' is an indicator equals one if the target company is a public company, zero otherwise. 'All Cash Deal' is an indicator equals one if the deal is fully cash financed. 'Stock Deal' is an indicator equals one if the acquirer pays a positive fraction of the transaction value using stocks. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	CAR					
Model	(1)	(2)	(3)	(4)	(5)	(6)
SOX x CEO Power	0.006**	0.006**	0.004**	0.005**	0.005**	0.005**
	[0.019]	[0.023]	[0.042]	[0.034]	[0.034]	[0.047]
CEO Power	-0.004	-0.003	-0.002	-0.003	-0.004	-0.002
	[0.117]	[0.173]	[0.246]	[0.137]	[0.109]	[0.238]
SOX	0.000			-0.003		
	[0.997]			[0.685]		
Firm Size	-0.013***	-0.010**	-0.002	-0.012**	-0.011**	-0.003
	[0.007]	[0.020]	[0.206]	[0.011]	[0.046]	[0.201]
Firm Age	-0.000	0.000	0.000	-0.000	-0.000	0.000
	[0.637]	[0.852]	[0.575]	[0.635]	[0.226]	[0.172]
Profitability	-0.002	-0.004	-0.016	-0.024	-0.032	-0.013
	[0.944]	[0.628]	[0.496]	[0.484]	[0.389]	[0.541]
Leverage	0.065***	0.083**	0.021	0.063**	0.066***	0.022
	[0.008]	[0.013]	[0.192]	[0.010]	[0.007]	[0.257]
Tobin's Q	0.008	0.013**	0.007	0.009	0.010	0.006
	[0.342]	[0.043]	[0.264]	[0.236]	[0.208]	[0.329]
Relative Deal Size				-0.019	-0.019	-0.019
				[0.111]	[0.119]	[0.104]
Friendly Target				-0.013	-0.012	-0.018
				[0.521]	[0.526]	[0.379]
Subsidiary Target				-0.008**	-0.009**	-0.008*
				[0.037]	[0.024]	[0.053]
Public Target				-0.024***	-0.024***	-0.027***
				[0.000]	[0.000]	[0.000]
All Cash Deal				0.012***	0.013***	0.011***
				[0.002]	[0.002]	[0.004]
Stock Deal				-0.005	-0.005	0.001
				[0.376]	[0.414]	[0.822]
Firm FE	Y	Y	N	Y	Y	N
Year FE	N	Y	Y	N	Y	Y
Industry FE	N	N	Y	N	N	Y
Observations	1,706	1,706	1,706	1,706	1,706	1,706
R-squared	0.255	0.260	0.059	0.289	0.300	0.172

Robustness Test on M&A Deals

This table represents the estimates of the effect of better governance on the market reaction to the announcement of M&A deals by the firms with powerful CEOs for four-day event window. The dependent variable is 'CAR' which is four-day (-1,2) cumulative abnormal return calculated using the market model. All models include baseline controls. Models (4)-(6) additionally control deal features.

Dependent variables	CAR					
Model	(1)	(2)	(3)	(4)	(5)	(6)
SOX x CEO Power	0.008***	0.007**	0.004*	0.007**	0.007**	0.005*
	[0.007]	[0.014]	[0.088]	[0.012]	[0.014]	[0.094]
CEO Power	-0.006**	-0.004	-0.002	-0.006**	-0.005*	-0.002
	[0.029]	[0.114]	[0.345]	[0.031]	[0.051]	[0.344]
SOX	-0.004			-0.007		
	[0.686]			[0.441]		
Baseline Controls	Y	Y	Y	Y	Y	Y
Deal Features	N	N	N	Y	Y	Y
Firm FE	Y	Y	N	Y	Y	N
Year FE	N	Y	Y	N	Y	Y
Industry FE	N	N	Y	N	N	Y
Observations	1,706	1,706	1,706	1,706	1,706	1,706
R-squared	0.254	0.271	0.057	0.287	0.306	0.169

3.5 Robustness Tests

3.5.1 CEO Overconfidence and Powerful CEOs

We check that the results are robust to controlling for the impact of CEO overconfidence. This is important because Banerjee et al. (2015) show that SOX helps to restrain overconfident CEOs by (inter alia) reducing overinvestment and by improving their takeover performance. Some of the powerful CEOs in our study could also be overconfident CEOs. However, the correlation coefficient between powerful CEOs and overconfident CEOs is negative (-0.0295), suggesting that spurious correlation between CEO power and CEO overconfidence is unlikely to drive our results.

We obtain qualitatively similar results when we control for CEO overconfidence. We do this by controlling for a variable analogous to Holder67 (constructed following the approach in Malmendier et al., 2011). We also re-run the models after excluding highly overconfident CEOs. Further, we examine models that include an overconfident-CEO variable and an interaction-term of overconfident-CEO and SOX (unreported). In all cases, we find results consistent with baseline findings.

3.5.2 Alternative Measures of Power and Compliant Firms

In this section, we focus on highly powerful CEOs and re-estimate the models. We expect that the moderating effect of regulatory changes would be more pronounced for highly powerful CEOs given that corporate policies of highly powerful CEOs are presumably more misaligned in a poorly governed firm. We construct a binary variable "CEO Power Top Q" that equals one if powerful CEO index is in the top quartile of the industry-year distribution.

The results in Table 9 Panel A show that firms with highly powerful CEOs generally adopt similar corporate policies reported in baseline results. We note that the interaction terms, 'SOX * CEO power', representing the impact of the regulatory change on highly powerful-CEOs' corporate policies and investments are significant. More importantly, the economic magnitude of the interaction term, is on average, higher than the baseline results.

Table 8: Powerful CEOs and Overconfident CEOs

This table represents the results of examining the effect of better governance on the non-compliant firms with powerful CEOs after controlling CEO's overconfidence. Models include publicly traded, non-regulated, non-compliant S&P1500 firms. Models (1), (9), (10), and (11) include analyses during 1992-2011. Models (2)-(6) include analyses for the available information on innovation from Kogan et al. (2017) during 1992-2008. Models (7)-(8) include analyses during 1992-2006 with available data on the market reaction to a new product announcement from Mukherjee et al. (2017). '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Dividend $Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Holder67' is an indicator equals one if the average vested option of the CEO is at least 67% in the money on at least two occasions, otherwise zero. All models include baseline controls and firm fixed effects. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	$[RD_{(t+1)}/Asset_{(t)}]$ x 100	Patents	Citations	Value of Innovation	Radical $\overline{90}$	Radical $\overline{95}$	75th Percentile Return	Product Announcement Return	$[CAPX_{(t+1)}/Asset_{(t)}]$ x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power	0.187**	0.069***	0.141***	0.093***	0.016*	0.018**	0.065***	0.012**	-0.221**	0.034***	0.005**
	[0.023]	[0.003]	[0.001]	[0.002]	[0.061]	[0.041]	[0.008]	[0.022]	[0.025]	[0.002]	[0.039]
CEO Power	-0.183***	-0.034**	-0.052	-0.016	-0.005	-0.006	-0.036**	-0.007	0.174**	-0.016**	-0.002
	[0.009]	[0.030]	[0.101]	[0.466]	[0.587]	[0.381]	[0.039]	[0.108]	[0.043]	[0.028]	[0.390]
SOX	-0.224	-0.368***	-1.089***	-0.412***	-0.062**	-0.061**	-0.473***	-0.099***	0.449	-0.052*	-0.006
	[0.301]	[0.000]	[0.000]	[0.000]	[0.021]	[0.013]	[0.000]	[0.000]	[0.103]	[0.060]	[0.425]
Holder67	0.267	-0.057	-0.219	0.020	-0.025	-0.022	0.081	0.010	0.051	-0.030	0.008
	[0.141]	[0.464]	[0.130]	[0.839]	[0.535]	[0.450]	[0.252]	[0.377]	[0.844]	[0.173]	[0.224]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	6,658	5,301	5,301	5,301	5,301	5,301	1,718	1,718	6,761	6,702	1,630
R-squared	0.853	0.789	0.738	0.738	0.745	0.728	0.619	0.724	0.699	0.780	0.286

Powerful CEOs, and Corporate Policies: After Excluding Highly Overconfident CEOs

This table represents results for examining the effect of better governance on the firms with powerful CEOs after excluding highly overconfident CEOs.

Dependent variables	$[RD_{(t+1)}/Asset_{(t)}]$ x 100	Patents	Citations	Value of Innovation	Radical $\overline{90}$	Radical $\overline{95}$	75th Percentile Return	Product Announcement Return	$[CAPX_{(t+1)}/Asset_{(t)}]$ x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power	0.205**	0.085***	0.171***	0.147***	0.026**	0.025**	0.043*	0.010*	-0.176*	0.035***	0.006*
	[0.022]	[0.002]	[0.000]	[0.000]	[0.037]	[0.022]	[0.076]	[0.068]	[0.084]	[0.002]	[0.098]
CEO Power	-0.128	-0.034*	-0.038	-0.012	-0.004	-0.005	-0.020	-0.004	0.153*	-0.014*	-0.002
	[0.121]	[0.083]	[0.302]	[0.679]	[0.622]	[0.531]	[0.296]	[0.348]	[0.066]	[0.052]	[0.466]
SOX	-0.262	-0.404***	-1.193***	-0.585***	-0.077**	-0.069**	-0.405***	-0.077***	0.167	-0.071**	0.002
	[0.246]	[0.000]	[0.000]	[0.000]	[0.028]	[0.023]	[0.000]	[0.000]	[0.561]	[0.012]	[0.888]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	5,642	4,384	4,384	4,384	4,384	4,384	1,372	1,372	5,657	5,606	1,371
R-squared	0.861	0.798	0.746	0.782	0.744	0.728	0.590	0.689	0.702	0.800	0.295

Table 9: High vs Less Powerful CEOs

This table represents the results of examining the effect of better governance on the non-compliant firms with highly powerful CEOs and less powerful CEOs. Models include publicly traded, non-regulated, non-compliant S&P1500 firms. Models (1), (9), (10), and (11) include analyses during 1992-2011. Models (2)-(6) include analyses for the available information on innovation from Kogan et al. (2017) during 1992-2008. Models (7)-(8) include analyses during 1992-2006 with available data on the market reaction to a new product announcement from Mukherjee et al. (2017). '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Dividend $Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. Panel A includes 'CEO Power Top Q' which is an indicator equals one if CEOs belong to the top 25% of the CEO power index distribution. Panel B includes 'CEO Power Bottom Q' which is an indicator equals one if CEOs belong to the bottom 25% of the CEO power index distribution. All models include baseline controls and firm fixed effects. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Panel A: Highly Powerful CEOs

Dependent variables	[RD(t+1)/ Asset(t)] x 100	Patents	Citations	Value of Innovation	Radical $\overline{90}$	Radical $\overline{95}$	75th Percentile Return	Product Announcement Return	[CAPX(t+1)/ Asset(t)] x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power Top Q	0.446**	0.163**	0.297**	0.236**	0.055*	0.052**	0.143*	0.027*	-0.575**	0.101***	0.019**
	[0.025]	[0.026]	[0.033]	[0.043]	[0.056]	[0.038]	[0.052]	[0.062]	[0.041]	[0.002]	[0.048]
CEO Power Top Q	-0.118	-0.097**	-0.151	-0.026	-0.007	-0.010	-0.033	-0.009	0.402	-0.027	-0.007
	[0.423]	[0.047]	[0.141]	[0.744]	[0.712]	[0.546]	[0.516]	[0.414]	[0.109]	[0.220]	[0.323]
SOX	0.076	-0.305***	-0.960***	-0.723***	-0.090***	-0.071***	-0.395***	-0.079***	0.136	-0.013	0.006
	[0.571]	[0.001]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]	[0.000]	[0.516]	[0.562]	[0.370]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,128	5,472	5,472	5,472	5,472	5,472	1,762	1,762	7,184	7,122	1,706
R-squared	0.872	0.798	0.745	0.781	0.745	0.729	0.615	0.687	0.699	0.770	0.288

Panel B: Less powerful CEOs

Dependent variables	[$RD_{(t+1)}$/ $Asset_{(t)}$] x 100	Patents	Citations	Value of Innovation	Radica_ 90	Radica_ 95	75th Percentile Return	Product Announcement Return	[$CAPX_{(t+1)}$/ $Asset_{(t)}$] x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power Bottom Q	-0.415**	-0.065	-0.192	-0.189	0.014	0.004	-0.068	-0.022	0.461	-0.064***	-0.013
	[0.011]	[0.374]	[0.130]	[0.101]	[0.652]	[0.895]	[0.321]	[0.112]	[0.125]	[0.006]	[0.108]
CEO Power Bottom Q	0.392***	0.085*	0.126	0.046	-0.001	-0.000	0.023	0.015	-0.326	0.038**	0.010
	[0.003]	[0.054]	[0.122]	[0.451]	[0.967]	[0.977]	[0.618]	[0.144]	[0.164]	[0.010]	[0.120]
SOX	0.287**	-0.243***	-0.828***	-0.346***	-0.049**	-0.058***	-0.359***	-0.066***	-0.134	0.032	0.010
	[0.022]	[0.005]	[0.000]	[0.001]	[0.013]	[0.004]	[0.000]	[0.000]	[0.534]	[0.165]	[0.119]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	7,128	5,472	5,472	5,472	5,472	5,472	1,762	1,762	7,184	7,122	1,706
R-squared	0.873	0.798	0.745	0.781	0.745	0.729	0.615	0.687	0.699	0.770	0.287

Finally, in an unreported falsification test, we re-estimate the models for the sample of compliant firms with powerful CEOs in the post-regulation period. The analysis evaluates whether powerful CEOs in compliant firms also initiate strategic shifts within their firms in the post-regulation period. We find that compliant firms with powerful CEOs generally adopt similar corporate policies to compliant firms without powerful CEOs in the post regulation period. That is, agency conflict is less of a concern in compliant firms. Thus, the marginal effect of the regulatory change on better corporate outcomes is statistically indistinguishable from zero[62].

3.5.3 Placebo test: Non-powerful CEOs

In addition, we conduct a placebo test where we rerun the baseline regressions using an indicator that takes the value 1 if the CEO power score is in the bottom quartile of the industry-year distribution. Thus, using the sample of non-compliant less powerful CEO managed firms as a treatment group (placebo treatment), we explore the sensitivity of corporate policies to the regulatory change (see, Table 9 Panel B). The results do not hold consistently for the *non-compliant firms* with less powerful CEOs (CEO Power Bottom Q) suggesting that CEOs who have limited power are less likely to adopt self-serving corporate policies. That is, the corporate policies of less powerful CEO managed firms and firms without powerful CEOs are not significantly different in the post-regulation period.

3.5.4 Placebo Shocks

We also introduce placebo shocks to examine the robustness of our analysis. We follow Atanasov and Black (2016) and only use pre-treatment data and apply a placebo shock at a different time (the year 1996)[63]. We document insignificant and indifferent effects of

[62] The only variables for which we get 'SOX x CEO Power' significant in the compliant firm sample are 'Patents, 'Citations' and 'Value of Innovation'. As reported in Table 1 Panels A and B, *compliant firms* have significantly higher patents, citations, and patent value not only during the sample period but also in the pre-regulation period. Since the pre-treatment trend in these outcome variables could continue without treatment, we cannot interpret these results causally (Atanasov and Black 2016).

[63] We also use the years 1997 and 1998 as placebo shock years and find robust outcomes.

the placebo shock on the corporate policies of firms managed by powerful CEOs against firms without powerful CEOs. More importantly, this results further demonstrate that our results are not being driven by any apparent pre-treatment trends. We report these results in Table 10.

3.5.5 SOX Induced CEO Turnover and Shorter Event Window

A concern with using regulatory changes as an identification strategy is that powerful CEOs may be replaced during the SOX period. Thus, the changes in corporate policy may be driven by a new CEO. We address this concern by excluding firms that experience turnover of CEOs around SOX in 2002 (i.e., for whom the CEO in 2001 is different from the CEO in 2003). Our main findings hold suggesting that the results are not affected by SOX induced CEO turnover. These results are in Table 11.

Our analysis considers the longer-term effect of the regulatory change using a 20-year window (10 years before and 10 years after) since a strategic shift in corporate policies, such as R&D investment, innovation, takeovers and dividend policy may take longer to respond to the regulatory change. However, DID estimates are more consistent when we compare outcomes just before and just after the policy change. The fundamental identifying assumption of DID is the parallel trend and this assumption is often valid for a short event window. Many confounding events may take place in a longer event window and thus distort the effect of the exogenous event. We re-estimate the analysis using a 10-year window (5 years before and 5 years after). However, we continue to find consistent results suggesting that other confounding events are less likely to drive our results. (Table 12).

Table 10: Powerful CEOs and Corporate Policies: Placebo Shock

This table represents the results of the effect of a placebo shock on the firms with powerful CEOs. Models include publicly traded, non-regulated, non-compliant S&P1500 firms for 1992-2001. '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. '$Dividend\ Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'Placebo shock' is an indicator that equals one if the observation occurs in 1996 or later but before 2002 and zero if the observation occurs before 1996. All models include baseline control variables and firm fixed effects. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	[$RD_{(t+1)}$ / $Asset_{(t)}$] x 100	Patents	Citations	Value of Innovation	Radical_90	Radical_95	75th Percentile Return	Product Announcement Return	[$CAPX_{(t+1)}$ / $Asset_{(t)}$] x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Placebo Shock x CEO Power	0.172	0.021	0.061	0.023	-0.001	0.002	-0.052	-0.001	-0.041	0.012	-0.002
	[0.125]	[0.387]	[0.158]	[0.487]	[0.952]	[0.826]	[0.241]	[0.973]	[0.808]	[0.168]	[0.768]
CEO Power	-0.207*	-0.019	-0.028	-0.005	-0.002	-0.003	0.009	-0.001	0.051	-0.011	-0.006
	[0.075]	[0.477]	[0.544]	[0.884]	[0.859]	[0.712]	[0.827]	[0.920]	[0.773]	[0.182]	[0.279]
Placebo Shock	0.091	-0.100	-0.361***	-0.019	-0.035	-0.030	0.243**	0.023	-0.280	-0.076***	0.017
	[0.752]	[0.187]	[0.005]	[0.837]	[0.308]	[0.263]	[0.044]	[0.550]	[0.554]	[0.006]	[0.383]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,679	2,515	2,515	2,979	2,979	2,979	767	767	3,298	3,283	689
R-squared	0.897	0.929	0.881	0.864	0.905	0.901	0.673	0.780	0.740	0.777	0.373

Table 11: Powerful CEOs and Corporate Policies: After Excluding Firms Experiencing CEO Turnover around SOX

This table represents the results of examining the effect of better governance on the non-compliant firms with powerful CEOs after excluding firms that experienced CEO turnovers during 2002-2003. Models include publicly traded, non-regulated, non-compliant S&P1500 firms. Models (1), (9), (10), and (11) include analyses during 1992-2011. Models (2)-(6) include analyses for the available information on innovation from Kogan et al. (2017) during 1992-2008. Models (7)-(8) include analyses during 1992-2006 with available data on the market reaction to a new product announcement from Mukherjee et al. (2017). '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Dividend $Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. All models include baseline controls and firm fixed effects. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent Variables	$[RD_{(t+1)}/Asset_{(t)}] \times 100$	Patents	Citations	Value of Innovation	Radical_90	Radical_95	75th Percentile Return	Product Announcement Return	$[CAPX_{(t+1)}/Asset_{(t)}] \times 100$	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power	0.211***	0.074***	0.143***	0.130***	0.023**	0.020**	0.051**	0.012**	-0.259**	0.042***	0.005*
	[0.003]	[0.006]	[0.006]	[0.002]	[0.044]	[0.049]	[0.048]	[0.049]	[0.016]	[0.001]	[0.064]
CEO Power	-0.174***	-0.029	-0.026	-0.010	-0.011	-0.011	-0.039*	-0.008	0.186*	-0.020**	-0.003
	[0.001]	[0.111]	[0.493]	[0.743]	[0.199]	[0.152]	[0.059]	[0.109]	[0.056]	[0.015]	[0.264]
SOX	-0.280	-0.425***	-1.212***	-0.589***	-0.088***	-0.071**	-0.439***	-0.099***	0.540*	-0.060*	-0.001
	[0.189]	[0.000]	[0.000]	[0.000]	[0.008]	[0.017]	[0.000]	[0.000]	[0.078]	[0.075]	[0.918]
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	5,532	4,320	4,320	4,320	4,320	4,320	1,406	1,406	5,573	5,529	1,313
R-squared	0.871	0.796	0.745	0.787	0.763	0.743	0.633	0.735	0.712	0.776	0.301

Table 12: Powerful CEOs and Corporate Policies: Using Shorter Event Window

This table represents results of examining the effect of better governance on the firms with powerful CEOs during 1997-2006. Models include publicly traded, non-regulated, non-compliant S&P1500 firms. '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the $time_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the $time_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. '$Dividend\ Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. All models include baseline controls and firm fixed effects. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	$[RD_{(t+1)}/Asset_{(t)}] \times 100$	Patents	Citations	Value of Innovation	75th Percentile Return	Product Announcement Return	$[CAPX_{(t+1)}/Asset_{(t)}] \times 100$	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOX x CEO Power	0.201***	0.037*	0.120***	0.083**	0.066***	0.010**	-0.162*	0.031***	0.006**
	[0.001]	[0.064]	[0.004]	[0.011]	[0.006]	[0.032]	[0.079]	[0.005]	[0.045]
CEO Power	-0.155**	-0.020	-0.043	-0.035	-0.033*	-0.005	0.134*	-0.014**	-0.006**
	[0.014]	[0.230]	[0.204]	[0.209]	[0.065]	[0.235]	[0.099]	[0.040]	[0.047]
SOX	-0.305	-0.316***	-1.066***	-0.524***	-0.356***	-0.060***	0.965***	-0.022	-0.002
	[0.123]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.445]	[0.888]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	4,094	3,781	3,781	3,781	1,547	1,547	4,356	4,311	1,085
R-squared	0.883	0.917	0.841	0.886	0.647	0.748	0.729	0.820	0.345

3.5.6 Other Sources of Power and Omitted Governance Variables

We also ensure that the results are robust to controlling for other governance variables. We include CEO Pay Slice (CPS) that measures the relative importance of the CEO and the extent to which the CEO may extract rents. Bebchuk et al. (2011) suggest that CPS measures the centrality of the CEO in the compensation structure and reflects the outcome of CEO power on compensation.. In addition, we include whether the CEO is the only insider on the board (Adams et al. (2005)). The results in Table 13 after controlling for these variables, are consistent with our main results.

Although our specification use firm-fixed effects which lessen the likelihood that our results may be driven by other omitted corporate governance characteristics, we control for additional corporate governance features. External governance mechanisms, such as institutional holdings of company stock, may exert influence on the CEOs' investment preferences and quality (Edmans 2009, Mccahery, Sautner, and Starks 2016, Appel, Gormley, and Keim 2016). In addition, dual-class share structures can enable managers to hold greater control rights and thus may allow CEOs to pursue private benefits at shareholder's expense (Masulis et al., 2009, Villalonga and Amit 2006). We find results consistent with our baseline estimations reported in Table 13 Panel A.

Finally, previous literature suggests that dual class structure allows CEOs to engage in value-destroying acquisitions more often and firm's capital expenditures contribute less to shareholder value (Masulis et al., 2009). Gompers, Ishii, and Metrick (2010) argue that in dual-class firms, firm value is increasing in insiders' cash-flow rights and decreasing in insider voting rights. As we use CEO ownership concentration and founder status as sources of managerial power, one plausible concern is that our results could be driven/influenced by dual-class firms. To disentangle the dual class effect in our study, we exclude all dual class firms and re-run all baseline models and we continue to find consistent results except for takeover performance which is not statistically significant at conventional levels (significant at the 11% level).

Table 13: Alternative Sources of CEO Power and Concern for Omitted Variable Bias

This table represents the results of the effect of better governance on the non-compliant firms with powerful CEOs after addressing other potential sources of CEO power and concern for omitted variables bias. Models include publicly traded, non-regulated, non-compliant S&P1500 firms. '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of $patents_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90^{th} percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95^{th} percentile of the technology-class-year citations distribution. '75^{th} Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75^{th} percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. '$Dividend\ Payer_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Only Insider' is an indicator equals one if the CEO is the only insider in the corporate board of the firm, zero otherwise. 'CPS' is the CEO pay slice- the percentage of the total compensation of the top five executives received by the CEO. 'Institutional holdings' is the proportional ownership of institutional investors. 'Dual Class' is an indicator equals one for firms with dual-class shares, zero otherwise. All models include baseline controls and firm fixed effects. Panel B also includes industry-year interacted joint fixed effects. Standard errors are clustered at the firm-level in panel A. Standard errors are clustered at the industry-year level in panel B. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Panel A: Alternative Sources of Executive Power and Governance Measures

Dependent variables	[RD(t+1)/ Asset(t)] x 100	Patents	Citations	Value of Innovation	Radical 90	Radical 95	75th Percentile Return	Product Announcement Return	[CAPX(t+1)/ Asset(t)] x 100	Dividend Payer(t+1)	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power	0.211**	0.043*	0.097**	0.126***	0.021*	0.016*	0.049*	0.009*	-0.264***	0.032***	0.008*
	[0.011]	[0.054]	[0.029]	[0.001]	[0.066]	[0.090]	[0.071]	[0.095]	[0.006]	[0.006]	[0.083]
CEO Power	-0.187**	-0.033	-0.052	-0.072**	-0.011	-0.005	-0.036	-0.005	0.204**	-0.018**	-0.005
	[0.012]	[0.107]	[0.233]	[0.042]	[0.378]	[0.603]	[0.103]	[0.205]	[0.027]	[0.042]	[0.226]
SOX	-0.427*	0.069	-0.406***	-0.096	-0.024	-0.020	-0.363***	-0.076***	0.788***	-0.026	-0.008
	[0.062]	[0.371]	[0.006]	[0.510]	[0.476]	[0.454]	[0.000]	[0.000]	[0.001]	[0.293]	[0.529]
Only Insider	-0.082	0.136***	0.117	0.304***	0.058	0.046	-0.078*	-0.021**	-0.215	-0.007	-0.006
	[0.415]	[0.010]	[0.144]	[0.001]	[0.101]	[0.132]	[0.072]	[0.018]	[0.154]	[0.662]	[0.280]
CPS	-0.196	-0.051	0.025	0.052	0.058	0.007	-0.296*	-0.065*	-0.181	-0.022	-0.011
	[0.619]	[0.712]	[0.918]	[0.837]	[0.530]	[0.923]	[0.064]	[0.093]	[0.728]	[0.647]	[0.540]
Dual Class	-0.615	-0.073	-0.207	-0.029	-0.101	-0.095	0.244	0.026	-1.185**	-0.025	0.005
	[0.117]	[0.594]	[0.401]	[0.910]	[0.206]	[0.156]	[0.156]	[0.285]	[0.047]	[0.453]	[0.824]
Institutional Holdings	-0.769	-0.497**	-0.443	-0.384	-0.131	-0.083	-0.435**	-0.090***	0.674	0.044	0.006
	[0.136]	[0.010]	[0.227]	[0.268]	[0.176]	[0.287]	[0.016]	[0.007]	[0.328]	[0.417]	[0.856]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	4,249	3,464	3,464	3,464	3,464	3,464	1,159	1,159	4,250	4,205	1,081
R-squared	0.896	0.804	0.755	0.783	0.725	0.705	0.686	0.758	0.726	0.823	0.303

Powerful CEOs, and Corporate Policies: After Excluding Dual Class Firms

Dependent variables	[RD(t+1)/ Asset(t)] x 100	Patents	Citations	Value of Innovation	Radical 90	Radical 95	75th Percentile Return	Product Announcement Return	[CAPX(t+1)/ Asset(t)] x 100	Dividend Payer(t+1)	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x CEO Power	0.173**	0.049*	0.111**	0.093**	0.023*	0.022*	0.055**	0.009*	-0.187*	0.030**	0.007
	[0.013]	[0.093]	[0.032]	[0.049]	[0.086]	[0.068]	[0.049]	[0.095]	[0.091]	[0.011]	[0.104]
CEO Power	-0.131**	-0.039*	-0.048	-0.008	-0.013	-0.010	-0.032	-0.004	0.126	-0.011	-0.006*
	[0.039]	[0.076]	[0.259]	[0.827]	[0.227]	[0.286]	[0.118]	[0.313]	[0.189]	[0.152]	[0.076]
SOX	-0.281	-0.144	-0.735***	-0.335	-0.077*	-0.066*	-0.359***	-0.078***	0.379	-0.045	-0.013
	[0.203]	[0.271]	[0.005]	[0.108]	[0.072]	[0.074]	[0.000]	[0.000]	[0.221]	[0.200]	[0.290]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	4,826	3,820	3,820	3,820	3,820	3,820	1,300	1,300	4,716	4,813	1,191
R-squared	0.888	0.832	0.795	0.807	0.768	0.750	0.615	0.741	0.734	0.799	0.289

Panel B: High Dimensional Fixed Effects

Dependent variables	[RD(t+1)/ Asset(t)] x 100	Patents	Citations	Value of Innovation	75th Percentile Return	Product Announcement Return	[CAPX(t+1)/ Asset(t)] x 100	Dividend Payer(t+1)	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SOX x CEO Power	0.161***	0.028*	0.055**	0.050*	0.060***	0.016***	-0.240***	0.035***	0.006*
	[0.000]	[0.090]	[0.031]	[0.063]	[0.009]	[0.002]	[0.002]	[0.000]	[0.079]
CEO Power	-0.136***	-0.017	-0.019	0.022	-0.027	-0.006	0.182***	-0.015***	-0.002
	[0.003]	[0.161]	[0.332]	[0.240]	[0.146]	[0.134]	[0.005]	[0.000]	[0.568]
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry x Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	6,998	5,211	5,211	5,211	1,344	1,344	7,067	7,003	1,443
R-squared	0.881	0.879	0.843	0.843	0.729	0.798	0.755	0.803	0.402

3.5.7 Alternative Econometric Modelling

We also test whether the results are robust to alternative fixed effects. Specifically, industry-specific shocks in a year may affect firm-level policies. Thus, unobserved heterogeneity across industries might also correlate with corporate policies besides unobserved heterogeneity across firms. To mitigate this concern, we run the baseline specifications using (industry times year) interacted joint fixed-effects with firm fixed effects instead of the baseline year fixed-effects and industry fixed-effects or year fixed-effects and firm-fixed effects. High-dimensional fixed effects models also allow us to remove any potential firm or industry level omitted variable bias problems (Gormley and Matsa 2014). The results in Table 13 Panel B are consistent with the baseline results suggesting that time-varying industry shocks are unlikely to drive our results.

3.5.8 Triple Difference Analysis

Our analysis mainly concentrates on *non-compliant firms* having weaker governance mechanisms before adopting regulatory imposed board independence. Our methodology allows us to avoid problems of DID analysis with multiple subpopulations where some firms are subject to policy intervention (here, *non-compliant firms*) and others not (here, *compliant firms*) (Athey and Imbens 2006). Thus, model (1) allows us to get true counterfactuals (*non-compliant firms* without powerful CEOs) to analyze the effect of powerful CEOs on corporate policies (see, (Bertrand, Duflo, and Mullainathan 2004). However, as an additional robustness check, we perform a triple difference analysis (Diff-in-diff-in-diff) to compare the moderating effect of quasi-exogenous improvement in board governance on powerful CEOs with *compliant firms*. The covariate balance test of the treatment and control groups of this analysis shows that the treatment and control groups had balance in all covariates except firm age. We control for firm age and other covariates in the baseline specifications of all models. We find after using firm and year fixed effects, the coefficient 'SOX x Non-compliant x CEO Power' is economically and statistically significant. The results suggest that the moderating effect of the regulatory change on corporate policies is stronger for *non-compliant firms* with powerful CEOs.

Table 14: Powerful CEOs and Corporate Policies: Generalized Triple-difference

This table presents the regression estimates capturing the differential effects of improved governance on firm's corporate policies for powerful CEO managed non-compliant firms relative to powerful CEO managed compliant firms. Models include publicly traded, non-regulated S&P1500 firms. Models (1), (9), (10), and (11) include analyses during 1992-2011. Models (2)-(6) include analyses for the available information on innovation from Kogan et al. (2017) during 1992-2008. Models (7)-(8) include analyses during 1992-2006 with available data on the market reaction to a new product announcement from Mukherjee et al. (2017). '$RD_{(t+1)}/Asset_{(t)}$] x 100' is the R&D expenditures$_{(t+1)}$ scaled by assets$_{(t)}$. 'Patents' are the natural logarithm of one plus number of patents applied by the firms at the time $_{(t+2)}$. 'Citations' are the natural logarithm of one plus number of citations attributed to the firms' patents at the time $_{(t+2)}$. 'Value of Innovation' is the natural logarithm of one plus the average value of patents$_{(t+2)}$. 'Radical_90' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90th percentile of the technology-class-year citations distribution. 'Radical_95' is the natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95th percentile of the technology-class-year citations distribution. '75th Percentile Return' is the natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75th percentiles. 'Product Announcement Return' is the natural logarithm of the sum of all positive cumulative abnormal returns over the year. '$CAPX_{(t+1)/}Asset_{(t)}$] x 100' is the value of capital expenditures$_{(t+1)}$ scaled by assets$_{(t)}$. 'Dividend Payer$_{(t+1)}$' is an indicator equals one if the firm pays dividends, zero otherwise. 'CAR' is the three-day cumulative abnormal return calculated using the market model. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. 'SOX' is an indicator that equals one if the observation occurs in 2002 or later and zero otherwise. 'Non-compliant' is an indicator equals one for the firms which did not have the fully independent audit committee or majority board independence before 2002. All models include baseline control variables, firm fixed effects, and interactions between year fixed effects and 'CEO Power'. Standard errors are clustered at the firm-level. p-values are in parentheses. Significance levels: *=10%; **=5%; ***=1%.

Dependent variables	[$RD_{(t+1)}$ / $Asset_{(t)}$] x 100	Patents	Citations	Value of Innovation	Radical_90	Radical_95	75th Percentile Return	Product Announcement Return	[$CAPX_{(t+1)}$ / $Asset_{(t)}$] x 100	Dividend $Payer_{(t+1)}$	CAR
Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SOX x Non-compliant x CEO Power	0.228***	0.093***	0.309***	0.168***	0.025**	0.023**	0.088***	0.016**	-0.272**	0.022*	0.006*
	[0.008]	[0.002]	[0.000]	[0.001]	[0.042]	[0.030]	[0.003]	[0.012]	[0.042]	[0.078]	[0.088]
Non-compliant x CEO Power	-0.178**	-0.055***	-0.110***	-0.080**	-0.019*	-0.017*	-0.042*	-0.007	0.206*	-0.008	-0.002
	[0.026]	[0.007]	[0.009]	[0.013]	[0.059]	[0.054]	[0.052]	[0.179]	[0.074]	[0.352]	[0.615]
SOX x Non-compliant	-0.090	-0.149*	-0.492***	-0.214	-0.057*	-0.049*	-0.212***	-0.043***	0.572*	-0.039	-0.013
	[0.687]	[0.082]	[0.008]	[0.104]	[0.075]	[0.075]	[0.001]	[0.004]	[0.061]	[0.151]	[0.125]
CEO Power x Year	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Baseline Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	14,987	11,883	11,883	11,883	11,883	11,883	3,992	3,992	14,896	14,782	3,638
R-squared	0.850	0.838	0.772	0.824	0.760	0.740	0.609	0.682	0.674	0.790	0.292

Covariate Balance Test for Generalized Triple-difference

This table reports the balance of covariates between treatment and control firms during the pre-regulatory period. The sample consists of publicly traded, non-regulated firms that were available from Execucomp. The sample excludes missing data on CEO power components and firms with missing information of corporate board structure before the year 2002. The non-compliant firms are the firms without a fully independent audit committee or majority board independence before the year 2002. 'CEO Power' is an index: the sum of five indicators- 'Founder CEO', 'CEO-Chair Duality', 'Title Concentration', 'CEO Tenure above Industry Median' and 'CEO Ownership above Industry Median' and thus the index value ranges from 0 to 5. Treatment firm sample includes the non-compliant firms. Control firm sample includes the other firms. 'Firm size' is the natural logarithm of the asset. 'Firm age' is the difference between the current year and the year of firm's incorporation. 'Profitability' is the earnings before interest and tax (EBIT) scaled by assets. 'Leverage' is the long-term debt scaled by $assets_{(t-1)}$. 'Tobin's Q' is the natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. Standard errors are clustered at the firm-level for t-test.

	Treatment Firms			Control Firms			t-test
Variables	Mean	Median	SD	Mean	Median	SD	
Firm Size	6.984	6.774	1.455	7.079	6.912	1.518	-1.08
Firm Age	21.028	15.000	17.951	23.970	17.000	20.290	-2.55**
Profitability	0.037	0.053	0.123	0.035	0.051	0.124	0.43
Leverage	0.196	0.166	0.189	0.203	0.181	0.187	-0.62
Tobin's Q	0.650	0.535	0.602	0.672	0.512	0.631	-0.66

3.5.9 CEO Power Index Composition

We follow guidance from the extant literature to construct the proxy for CEO power. One concern with adopting this approach is that one of the components may unduly drive our interpretations of the findings. To mitigate this concern, in unreported tests, we repeat our analysis by reconstructing the CEO power index by iteratively omitting one of these sources of power at a time and continue to find consistent results. We also use an alternative definition of powerful CEOs defined as an indicator dummy that equals 1 if the CEO power index score is in the top decile of the distribution and find consistent results.

3.6 Conclusion

This paper addresses how improvements in corporate governance can help to rein in powerful CEOs. In so doing the paper interfaces with several key issues in the literature, including how to restrain powerful CEOs and whether, and when, the governance changes mandated in SOX and the NYSE/NASDAQ listing rules, have been beneficial. Prior studies suggest that powerful CEOs might harm shareholders either through empire building or through complacency. Further, there is some controversy over the utility of regulations targeting mandatory adoption of an independent board, with some evidence that compliance costs discouraged some firms from listing in the US.

We analyze whether a quasi-exogenous increase in board independence, as mandated by regulatory changes, can mitigate the harms of powerful CEOs. In particular, the study challenges the notion that powerful CEOs are detrimental for all firms by exploring the heterogeneity in firms' pre-regulation governance. We show that a powerful CEO coupled with poor corporate governance drives the negative views of powerful CEOs. An exogenous improvement in the governance of the firm may bring a balance of managerial power *vis-à-vis* directors and thus a strategic shift in firms with powerful CEOs, diverting the energy and efforts of powerful CEOs to value-enhancing projects.

The study shows that after the exogenous improvement in governance, powerful CEOs in these firms reduced investment in tangible assets and powerful CEOs'

acquisitions created more value. This implies that quasi-exogenous improvement in board governance helped to reduce empire building by powerful CEOs.

We also find that the adoption of an independent board encourages powerful CEOs to increase long-term strategic investments, e.g., in innovation. An increase in innovation inputs (R&D investments) then translates into an increase in innovation output quantity and quality (patents, patent citations, and patent value). Mandatory adoption of independent boards is also associated with the market reacting more positively to powerful CEOs' new product announcements. Further, dividend payout policy of these firms has improved, suggesting that increased oversight helps to prevent powerful CEOs hoarding cash. We conduct a battery of robustness tests to ensure the veracity of these results, including placebo tests and falsification tests. We find that regulatory changes mandating an independent board do not influence powerful CEOs in firms that have already complied with its requirements before its passage. Further, these regulations have less of an impact on non-powerful CEOs, who arguably are less apt to directly benefit from the exogenous improvements in corporate governance as they are already more susceptible to board scrutiny.

These results overall suggest that increased board independence can be beneficial and that it can be one way to reign in powerful CEOs. This highlights that SOX, and the NYSE /NASDAQ rule changes, have benefited some firms. Further, it suggests that companies, both in the US and elsewhere, might consider increasing independent oversight in order to reign in powerful CEOs and mitigate empire building.

Table TA7: Variable Definition

Powerful CEO Index	
Founder CEO	Indicator variable that equals one if any source explicitly mentions that the current CEO is one of the original founders of the firm or was the main executive at the time the company was founded. Source: hand-collected from several sources including 10-K filings of the SEC available through Electronic Data-Gathering, Analysis, and Retrieval (EDGAR), Funding Universe website, company websites, Wikipedia, Bloomberg website and other Internet sources.
CEO-Chair Duality	Indicator variable taking the value of one if the CEO is also the chairman of the firm and zero otherwise. Source: Execucomp.
Title Concentration	Indicator variable taking the value of one if the CEO, who is also the chairman of the firm, additionally holds any one, or more, other senior posts (titles), including COO, President, and CFO. Source: Execucomp.
CEO Tenure	CEO tenure in years. Source: Execucomp and hand-collected from several sources including 10-K filings of the SEC available through Electronic Data-Gathering, Analysis, and Retrieval (EDGAR), Funding Universe website, company websites, Wikipedia, Bloomberg website and other Internet sources.
CEO Tenure above the Industry Median	Indicator variable taking the value of one if the tenure is above the median tenure of CEOs in the industry-year distribution of tenure where the industry is defined using 2-digit SIC code, zero otherwise.
CEO Ownership	Percentage of share ownership held by CEOs. Source: Execucomp.
CEO Ownership above the Industry Median	Indicator variable taking the value of one if the ownership is above the median ownership of CEOs in the industry-year distribution of ownership where the industry is defined using 2-digit SIC code, zero otherwise.
CEO Power	An index which is an aggregate measure of the five components of CEO power-Founder CEO, CEO-Chair Duality, Title Concentration, CEO Tenure above Industry Median and CEO Ownership above Industry Median and thus the index value ranges from 0 to 5.
CEO Power Top Q	Indicator variable taking the value of one if the CEO power index is in the top 25% of the industry-year distribution, zero otherwise.

CEO Power Bottom Q	Indicator variable taking the value of one if the CEO power index is in the bottom 25% of the industry-year distribution, zero otherwise.
Firm Characteristics and Control Variables	
Firm Size	The natural logarithm of the book value of the total assets. Source: Compustat.
Firm Age	Firm's age since incorporation. Sources: CRSP.
Profitability	Earnings before interest and tax scaled by book value of a firm's total assets. Source: Compustat.
Leverage	Firms total debt in the year t scaled by book value of total assets in the year t-1. Source: Compustat.
Tobin's Q	The natural logarithm of the book value of debt plus the market value of equity scaled by the book value of assets. Source: Compustat.
$RD_{(t)}$	Research and development expenditures in the year t scaled by total assets in the year t-1. Sources: Compustat.
CPS	The percentage of the total compensation of the top five executives that goes to the CEO. Source: Execucomp.
Only Insider	An indicator equals one if CEO is the only insider on the board, zero otherwise. Source: ISS.
Dual Class	An indicator equals one for firms with dual-class shares, zero otherwise. Source: ISS.
Institutional Holdings	Proportional ownership of institutional investors. Source: Thomson 13f Institutional holdings.
SOX	The indicator that equals one if the observation occurs in 2002 or later, zero otherwise.
Placebo Shock	The indicator that equals one if the observation occurs during 1996-2000 and zero if the observation occurs before 1996.
Holder67	The indicator equals one if the average vested option of the CEO is at least 67% in the money on at least two occasions, zero otherwise. Source: Execucomp and CRSP (See, Malmendier et al., 2011).
Highly Overconfident CEOs	The indicator equals one if CEOs belong to the top 5% of the *Holder67* measure, zero otherwise. Source: Execucomp and CRSP.
Dependent Variables	
$RD_{(t+1)}/\ Asset_{(t)}$	$R\&D\ expenditures_{(t+1)}$ scaled by $assets_{(t)}$. Source: Compustat.
$CAPX_{(t+1)}/\ Asset_{(t)}$	Capital $expenditures_{(t+1)}$ scaled by $assets_{(t)}$. Source: Compustat.
CAR	The three-day cumulative abnormal return (-1,1) calculated using the market model. Source: SDC platinum and CRSP.

Dividend Payer$_{(t+1)}$	The indicator equals one if firm pays dividends at the period (t+1), zero otherwise. Source: Compustat.
Patent	The natural logarithm of one plus number of patents applied by the firms at the time (t+2). Source: KPSS (2017).
Citations	The natural logarithm of one plus number of citations attributed to the firms' patents at the time (t+2). Source: KPSS (2017).
Patent Value	The natural logarithm of one plus the average value of patents$_{(t+2)}$. Source: KPSS (2017).
Radical_90	The natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 90th percentile of the technology-class-year citations distribution. Source: KPSS (2017).
Radical_95	The natural logarithm of one plus number of patents $_{(t+2)}$ with citations in the 95th percentile of the technology-class-year citations distribution. Source: KPSS (2017).
Product Announcement Return	The natural logarithm of the sum of all positive cumulative abnormal returns over the year. Source: Mukherjee et al. (2017).
75th Percentile Return	The natural logarithm of one plus the number of announcements with the cumulative abnormal returns above the 75th percentiles. Source: Mukherjee et al. (2017).
Deal Specific Features	
Relative Deal Size	The transaction value over acquirer's market capitalization on 11 days before the announcement date. Source: SDC platinum.
Friendly Deal	The indicator equals one if the deal is friendly, zero otherwise. Source: SDC platinum.
Subsidiary Target	The indicator equals one if the target company is a subsidiary company, zero otherwise. Source: SDC platinum.
Public Target	The indicator equals one if the target company is a public company, zero otherwise. Source: SDC platinum.
All Cash Deal	The indicator equals one if the deal is fully cash financed, zero otherwise. Source: SDC platinum.
Stock Deal	The indicator equals one if the acquirer pays a positive fraction of the transaction value using stocks, zero otherwise. Source: SDC platinum.

Chapter 4

Dissecting Family Firms

4.1 Introduction

Family businesses are a prevalent feature of many economies and have significant resources under their control.[64]The impact of founding family ownership and management on firm performance and corporate outcomes has been the subject of extensive research in both the finance and management fields. However, the existing studies provide conflicting views on the effect of family ownership on corporate outcomes.

For example, some studies (Anderson and Reeb 2003a, Villalonga and Amit 2006, Hsu, Huang, Massa, and Zhang 2014) document a positive 'founding family premium'. In contrast, other studies highlight value destruction by the founding families and argue that family firms may extract private benefits to the detriment of shareholders or stakeholders (Demsetz, 1983, Demsetz and Lehn 1985, Morck, Shleifer, and Vishny 1988, Holderness and Sheehan 1988, Burkart, Gromb, and Panunzi 1997, Faccio, Lang, and Young 2001). Further, there are conflicting results on the impact of the level of involvement of founding family members (either as CEOs or board directors) on corporate outcomes including strategic investments and financing decisions (Johnson, Magee, Nagarajan and Newman 1985, Stein 1988, Mishra and McConaughy 1999, Fahlenbrach 2009, Li and Srinivasan 2011, He and Tian 2013, Block, Miller, Jaskiewicz, and Spiegel 2013).

Conflicting results in the family firm literature are difficult to reconcile, and thus evidence of the impact of family firms on corporate policies or firm performance is inconclusive. One plausible reason for such conflicting views in this context is the absence of a consistent definition of a family firm in the literature. That is, empirical studies employ a wide variety of definitions of family-firms[65]and as such, the results of these studies are likely to be sensitive to how family firms are identified. Moreover, although some previous studies do not distinguish between family ownership and family

[64]Claessens, Djankov, and Lang (2000) report that more than two-thirds of firms in East Asia are controlled by a single shareholder. La Porta, Silanes, and Shleifer (1999) report that 30% firms in their sample from 27 richest economies are controlled by families or individuals. They use a 20% family ownership threshold to identify those firms. Using a less restrictive cut-off of 10% ownership and for smaller firms, that proportion rises to 53%.

[65]See Miller, Miller, and Lester (2010) for an extensive list of studies that employ wide-ranging definitions of family firms.

management when defining a family firm, founding family involvement in a business distinguishes a family firm from others.[66]In addition, pervasive endogeneity also hinders the ability to interpret a causal association between family firms and firm performance.

In this study, we use an extensive hand-collected unique dataset on family ownership and founder CEO status from proxy filings of S&P500 firms for a long panel (2001-2010). We analyze the sensitivity of the relationship between family firms and firm performance to the definition of a family firm. We focus on the variation in ownership stakes and founder CEO status in defining family firms. In addition, we examine the impact of family firms on other corporate policies (such as capital structure, Mergers, and Acquisitions) and exploit quasi-natural experiments to facilitate causal interpretations. We show that the documented relationship between family firms and firm performance is sensitive to the exact definition of family firms used in the family firm literature. This estimation is important to reconcile arguably a real effect of family firms on corporate policies and firm performance.

However, the estimation of the impact of family firms on corporate outcomes is particularly challenging because of the endogeneity of family firm status. We attempt to overcome this challenge following Lemmon and Lins (2003) and Lins, Volpin, and Wagner (2013). More precisely, we use the financial crisis of 2008-2009 as an unexpected shock to a firm's business. The financial crisis initiates an exogenous variation on firm performance. Using this context, we investigate how family firms perform compared to other firms where we explore different definitions of family firms. Our results suggest that the 'founding family premium' varies with the definition of a family firm.

We find that family firms, defined based on either the ownership stakes of the founding-family (incrementally varying ownership thresholds in the magnitude of 5%) or founder CEO status, perform better than non-family firms when ownership stakes

[66]For example, Anderson and Reeb (2003) and Cronqvist and Nilsson (2003) do not explicitly distinguish between family ownership and family management while defining family firms. Miller and Rice (1988), Miller et al. (2010), Jaskiewicz, Block, Combs, and Miller (2017) argue that founding family involvement in management is a key element of family firm definition. Villalonga and Amit (2006) consider that both ownership and management should be considered while defining family firms.

increase. However, when family firms are defined based only on founding family ownership stakes without necessarily requiring founding family management (whether the founder is the current CEO), the family firm premium disappears after a certain level of ownership. This evidence suggests that the definitional ambiguity of family firms drives the inconclusive (or conflicting) findings in the literature on the founding family's impact on firm performance.

We further explore capital structure decisions of family firms. More precisely, we analyze the impact of family firms on leverage using the financial crisis of 2008-2009 as a quasi-exogeneous liquidity shock. Utilizing this quasi-exogeneous shock, our evidence on corporate leverage supports the primary findings of Anderson and Reeb (2003b). We show that family firms (defined using various ownership thresholds without necessarily requiring the presence of a founder CEO), per se, do not seem to have any impact on the firms leverage level (statistically indistinguishable from zero). However, during the liquidity crisis of 2008-2009, founder CEO-run firms were associated with lower leverage than other firms.

In terms of investment decisions, we find that firms with founder CEOs undertake value accretive M&A deals. However, this association is also sensitive to various levels of family ownership. We reveal that family firms (with or without explicit consideration of the founder CEO's presence), may not undertake valuable M&A projects when family ownership is high. Overall, our findings highlight the sensitivity of investment performance to the definition of family firms which support the literature that suggests that high managerial ownership may trigger risk aversion (Gormley and Matsa 2016).

The findings of our study are particularly policy-relevant since we document that, in assessing the influence of family firm on firm performance, financing and investment decisions, stakeholders or policy-makers should consider the significant heterogeneity among family-firms that arises from differences in the financial stakes involved and provision of human capital by founder CEOs. Our study contributes to the literature in three ways. First, our study reconciles the contradictory findings in the family-firm literature in addition to facilitating a causal interpretation of these relationships. We provide empirical evidence on the impact of the variation in family firm definitions along

two dimensions- family ownership and provision of managerial talent from within the family (founder CEO) on firm performance and corporate decisions (leverage, M&A). Although family firms are often criticized because of the extraction of private benefits by family members, our study highlights that shareholders of family firms may also experience risk-related agency conflicts. Risk-related agency conflicts aggravate in family firms, especially, when founding families are under-diversified due to their high ownership stakes in focal firms.

In addition, our study extends the findings of Villalonga and Amit (2006) and Miller et al. (2010). First, we exploit different thresholds of ownership stakes (instead of restricting the definition to a minimum 5% family ownership). Second, we extend the impact of family firms beyond firm performance and focus on finance and investment decisions where we address endogeneity using the financial crisis as a quasi-natural experiment. Thus, our study contributes to the literature by documenting plausibly causal interpretation of the effect of family firms on corporate outcomes.

Finally, the existing literature is inconclusive regarding the exact impact of family firms on strategic investments, such as M&A decisions (Yeh and Woidtke 2005). Successful M&A activities require alignment of interest of shareholders and firms. This study contributes to the literature highlighting that the degree of alignment of goals of the firms and their owners in designing the firms' investment policy, depends on the extent of founding-family ownership and management by the founder-CEOs.

The remaining of the paper is organized as follows. Section two discusses the background and hypotheses of the study. Section three presents the research methods. Section four discusses the results and section five concludes the paper.

4.2 Prior Literature and Development of Hypotheses

4.2.1 Definitional Ambiguity in Family Firms

Family firms have received significant attention in the literature of multiple disciplines, including but not limited to, finance, management, accounting, and economics. Although empirical research on family firms highlights the significance of family ownership and family management in defining family firms, the definition of family firms used in the

analyses varies significantly. The value of family firms compared to non-family firms could depend on how family ownership size and management are incorporated into the definition of a family firm (Villalonga and Amit 2006).

The ownership threshold to define a family firm in prior studies has varied from families must be the majority shareholders of family firms (Holderness and Sheehan 1988), family ownership is at least 33% (Barth, Trygve, and Schone 2005), family ownership is at least 25% of voting rights (Lins et al., 2013), family ownership is at least 20% (La Porta et al., 1999, Faccio et al., 2001, Masulis, Pham, and Zein 2011, Hsu et al., 2014), family ownership is at least 10% (Maury 2006, Caprio, Croci, and Giudice 2011) to where founding families hold at least 5% equity ownership (Anderson and Reeb 2003a, 2003b, Villalonga and Amit 2006, Strebulaev and Yang 2012, Kang and Kim 2017).

The definition of 'family' can include founder or descendants of the founder or individuals closely affiliated with the founder. Alternative definitions of a family firm include companies run by heirs of the people previously in charge or by families that are clearly in the process of transferring control to heirs (Mehrotra, Morck, Shim, and Wiwattanakantang 2013) or if the largest blockholder is an individual (Massa and Zaldokas 2017). Family firms are also defined based on family involvement in the management of the firms including where founding family members are officers, directors or CEOs (Anderson and Reeb 2003a, 2003b).

Villalonga and Amit (2006) attempt to reconcile the conflicting evidence on family firm premiums by distinguishing among three fundamental elements in the definition of family-firm: ownership, control, and management. However, Villalonga and Amit (2006) define family blockholders as the owners of 5% or more of the firm's equity, either individually or as a group. Thus, the study does not specify the exact ownership stake that effectively bonds founding families with their firms. Moreover, the authors use treatment effects models to address the self-selection and reverse causality concerns related to family firm's ownership and management. However, their models use firm risk and lagged Tobin's Q as the instruments which are presumably associated with firm performance.

Miller et al. (2010) also claim that the superiority of family firm performance is sensitive to the definition of a family firm and the exploration of a particular sample. However, our study differs from Miller et al. (2010) who mainly focus on the distinction between lone founder and family founder in exploring family firm definition. More importantly, Miller et al. (2010) do not consider the variations in ownership stakes of the founding family while defining family firms and instead use a single arbitrary percentage of ownership (5% threshold). We argue that this is a notable omission that has strong implications for the claimed association between family firms and firm performance. As such, we consider an array of ownership thresholds ranging from a minimum of 5% to a minimum of 25% family ownership[67].

4.2.2 Family Firms and Performance

The literature on the effect of family ownership on firm performance can be broadly classified into two strands: one that documents a positive family premium and the other that highlights value destruction by families (Holderness and Sheehan 1988). The relationship between family firms and performance is shown to be curvilinear by Morck et al. (1988) and McConnell and Sarvaes (1990).

Morck et al. (1988) show that in matured firms, founding families are associated with a negative effect on market valuation (Tobin's Q); however, younger firms enjoy a positive family effect when one of the top two executives comes from the founding families. Morck et al. (1988) further shows that ownership positively influences firm performance when the size of ownership is below 5% and over 25%. They claim that some form of entrenchment might explain the declining firm value as ownership rises from 5% to 25%. McConnell and Sarvaes (1990) show a positive relationship between family ownership and firm performance until insider ownership reaches approximately 40% to 50% and a negative association at higher ownership levels. Other studies find that family

[67] The extant family firm literature uses the definition of family firm based on ownership thresholds to create a proxy for family firm. Thus, we do not use family ownership as the continuous variables.

firms have, on average, lower firm value than non-family counterparts (Holderness and Sheehan 1988). In contrast, some studies document the positive impact of family firms. Family firms (defined by ownership levels) have a higher market valuation (Anderson and Reeb 2003a, Villalonga and Amit 2006), better accounting performance and reduced agency costs (Anderson and Reeb 2003a).

The literature, such as Adams et al. (2009) and Fahlenbrach (2009), argues that a founder CEO premium mainly drives the family firm premium. In contrast, Li and Srinivasan (2011) find an insignificant impact of founder CEO on firm performance but find that founder directors improve firm governance and performance.

Thus, due to the differences in definitions of family firms in terms of family ownership stakes and the provision of management from founding families, convincing evidence or causality is difficult to claim. In this study, we revisit the contrasting findings on the impact of family firms on firm performance measures in a single setting by defining family firms based on various levels of ownership and family management of firms. This setting allows us to test the sensitivity of the relationship to family ownership and management in a rigorous fashion. Thus, we hypothesize:

Hypothesis 1: The effect of family firms on the firm performance varies with the level of family ownership stakes and involvement of founder CEOs in management.

4.2.3 Family Firm and Leverage

There are contrasting views on the impact of family firms on financing decisions such as leverage. Founding families who value voting rights may have strong incentives for debt financing (Stulz 1988). Moreover, concentrated ownership in family firms potentially causes considerably undiversified portfolios for a family member (Mishra and McConaughy 1999). Thus, family firms may have an incentive to use low-cost debt financing. Anderson et al. (2003) document that founding family ownership is related, both statistically and economically, to a lower cost of debt financing. The lower debt financing cost may motivate family firms to include more leverage in their capital structure. Kim and Sorensen (1986) argue that higher leverage in family firms could be

driven by the control-oriented motivation of insiders (Stulz 1988) and as such, insider-dominated family firms may use more leverage to fund organizational growth.

In contrast, other studies suggest that family firms use less leverage in their capital structure (Anderson, Duru, and Reeb 2012). However, Anderson and Reeb (2003b) do not find a significant effect of the family firm on leverage decision. Moreover, a founder's presence may also moderate a family firm's leverage policy. Family firms, where founders serve as managers and family ownership is high, may pursue a zero-leverage strategy. Strebulaev and Yang (2012) argue that as founding families derive utility from maintaining the family legacy, founder CEO run firms or family firms could be more averse to the risks associated with leverage.

Thus, the evidence on the relationship between family firms and leverage policy is mixed. We explore the impact of differing levels of ownership and family management on leverage and hypothesize that:

Hypothesis 2: The effect of family firms on the firm's leverage varies with the level of family ownership stakes and involvement of founder CEOs in management.

4.2.4 Family Firm and Strategic Investment

Family firms may prefer long-term strategic investment. Concentrated ownership of family members may motivate them to avoid the myopic and opportunistic behavior that is typical of short-term investors (Stein 1988). Merger and acquisitions, a common strategic investment, may dilute family ownership concentration depending on the relative size of the firm in relation to the counterpart (Shim and Okamuro, 2011). Miller et al. (2010) and Shim and Okamuro (2011) document an inverse relationship between concentrated family ownership and the number of acquisitions and argue that M&A transactions may dilute family ownership and the founding family may lose their control of the firm. Thus, family firms may be reluctant to undertake mergers. However, Miller et al. (2010) report that founder run firms are not unwilling to make mergers as founders do not care about passing on family wealth and positions in firms. Alternatively, founders may want to promote corporate growth (Jaskiewicz et al., 2017) through M&A deals. Shim and Okamuro (2011) further show that family firms have the same probability of

undertaking a merger as non-family firms when the family ownership ratio is above 90%. They also show that non-family firms have better merger performance than family firms.

On the other hand, some studies argue that a family firm's concentrated ownership may generate value-enhancing M&A deals. Morck, Shleifer, and Vishny (1990) show that dispersed ownership may spur agency conflict driven value-destroying acquisitions. Caprio et al. (2011) show that family-controlled firms do not destroy wealth when they acquire other companies. Moreover, they report that non-founder-run firms engage in value-destroying M&A deals. Morck et al. (1988) provide evidence that firms in which one of the top two officers is a member of the founding family are less likely to be acquired in a hostile tender offer than firms in which the top two officers are unrelated to the founder. Li and Srinivasan (2011) illustrate that founder-director firms generate higher acquisition returns than non-founder firms.

It is thus not clear from the literature whether family firms have a positive or a negative effect on a firm's M&A activities. It is plausible that the variation in the definition of a family firm in relation to family ownership size and management may explain the differences in the empirical evidence. Therefore, in this study, we consider the sensitivity of the relationship to family ownership and management and test the following hypothesis:

Hypothesis 3: The effect of family firms on M&A investment performance varies with the level of family ownership stakes and involvement of founder CEOs in management.

4.3 Sample Selection and Data Sources

Our primary sample comprises S&P500 firms during the period 2001-2010. We restrict our sample period to 2010 to enhance the comparability of our findings with the prior literature.[68]We exclude regulated financial and utility firms from the sample. In our analysis, selected firms may enter and exit the sample throughout the sampling period.

[68] Anderson Reeb (2003) and Adams et al. (2009) use a sample period of 1992-1999, Fahlenbrach uses 1993-2002, Villalonga and Amit (2006) use 1994-2000, Anderson and Reeb (2012) use 2004-2007, Hsu et al. (2014) use 2000 to 2010, and Kang and Kim (2017) use 1996-2010.

To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP.

The majority of the firm and CEO-specific data are from Compustat's fundamentals annual data, CRSP and ExecuComp. CEO-tenure data are mainly from ExecuComp. However, CEO-tenure constructed using the Compustat ExecuComp data (variable: 'became CEO') is problematic for a set of CEOs who leave their managerial position and return to the focal firms of analysis later during the sample period. For these CEOs, we use hand-collected tenure data from a variety of sources including those described above. We collect data on M&A deals of the firms from the Securities Data Company (SDC) platinum. For inclusion in the analysis, the acquirer must be a public firm. We use CRSP's daily value weighted return for calculating market specific parameters.

4.3.1 Empirical model and control variables

To test our hypotheses, we examine the effect of family ownership and management on corporate outcomes by estimating the following empirical model:

$$Y_{i,t} = \alpha + \beta Family\ firm + \gamma Z_{i,t} + Industry\ dummies + Year\ dummies + \varepsilon_{i,t} \quad (1)$$

Here, Y represents corporate outcomes, namely-Tobin's Q, leverage, and M&A performance. Tobin's Q is estimated as the firm's market value to book value where market value is calculated as the book value of assets minus the book value of equity plus the market value of equity. We primarily use Tobin's Q as the measure of firm performance in our study since the prior family firm literature extensively uses "Tobin's Q" to explore firm performance. We define leverage as total long-term debt plus debt in current liabilities minus cash holdings scaled by assets. We use cumulative abnormal returns (CAR) around the announcement of an M&A as the measure of acquisition performance. We select a five-day event window for calculating CAR following Masulis, Wang, and Xie (2007) and Fuller, Netter, and Stegemoller (2002).

In equation (1), Z is a vector of control variables that includes standard variables that have been found to impact the respective outcome variables in the literature. We follow the previous research (see, e.g., Anderson and Reeb 2003) and control for firm size measured by the natural logarithm of total assets and firm age which is the natural

logarithm of a firm's age. We also control for leverage since high leverage often incentivizes managers for earnings management (Duke and Hunt, 1990), subsequently influencing firm performance[69].

We control for managerial tenure (CEO tenure) and equity-based payment (CEO equity-based pay). Since successful past performance and firm age (older firms) can reduce managers' willingness to change or pursue entrepreneurial activities (e.g., Zahra, 2005), we also control for past performance measured by return on assets (ROA) and stock return volatility following previous literature (see, Adams et al., 2009, Demsetz and Lehn 1985). We define return volatility as the standard deviation of the firm's stock return collected from CRSP over the fiscal year.

Presumably, firm performance would, in part, be driven by the same unobserved factors in a particular year, and thus, we incorporate year-fixed effects in our analysis. Since our main explanatory variable of interest (proxy for family firm) changes little over time for any given firm, we do not use firm-fixed effects in our model (Zhou 2001). However, we expect differences in variability to be more systematically related to industry and thus use industry-fixed effects at the two-digit SIC level. We cluster standard errors at the firm level.

4.3.2 Family ownership and founder status

A major challenge in identifying the effect of founders on firm performance is the construction of a credible dataset of founders and family ownership. We use data from several sources including SEC 10-K filings from EDGAR, the Funding Universe website, Reference for business-Company history website, company websites, and other Internet resources including Wikipedia, Forbes pages, Bloomberg's Business Week website among others to identify whether a firm's current CEO is the founder of the firm. We define the founder CEO following Adams et al. (2009),[70] that is, 'Founder CEO' in a given year is

[69] We find similar evidence of baseline result if we do not control for leverage.

[70]In the case of a merger of equals, the founders of the new company are the founders of both firms that are merging. In the case of a spin-off, the founders are the founders of the original company, as well as the CEO at the time of the spin-off if his name is explicitly mentioned in any

an indicator variable that equals one if any data source explicitly mentions that the current CEO is one of the founders of the firm or was the chief executive at the time the company was founded. Thus, a CEO who belongs to a future generation of the founding-family does not qualify as a founder CEO as they are not the founder of the firm.[71]

We hand-collect the founding family's ownership data from definitive proxy statements-SEC 14A filings in EDGAR for S&P500 firms for the year 2001-2010. We aggregate the number of shares held by all family members of the firms. If the proxy statements do not explicitly mention whether the blockholders are family members, we explore company history from company websites, Funding Universe websites, Wikipedia and Bloomberg's Business Week website to determine the relationship between blockholders and the founding family. We use varying percentages of ownership held by the founding families and provision of managerial talent or leadership from within the family to create alternative definitions of family firms. Particularly, we allow family ownership to vary from 5% to 25% thresholds while defining family firms.

4.3.3 Distribution of firms

Sample firms are distributed in 53 different two-digit SIC codes[72]and founder-run firms are distributed in 28 different industries. The sample comprises 362 unique firms. There are 63 firms where the founders served as CEO at any point of the sample period. Table 1B reports the yearly distribution of family firms. The proportion of founder-run firms declines over time. A similar pattern is observed for family firms. However, on average, as in Fahlenbrach (2009), we do not observe any marked variations in the distribution of founder run and family firms across the years.

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data source. In the case of an acquisition and spin off, founders are the founders of the company during the pre-spin-off period.

[71] For example, Micky Arison, the CEO of Carnival Corporation is not considered as the founder as the company was originally founded by his father, Ted Arison (Source: Funding Universe).

[72] Similar to Villalonga and Amit (2006) whose sample consisted of 53 industries.

Table1A: Distribution of Founder-Run and Family Firms

Table1a represents the distribution of founder-run firms and non-founder-run firms in different industries. Founder-run firms are the firms where the founders serve as the CEOs of the firms.

Sic2	Industry description	%Non-Founder-run firms in industry	%Founder-run firms in industry
10	Metal mining	100.00%	0.00%
12	Bituminous coal	100.00%	0.00%
13	Oil and gas extraction	80.62%	19.38%
14	Nonmetal minerals	100.00%	0.00%
15	General building Contractors	100.00%	0.00%
16	Heavy construction, except buildings	100.00%	0.00%
17	Electrical work	0.00%	100.00%
20	Food and kindred products	100.00%	0.00%
21	Tobacco products	100.00%	0.00%
22	Textile mill products	100.00%	0.00%
23	Apparel and other textile products	76.92%	23.08%
24	Lumber and wood products	100.00%	0.00%
25	Furniture and fixtures	100.00%	0.00%
26	Paper and allied products	100.00%	0.00%
27	Printing and publishing	100.00%	0.00%
28	Chemical and allied products	89.66%	10.34%
29	Petroleum and coal products	100.00%	0.00%
30	Rubber and miscellaneous plastic products	80.00%	20.00%
31	Leather and leather products	100.00%	0.00%
32	Stone, clay, and glass products	100.00%	0.00%
33	Primary metal industries	100.00%	0.00%
34	Fabricated metal products	100.00%	0.00%
35	Industrial machinery and equipment	91.60%	8.40%
36	Electronic and other electrical equipment	86.15%	13.85%
37	Transportation equipment	100.00%	0.00%
38	Instruments and related products	94.38%	5.62%
39	Miscellaneous manufacturing products	100.00%	0.00%
40	Railroad transportation	100.00%	0.00%
42	Trucking and warehousing	100.00%	0.00%
44	Water transportation	0.00%	100.00%
45	Transportation by air	66.67%	33.33%
47	Transportation services	60.00%	40.00%
48	Communications	74.78%	25.22%
50	Wholesale trade-durable goods	75.00%	25.00%
51	Wholesale trade-nondurable goods	60.00%	40.00%
52	Building materials and gardening	95.00%	5.00%
53	General merchandise stores	82.19%	17.81%
54	Food stores	66.67%	33.33%
55	Auto dealers and service stations	87.50%	12.50%
56	Apparel and accessory stores	81.48%	18.52%
57	Furniture and home furnishings	89.66%	10.34%
58	Eating and drinking places	86.67%	13.33%
59	Miscellaneous retail	81.67%	18.33%
70	Hotels and other lodging places	80.00%	20.00%
72	Personal services	100.00%	0.00%

73	Business services	85.20%	14.80%
75	Auto repair, services, and parking	100.00%	0.00%
78	Motion pictures	0.00%	100.00%
79	Amusement and recreation services	66.67%	33.33%
80	Health services	100.00%	0.00%
82	Educational services	100.00%	0.00%
87	Engineering and management services	85.71%	14.29%
99	Conglomerate	50.00%	50.00%

Table1B:

This table represents the yearly distribution of founder-run firms and family firms. Founder-run firms are the firms where the founders serve as the CEOs of the firms. Family firms are firms where founding families have at least 5% ownership stakes in the firms. Industries are identified by two-digit sic codes.

Year	%Distribution of founder-run firms	%Distribution of family-firms
2001	14.47%	20.39%
2002	13.87%	20.65%
2003	12.78%	19.17%
2004	11.91%	19.44%
2005	11.21%	18.38%
2006	11.38%	18.86%
2007	11.53%	18.44%
2008	11.40%	16.24%
2009	10.17%	14.97%
2010	9.72%	14.44%

Table1C:

The table1C reports the number of family firms using different definitions of family firms. The table1D reports the correlation matrix on different definitions of family firms. Famfirm05 are firms where founding families have at least 5% ownership stakes in the firms. Famfirm10 are firms where founding families have at least 10% ownership stakes in the firms. Famfirm15 are firms where founding families have at least 15% ownership stakes in the firms. Famfirm20 are firms where founding families have at least 20% ownership stakes in the firms. Famfirm25 are firms where founding families have at least 25% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms. Famfirm05 and FCEO are firms where founding families have at least 5% ownership stakes and the CEO is one of the founders of the firms. Famfirm10 and FCEO are firms where founding families have at least 10% ownership stakes and the CEO is one of the founders of the firms. Famfirm15 and FCEO are firms where founding families have at least 15% ownership stakes and the CEO is one of the founders of the firms. Famfirm20 and FCEO are firms where founding families have at least 20% ownership stakes and the CEO is one of the founders of the firms. Famfirm25 and FCEO are firms where founding families have at least 25% ownership stakes and the CEO is one of the founders of the firms.

Type of firms	Yes	No	%Firm-year observations
Famfirm05	79	283	0.180
Famfirm10	61	301	0.128
Famfirm15	44	318	0.087
Famfirm20	33	329	0.066
Famfirm25	26	336	0.051
Famfirm05 or FCEO	111	251	0.245
Famfirm10 or FCEO	99	263	0.207
Famfirm15 or FCEO	88	274	0.175
Famfirm20 or FCEO	81	281	0.158
Famfirm25 or FCEO	76	286	0.150
Famfirm05 and FCEO	31	331	0.051
Famfirm10and FCEO	24	338	0.036
Famfirm15 and FCEO	18	344	0.027
Famfirm20 and FCEO	14	348	0.023
Famfirm25 and FCEO	12	350	0.018

Table1D: Correlation matrix of family-firms using different definitions

Variables	Famfirm05	Famfirm10	Famfirm15	Famfirm20	Famfirm25	Famfirm05 or FCEO	Famfirm10 or FCEO	Famfirm15 or FCEO	Famfirm20 or FCEO	Famfirm25 or FCEO
Famfirm05	1									
Famfirm10	0.817	1								
Famfirm15	0.659	0.807	1							
Famfirm20	0.569	0.697	0.864	1						
Famfirm25	0.495	0.606	0.751	0.869	1					
Famfirm05 or FCEO	0.495	0.405	0.362	0.362	0.314	1				
Famfirm10 or FCEO	0.414	0.507	0.451	0.448	0.388	0.836	1			
Famfirm15 or FCEO	0.355	0.434	0.539	0.533	0.462	0.717	0.857	1		
Famfirm20 or FCEO	0.329	0.403	0.500	0.578	0.501	0.665	0.796	0.928	1	
Famfirm25 or FCEO	0.288	0.352	0.436	0.505	0.581	0.581	0.695	0.810	0.873	1

Table 1C highlights how the distribution of sample firm changes if we use different definitions of family firms. For example, if our family firms are identified using a 5% ownership threshold '(Famfirm05)', the sample comprises 79 family firms and 283 non-family firms. If we use a higher ownership threshold of 20% to identify a family firm '(Famfirm20)', the sample is reduced to 33 family firms. There are very few family firms if we use a high ownership threshold (25%) and founder CEO status to define a family firm. We, therefore, do not use a family firm definition that requires both ownership and a founder CEO.

We include a correlation matrix of family firm definitions in Table 1D to highlight how commonly firms may overlap under different definitions. The table shows that the correlation between 'Famfirm05' and 'Famfirm05 or FCEO' is moderate (0.495). The low correlation between 'Famfirm05' and 'Famfirm25 or FCEO' (0.288) also suggests that our distribution of family firms may differ widely depending on the family firm definition. For example, the distribution of family firm for 'Famfirm05' would include Hess Corp, Danaher Corp, Family Dollar Stores among others as family firms. However, the definition 'Famfirm25 or FCEO' would consider those firms as non-family firms. Inversely, some companies, such as Sandisk Corp., EOG Resources Inc. among others would be treated as family firms under 'Famfirm25 or FCEO' but those companies would be non-family firms if we use 'Famfirm05' to identify family firms.

4.3.4 Summary statistics

Table 2 reports the descriptive statistics for the sample firms. The average Tobin's Q of all firms is 2.832. Average asset size is 8.95 which is comparable to prior studies.[73]Mean ROA is 16%, and median CEO tenure is six years in our sample.[74]On average, the founder is a CEO in 12% of the firm-year observations which is comparable to 13% in Adams et al. (2009).

We use an ownership threshold of 5% to define family-firms in Panel B. From panel B and panel C, we find that family ownership is more than 5% in approximately 18% of

[73] 8.64 in Adams et al. (2009) and 8.44 in Anderson and Reeb (2003).
[74] The average tenure of the CEO is 6.36 in Fahlenbrach (2009).

our firm-year observations. Family firms have a higher average of Tobin's Q than non-family-firms. Similar to Anderson and Reeb (2003), we find that family firms are older and smaller. The average leverage of family firms is 0.039 which is significantly lower than non-family firms (0.089). The CEOs of the family firms have longer tenure than CEOs in non-family firms (around 11 years compared to 7 years). The ROA of family firms is not significantly different from non-family firms. Similar to family firms, founder-run firms are smaller and older compared to non-founder-run firms (panel D and panel E). The average tenure of CEO founders is about 17 years compared to approximately seven years for other CEOs. Founder-run firms also pay more equity-based compensation to the CEO.

We identify 185 unique acquirer firms out of our primary sample. Using SDC Platinum's merger and acquisitions database, we find 1,033 M&A transactions made by these firms. Among 1,033 completed deals, we have 253 cross-border deals. The target firms could be private, public or subsidiary. The sample includes the deals where the bidder must own less than 50% of the target before announcing the deal, transactions value must be more than $1 million, the bidder must have CRSP stock price data for 210 trading days before the announcement and the deal value must be at least 1% of the bidder's market capitalization 11 days before the announcement (see, Masulis et al. 2007). Table 3 reports the summary statistics for the M&A sample.

The average Tobin's Q and ROA of the acquirer is 3.189 and 0.165 respectively. The leverage of acquirer firms is 2.9%, and volatility is 3.7%. CEO tenure of acquirer firms is approximately eight years. The average CAR is 0.2% with a standard deviation of 4.92%. Founder-run firms make around 13.6% of total deals. Family firms defined using a 5% ownership threshold (Famfirm05) account for 22.7% of the completed deals. Family firms with at least 25% ownership initiate only 2.3% of the completed deals. Approximately, 29% of deals are made by family firms defined using a 5% ownership threshold or where the CEO is the founder of the firm (Famfirm05 or FCEO).

Table 2-Panel A: Summary statistics of the sample

The table 2-Panel A reports the summary statistics of the sample. The sample consists of S&P500 firms for the period 2001 to 2010. To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP, respectively. This table presents the summary statistics on firm characteristics and CEO characteristics. All statistics are firm-level averages. Panel B (C) presents statistics on the (non-) family firm sample. Family firm is a firm with at least 5% of family ownership. Panel D (E) presents statistics on (non-) founder-run firm sample. A founder-run firm is a firm where one of the founders/key employees of the firm at the time of its formation serves as CEO. Panel F reports the correlation matrix of control variables. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity)/book value of assets. ROA is defined as net income/ total assets. Firm Size is the natural log of the book value of the asset of the firm. Firm age is the log of a firm age where firm age is the number of years since the inception of the firms (CRSP). Volatility is the standard deviation of the firm's stock return collected from CRSP over the fiscal year. ROA is operating income before depreciation divided by the book value of assets. CEO Equity pay is calculated by the value of annual option pay divided by the sum of salary, bonus, and annual option pay. CEO Tenure is the tenure of CEO measured in years. Leverage is defined as (long-term debt+ short-term debt) /total assets.

Variables	Mean	Median	P75	SD
Asset	20040.800	7178.483	17991.000	50755.810
Firm size	8.416	8.291	9.400	1.416
Firm age	34.411	31.000	46.000	23.326
ROA	0.163	0.158	0.210	0.093
Leverage	0.080	0.112	0.249	0.256
Tobin's Q	2.832	2.207	3.309	2.108
Volatility	0.038	0.025	0.045	0.047
CEO Equity pay	0.256	0.000	0.617	0.336
CEO tenure	7.705	6.000	10.000	6.953
Founder CEO	0.118	0.000	0.000	0.322

Table 2-Panel B: Summary statistics of the family firm sample

Founder Sample:	Mean	Median	P75	SD
Asset	20783.230	6042.573	13356.780	48721.430
Firm size	8.823	8.707	9.500	1.355
Firm age	27.120	25.000	36.000	16.438
ROA	0.157	0.162	0.210	0.097
Leverage	0.039	0.053	0.223	0.276
Tobin's Q	2.997	2.414	3.373	2.130
Volatility	0.039	0.027	0.046	0.038
CEO Equity pay	0.202	0.000	0.522	0.320
CEO tenure	10.995	7.000	13.000	10.348

Table 2-Panel C: Summary statistics of the non-family firm sample

Non-Founder Sample:	Mean	Median	P75	SD	T-stat
Asset	19877.340	7555.400	19256.000	51200.140	-0.394
Firm size	8.972	8.927	9.863	1.291	2.549**
Firm age	36.008	33.000	49.000	24.290	8.321***
ROA	0.164	0.157	0.210	0.092	1.594
Leverage	0.089	0.123	0.255	0.250	4.129***
Tobin's Q	2.794	2.172	3.292	2.101	-1.755*
Volatility	0.037	0.025	0.045	0.049	-0.617
CEO Equity pay	0.268	0.000	0.628	0.338	4.229***
CEO tenure	6.980	5.000	9.000	5.705	-13.086***

Table 2-Panel D: Summary statistics of the founder-run firm sample

Founder Sample:	Mean	Median	P75	SD
Asset	16531.490	4495.246	12783.920	40430.580
Firm size	8.511	8.395	9.454	1.488
Firm age	16.966	16.000	22.000	7.972
ROA	0.144	0.156	0.215	0.125
Leverage	-0.053	-0.011	0.146	0.322
Tobin's Q	3.568	2.551	4.778	2.652
Volatility	0.047	0.033	0.064	0.050
CEO Equity pay	0.183	0.000	0.289	0.323
CEO tenure	16.576	15.000	23.000	10.614

Table 2-Panel E: Summary statistics of the non- founder-run firm sample

Non-Founder Sample:	Mean	Median	P75	SD	T-stat
Asset	20506.540	7607.650	18299.500	51960.160	1.448
Firm size	9.003	8.935	9.814	1.268	7.054***
Firm age	0.166	0.159	0.209	0.088	4.382***
ROA	0.097	0.127	0.256	0.241	10.458***
Leverage	0.089	0.123	0.255	0.250	4.129***
Tobin's Q	2.737	2.188	3.164	2.007	-5.923***
Volatility	0.036	0.025	0.042	0.046	-4.173***
CEO Equity pay	0.266	0.000	0.624	0.336	4.570***
CEO tenure	6.527	5.000	9.000	5.293	-30.168***

Table 2-Panel F: Correlation matrix

Variables	Firm size	Firm age	ROA	Leverage	Tobin's Q	Volatility	CEO Equity pay	CEO tenure	Famfirm05	Founder CEO
Firm size	1									
Firm age	0.538	1								
ROA	-0.144	-0.008	1							
Leverage	0.235	0.274	-0.116	1						
Tobin's Q	-0.323	-0.246	0.409	-0.427	1					
Volatility	-0.220	-0.200	-0.001	-0.242	0.255	1				
CEO Equity pay	0.132	0.050	0.063	-0.003	-0.043	-0.048	1			
CEO tenure	-0.028	-0.090	-0.010	-0.108	0.031	0.035	0.003	1		
Famfirm05	-0.089	-0.152	-0.056	-0.072	0.050	0.036	-0.046	0.139	1	
Founder CEO	-0.163	-0.279	-0.084	-0.211	0.128	0.104	-0.053	0.435	0.172	1

Table 3: Summary statistics of M&A sample

Table 3 shows the summary statistics of the M&A sample. The sample consists of S&P500 firms for the period 2001 to 2010. To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP, respectively, and deal characteristics data from SDC. CAR is cumulative abnormal return over 5-day event window using market model. Founder CEO is an indicator variable equals one when one of the founders/ key employees of the firm at the time of its formation serves as CEO. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity) /book value of assets. Log (Tobin's Q) is the natural logarithm of Tobin's Q. Firm Size is the natural log of the book value of the asset of the firm. Firm Age is the log of a firm age where firm age is the number of years since the inception of the firms (CRSP). Volatility is the standard deviation of the firm's stock return collected from CRSP over the fiscal year. ROA is operating income before depreciation divided by the book value of assets. CEO Equity pay is calculated by the value of annual option pay divided by the sum of salary, bonus, and annual option pay. CEO Tenure is the tenure of CEO measured in years. Leverage is defined as (long-term debt+ short-term debt) /total assets. Famfirm05 is an indicator for a family-firm where founding families have at least 5% ownership stakes in the firms. Famfirm10 is an indicator for a family-firm where founding families have at least 10% ownership stakes in the firms. Famfirm15 is an indicator for a family-firm where founding families have at least 15% ownership stakes in the firms. Famfirm20 is an indicator for a family-firm where founding families have at least 20% ownership stakes in the firms. Famfirm25 is an indicator for a family-firm where founding families have at least 25% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms.

Variables	Mean	Median	P75	SD
Asset	19764.420	8026.599	22128.000	34555.750
Firm size	9.098	8.991	10.005	1.223
Firm age	30.414	23.000	43.000	21.321
ROA	0.165	0.161	0.207	0.077
Leverage	0.029	0.053	0.209	0.256
Tobin's Q	3.189	2.521	3.707	2.328
CAR	0.002	0.000	0.025	0.049
Volatility	0.037	0.027	0.050	0.033
CEO Equity pay	0.246	0.000	0.617	0.344
CEO tenure	7.833	6.000	10.000	6.880
Founder CEO	0.136	0.000	0.000	0.343
Famfirm05	0.227	0.000	0.000	0.419
Famfirm10	0.155	0.000	0.000	0.362
Famfirm15	0.083	0.000	0.000	0.276
Famfirm20	0.062	0.000	0.000	0.241
Famfirm25	0.023	0.000	0.000	0.151
Famfirm05 or FCEO	0.287	0.000	1.000	0.452
Famfirm10 or FCEO	0.241	0.000	0.000	0.428
Famfirm15 or FCEO	0.193	0.000	0.000	0.395
Famfirm20 or FCEO	0.172	0.000	0.000	0.378
Famfirm25 or FCEO	0.146	0.000	0.000	0.353

4.4 Empirical Analysis

4.4.1 Assessing the Association between Family Firms and Firm Performance: Replication of Previous Studies

In this section, we explore how the links between family firms and firm performance change using different ownership stakes and founder CEO status. The first part of our analysis involves replication of the OLS estimations as in Anderson and Reeb (2003), Villalonga and Amit (2006), Adams et al. (2009) and Fahlenbrach (2009) who examine the influence of family firms and founder CEOs on firm performance. We follow the literature and use Tobin's Q and the natural log of Tobin's Q as performance proxies. A key objective of the replication is to demonstrate the consistency of our data with previous studies.

Adams et al. (2009) point out that founder CEO status could be correlated with CEO characteristics, which means that the correlation identified between founder CEO and performance may be unreliable as a result of omitted variables. As such, we control for CEO characteristics, such as tenure and equity-based payments. We do not use CEO ownership as CEO ownership could potentially be part of family ownership. The results in Table 4 show positive coefficients for founder CEO firms that are both economically and statistically significant in models (1) and (2). We find that the marginal effect of founder CEO on Tobin's Q and Log (Tobin's Q) is 0.587 and 0.136 respectively which are consistent with Anderson and Reeb (2003).

We also report a significant positive link (both economically and statistically) between family firm and firm performance in columns (3) and (4). We define family firms using a 5% ownership threshold (Famfirm05) (similar to the definition used in Villalonga and Amit 2006 and Anderson et al., 2012). The selection of a 5% minimum threshold is motivated by the fact that the filing of schedule 13D becomes mandatory upon acquiring 5% beneficial ownership of the company shares and therefore allows detection of significant corporate block-holding. In this definition of a family firm, founders can, but not necessarily, be the current CEO of the firm. We find that the marginal effect of the family firm (Famfirm05) is 0.273 (consistent with Villalonga and Amit 2006).

Table 4: Replication of Previous Studies

Table 4 shows the replication of previous studies. The sample consists of S&P500 firms for the period 2001 to 2010. To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP, respectively. Founder CEO is an indicator variable equals one when one of the founders/ key employees of the firm at the time of its formation serves as the CEO. Famfirm05 is an indicator for a family firm where founding families have at least 5% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity)/book value of assets. Log(Tobin's Q) is the natural logarithm of Tobin's Q. Firm Size is the natural log of the book value of the asset of the firm. Firm Age is the log of a firm age where firm age is the number of years since the inception of the firms (CRSP). Volatility is the standard deviation of the firm's stock return collected from CRSP over the fiscal year. ROA is operating income before depreciation divided by the book value of assets. CEO Equity pay is calculated by the value of annual option pay divided by the sum of salary, bonus, and annual option pay. CEO Tenure is the tenure of CEO measured in years. Leverage is defined as (long-term debt+ short-term debt) /total assets. All models include the year and industry fixed effects. t-stats are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Tobin's Q	Log(Tobin's Q)	Tobin's Q	Log(Tobin's Q)	Tobin's Q	Log(Tobin's Q)
Models	(1)	(2)	(3)	(4)	(5)	(6)
Founder CEO	0.587**	0.136**				
	(0.044)	(0.035)				
Famfirm05			0.273**	0.065**		
			(0.043)	(0.027)		
Famfirm05 or FCEO					0.219**	0.055**
					(0.047)	(0.028)
Firm Size	-0.207***	-0.065***	-0.257***	-0.056***	-0.152***	-0.037***
	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm Age	-0.199*	-0.038*	-0.055	-0.013	-0.067	-0.015
	(0.069)	(0.058)	(0.398)	(0.400)	(0.204)	(0.226)
Volatility	7.549**	0.879	3.447*	0.607*	3.863*	0.633
	(0.022)	(0.117)	(0.090)	(0.089)	(0.075)	(0.105)
ROA	8.422***	2.693***	7.309***	1.637***	7.444***	1.782***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-2.244***	-0.660***	-0.655	-0.249***	-1.486***	-0.407***
	(0.000)	(0.000)	(0.110)	(0.006)	(0.000)	(0.000)
CEO Equity Pay	0.210	0.038	-0.024	-0.008	0.097	0.026
	(0.316)	(0.351)	(0.828)	(0.747)	(0.368)	(0.297)
CEO Tenure	-0.004	-0.000	0.008	0.002	0.003	0.000
	(0.674)	(0.828)	(0.117)	(0.197)	(0.579)	(0.806)
Industry fixed effects	Y	Y	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y	Y	Y
Observations	2,936	2,936	2,936	2,936	2,936	2,936
R-squared	0.509	0.597	0.624	0.692	0.570	0.635

Finally, consistent with Anderson and Reeb (2003) and Villalonga and Amit (2006), we find a positive association between family firms and firm performance when we use a 5% ownership threshold or presence of a founder CEO to define a family firm (Models (5) and (6)). Family firms increase Tobin's Q by 0.219 which is both economically and statistically significant. We also document a significant negative effect of firm size, age, and leverage on firm performance which are consistent with previous studies.

4.4.2 Assessing the Association between Family Firms and Firm Performance: Sensitivity Analysis

In this section, we demonstrate how the link between family firms and firm performance changes as we change the definition of a family firm. Initially, we do not condition on whether the founder is the current CEO or not. We define family firms based on a minimum ownership threshold of 10% to a minimum of 25% (we include the 5% ownership threshold in the replication study reported in Table 4). We find that family firms generally improve corporate performance as the family ownership stake increases (see, models (1) and (2) of Table 5). However, beyond the 15% threshold of ownership, we do not find a statistically significant association between family firms and firm value which could be driven by the agency problem between family and minority shareholders (see, Maury 2006).

Next, we include the founder CEO run firms in the definition of family firms (irrespective of the level of family ownership) in models (5) to (8). We find positive significant coefficients on family firms irrespective of ownership thresholds. We note that both the economic and statistical significance declines when ownership increases beyond ownership of 15%. The results support Villalonga and Amit (2006) who argue that family firms maximize firm value when founders serve as CEOs or the founding family holds at least 5% ownership. Additionally, we show that the relationship between performance and family firms holds at different ownership thresholds when family ownership or founder CEO status defines the family firm. This suggests that the family premium reported using different ownership thresholds in columns (5) to (8) could be driven by founder CEO status.

Table 5: Sensitivity of Firm Performance and Family Firm Relationship

Table 5 shows the link between family firm and firm performance using different definitions of family firms. The sample consists of S&P500 firms for the period 2001 to 2010. To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP, respectively. All statistics are firm-level averages. Founder CEO is an indicator variable equals one when one of the founders/key employees of the firm at the time of its formation serves as CEO. Famfirm10 is an indicator for a family firm where founding families have at least 10% ownership stakes in the firms. Famfirm15 is an indicator for a family firm where founding families have at least 15% ownership stakes in the firms. Famfirm20 is an indicator for a family firm where founding families have at least 20% ownership stakes in the firms. Famfirm25 is an indicator for a family firm where founding families have at least 25% ownership stakes in the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity) /book value of assets. Log(Tobin's Q) is the natural logarithm of Tobin's Q. Firm Size is the natural log of the book value of the asset of the firm. Firm Age is the log of a firm age where firm age is the number of years since the inception of the firms (CRSP). Volatility is the standard deviation of the firm's stock return collected from CRSP over the fiscal year. ROA is operating income before depreciation divided by the book value of assets. CEO Equity pay is calculated by the value of annual option pay divided by the sum of salary, bonus, and annual option pay. CEO Tenure is the tenure of CEO measured in years. Leverage is defined as (long-term debt+ short-term debt) /total assets. All models include the year and industry fixed effects. t-stats are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Models	Log(Tobin's Q)							
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Famfirm10	0.131**							
	(0.019)							
Famfirm15		0.164**						
		(0.035)						
Famfirm20			0.142					
			(0.103)					
Famfirm25				0.028				
				(0.766)				
Famfirm10 or FCEO					0.132***			
					(0.003)			
Famfirm15 or FCEO						0.144***		
						(0.005)		
Famfirm20 or FCEO							0.135**	
							(0.012)	
Famfirm25 or FCEO								0.109*
								(0.056)
Firm Size	-0.069***	-0.070***	-0.069***	-0.066***	-0.067***	-0.067***	-0.067***	-0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firm Age	-0.038**	-0.039**	-0.040**	-0.044**	-0.032*	-0.033*	-0.034*	-0.036*
	(0.035)	(0.031)	(0.029)	(0.020)	(0.072)	(0.071)	(0.067)	(0.054)
Volatility	0.882	0.852	0.859	0.885	0.886	0.869	0.872	0.870
	(0.118)	(0.128)	(0.126)	(0.122)	(0.110)	(0.115)	(0.115)	(0.118)
ROA	2.688***	2.675***	2.666***	2.670***	2.727***	2.720***	2.713***	2.710***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage	-0.677***	-0.675***	-0.675***	-0.678***	-0.652***	-0.651***	-0.653***	-0.660***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CEO Equity Pay	0.033	0.036	0.035	0.034	0.037	0.038	0.038	0.036
	(0.427)	(0.381)	(0.401)	(0.428)	(0.370)	(0.348)	(0.356)	(0.377)
CEO Tenure	0.002	0.002	0.002	0.002	-0.000	-0.000	-0.000	0.000
	(0.384)	(0.272)	(0.227)	(0.179)	(0.953)	(0.957)	(0.985)	(0.825)
Industry fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936
R-squared	0.598	0.598	0.597	0.594	0.600	0.600	0.599	0.597

To further explore the effect of a founder CEO on family firm performance, we include the summary statistics of the firm performance where we define family firms as the firms with ownership stakes and managerial position held by founders. Since we have a limited number of family firms for this definition, we only include some univariate tests here. The main objective of these tests is to provide some suggestive evidence that our hypothesis arguably holds for this sample of firms as well. We notice that, on an average, almost in every level of ownership threshold, family firms with founder CEOs have superior Tobin's Q than non-family firms. However, the family firm's performance is not statistically distinguishable from that of non-family firms when family ownership threshold reaches 25% level, and the founders of the firms serve as the CEOs. One plausible explanation is that the founder CEO could be entrenched when founding families hold high ownership stakes in the firm, and thus the founder premium may disappear.

Finally, in Table 6 we also include the difference of means tests for firm performance where we use arguably rigid definition for family firms. We define a family firm as a firm where the founding family holds ownership stakes, but the founder does not serve as CEOs. This setting allows us to disentangle the effect of founder CEOs from the family firm premium. Due to a limited number of firms in this category, we do not perform any multivariate analysis. However, the statistics show that after separating the founder CEO effect from the ownership effect of family firms, family firm performance is not statically distinguishable from non-family firms. This evidence supports our intuition that the way founder CEO status and ownership stakes are incorporated in the definition of family firms drives the family premium documented in the literature.

Table 6: Sensitivity of Firm Performance to Family Firm Definition: Presence Founder CEOs

Table 6 shows the summary statistics of firm performance using different definitions of family firms. The sample consists of S&P500 firms for the period 2001 to 2010. To be included in the final sample, firms are required to have financial and stock price data from Compustat and CRSP, respectively. Founder CEO is an indicator variable equals one when one of the founders/key employees of the firm at the time of its formation serves as CEO. Famfirm05 and FCEO are firms where founding families have at least 5% ownership stakes and the founder is the CEO in the firms. Famfirm10 and FCEO are firms where founding families have at least 10% ownership stakes and the founder is the CEO in the firms. Famfirm15 and FCEO are firms where founding families have at least 15% ownership stakes and the founder is the CEO in the firms. Famfirm20 and FCEO are firms where founding families have at least 20% ownership stakes and the founder is the CEO in the firms. Famfirm25 and FCEO are firms where founding families have at least 25% ownership stakes and the founder is the CEO in the firms. Famfirm05 without FCEO are firms where founding families have at least 5% ownership stakes and the founder is not the CEO in the firms. Famfirm10 without FCEO are firms where founding families have at least 10% ownership stakes and the founder is not the CEO in the firms. Famfirm15 without FCEO are firms where founding families have at least 15% ownership stakes and the founder is not the CEO in the firms. Famfirm20 without FCEO are firms where founding families have at least 20% ownership stakes and the founder is not the CEO in the firms. Famfirm25 without FCEO are firms where founding families have at least 25% ownership stakes and the founder is not the CEO in the firms. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity) /book value of assets. Log(Tobin's Q) is the natural logarithm of Tobin's Q. All models include the year and industry fixed effects. t-stats are reported in column (5). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Family-firms	Statistics on Log(Tobin's Q)	Yes	No	T-Stat
Definition: Firms have ownership and founders serve as CEOs				
Famfirm05 and FCEO	Mean	1.010	0.816	-4.188***
	SD	0.049	0.010	
Famfirm10 and FCEO	Mean	1.006	0.819	-3.332***
	SD	0.059	0.010	
Famfirm15 and FCEO	Mean	1.012	0.010	-2.892***
	SD	0.821	0.072	
Famfirm20 and FCEO	Mean	1.002	0.821	-2.533**
	SD	0.077	0.010	
Famfirm25 and FCEO	Mean	0.950	0.824	-1.402
	SD	0.086	0.010	
Definition: Firms have ownership and founders DO NOT serve as CEOs				
Famfirm05 without FCEO	Mean	0.853	0.821	-1.093
	SD	0.029	0.010	
Famfirm10 without FCEO	Mean	0.841	0.823	-0.517
	SD	0.038	0.010	
Famfirm15 without FCEO	Mean	0.882	0.822	-1.424
	SD	0.051	0.010	
Famfirm20 without FCEO	Mean	0.763	0.690	-1.636
	SD	0.052	0.009	
Famfirm25 without FCEO	Mean	0.823	0.825	0.012
	SD	0.074	0.010	

4.4.3 Family Firms and Firm Performance: Addressing Endogeneity

A major hurdle in the causal interpretation of the relationship between family firms and firm performance measures is endogeneity. We use the financial crisis of 2008-2009 as an unexpected liquidity shock that disrupted the equilibrium in a way that magnified both the benefits and costs of family control. Lins et al. (2013) show that the financial crisis affected a family's private benefits of control. Family-controlled firms became more biased toward survival-oriented actions that in turn helped to preserve the control benefits of the founding families at the expense of outside shareholders. Similarly, although in a different institutional setting in East Asia, Lemmon and Lins (2003) argue that a financial crisis represented a relative exogenous shock to any individual firm which altered the marginal cost to insiders of diverting resources away from profitable investment projects. Lemmon and Lins (2003) argue that the context of the financial crisis offers an interesting opportunity to study the valuation effects of ownership structure that avoids some of the potential shortcomings of prior studies driven from the identification problem.[75]

To ensure that, other contaminating factors may not drive our identification strategy, we use a 5-year event window from 2005-2009 and employ the following empirical model:

$$Y_{i,t} = \alpha + \delta Family\ firm_i \times \text{Crisis}_t + \partial \text{Crisis} + \beta Family\ firm + \gamma Z_{i,t} + Industry\ dummies + Year\ dummies + \varepsilon_{i,t} \quad (2)$$

Here, $Y_{i,t}$ represents firm performance measured by Log(Tobin's Q) in the post-crisis period. 'Crisis' is an indicator variable equals one if the year is 2008 or 2009 (following Lins et al., 2013) and zero if the year is 2005 through 2007. Our coefficient of interest is δ that measures the family's effect on firm performance during the post-crisis period. More importantly, we expect that δ would be sensitive to the family firm definition.

[75] Lemmon and Lins (2003) use the East Asian financial crisis that began in July 1997 to study the effect of ownership structure on firm value. The pre-shock period of the study is January 1, 1996 to January 1, 1997 which is one year before the crisis. The post-crisis period starts in July 1, 1997 and ends in August 1, 1998. They claim that an economic crisis is a relatively exogenous shock (at least, with respect to any individual firm) that significantly lowers the available return on investment opportunities of firms.

We use a continuous difference in difference (DID) setup where all firms are subject to the Crisis shock. However, a firm's sensitivity to the treatment may differ depending on their characteristics, e.g., whether they are a family firm (see, Atanasov and Black 2016). More precisely, we examine whether family firms or founder-managed firms experience less of a performance decline than other firms during the crisis period. We argue that the cross-sectional firm performance variation during the crisis could be driven by the founding family's management or level of ownership.

In our analysis, family firms or founder-managed firms are treated firms and other firms are the control firms. During the event window (year 2005-2009), the sample consists of 355 unique firms, 50 unique founder-run firms, and 67 unique firms with family ownership of at least 5%. One challenge of using crisis shock as treatment is that the treated and control firms may have different pre-treatment performance trends. We plot the performance of these groups in Graph-1. We observe that although founder-managed firms show better performance compared to other firms, there is a parallel trend between these two sets of firms in the pre-crisis period. Interestingly, there is a divergence of parallel trends of the performance of these firms in the post-crisis period. A similar pattern is found for family firms with 5% ownership stakes. We document this result using a rigorous regression framework in Table 7.

On average, the financial crisis negatively impacts firm performance. However, consistent with baseline results, we find that founder-run firms continue to have superior performance during the crisis period (Column (1) of Table 7). More precisely, there is a total founder premium of 2.35 units $(e^{.180} + e^{.109} = 2.35)$ on firm performance. The family-premium is statistically and economically significant when we define family firms using a 5% ownership threshold (Famfirm05). However, the family firm premium decreases when family firms are identified using a 10% or 15% threshold (Famfirm10 and Famfirm15). The coefficient of the interaction term, δ, becomes insignificant when a threshold of 20% or higher ownership is used (columns (5) and (6)).

We also examine the impact of founder CEO on performance and vary the definition of a family firm to include ownership or founder CEO. The number of family firms using this definition varies from 94 (Famfirm05 or FCEO) to 62 firms (Famfirm25 or FCEO).

Similar to the baseline results, we find that the family premium continues if we identify family firms through either ownership or founder CEO status.

Graph 1: Pre-and post-crisis trend in performance: Founder-managed (family) firms v. other firms

The following graphs show how the performance of founder-managed (family) firms change compared to other firms. Figure 1 compares founder-run firms against other firms. Figure 2 shows family firms (at least 5% family ownership) against other firms.

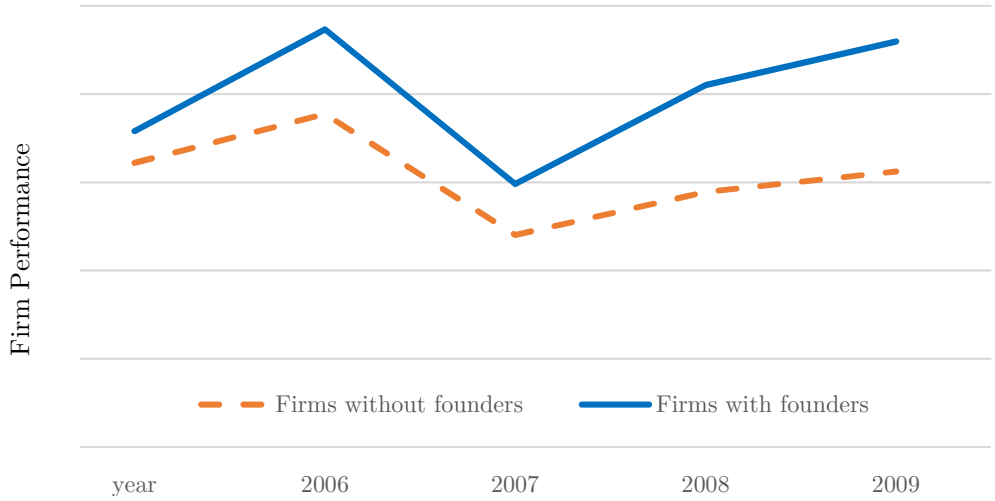

Figure 1: Founder v. Other Firms

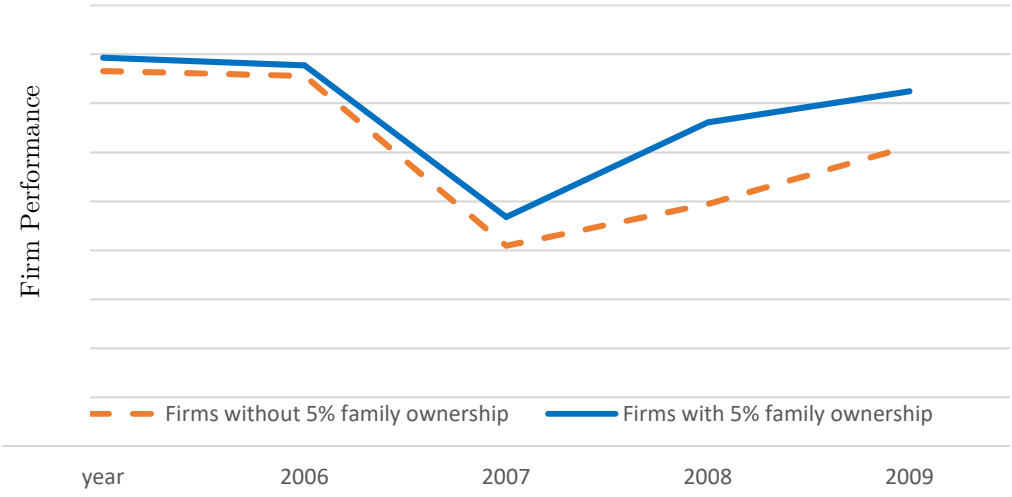

Figure 2: Family v. Other Firms

Table 7: Sensitivity of Firm Performance to Family Firm Definition: Around Financial crisis

Table 7 shows the link between the family firm and firm performance using different definitions of family firms and in the context of the financial crisis. Founder CEO is an indicator variable equals one when one of the founders/key employees of the firm at the time of its formation serves as CEO. Famfirm05 is an indicator for a family firm where founding families have at least 5% ownership stakes in the firms. Famfirm10 is an indicator for a family firm where founding families have at least 10% ownership stakes in the firms. Famfirm15 is an indicator for a family firm where founding families have at least 15% ownership stakes in the firms. Famfirm20 is an indicator for a family firm where founding families have at least 20% ownership stakes in the firms. Famfirm25 is an indicator for a family firm where founding families have at least 25% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms. Tobin's Q is defined as (book value of assets-book value of equity +market value of equity) /book value of assets. Log (Tobin's Q) is the natural logarithm of Tobin's Q. Crisis is an indicator variable, equals one if the year is 2008 or 2009. The crisis is zero if year is 2005 or 2006 or 2007. All models include the year and industry fixed effects. t-stats are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Log (Tobin's Q)					
Models	(1)	(2)	(3)	(4)	(5)	(6)
Founder CEO x Crisis	0.180***					
	(0.001)					
Famfirm05 x Crisis		0.100**				
		(0.013)				
Famfirm10 x Crisis			0.065*			
			(0.067)			
Famfirm15 x Crisis				0.065*		
				(0.077)		
Famfirm20 x Crisis					-0.027	
					(0.695)	
Famfirm25 x Crisis						-0.024
						(0.779)
Crisis	-0.074***	-0.074**	-0.086**	-0.114**	-0.058**	-0.058*
	(0.010)	(0.014)	(0.029)	(0.013)	(0.049)	(0.051)
Founder CEO	0.109					
	(0.123)					
Famfirm05		0.002				
		(0.966)				
Famfirm10			-0.009			
			(0.871)			
Famfirm15				0.113		
				(0.246)		
Famfirm20					0.118	
					(0.166)	
Famfirm25						0.037
						(0.705)
Control Variables	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	1,503	1,503	1,503	1,503	1,503	1,503
R-squared	0.614	0.605	0.621	0.427	0.605	0.603

Variables	Log (Tobin's Q)				
Models	(7)	(8)	(9)	(10)	(11)
Famfirm05 or FCEO x Crisis	0.123***				
	(0.002)				
Famfirm10 or FCEO x Crisis		0.115***			
		(0.008)			
Famfirm15 or FCEO x Crisis			0.129***		
			(0.005)		
Famfirm20 or FCEO x Crisis				0.119**	
				(0.020)	
Famfirm25 or FCEO x Crisis					0.127**
					(0.012)
Crisis	-0.085***	-0.078***	-0.078***	-0.073**	-0.073**
	(0.004)	(0.009)	(0.008)	(0.012)	(0.012)
Famfirm05 or FCEO	0.034				
	(0.406)				
Famfirm10 or FCEO		0.058			
		(0.225)			
Famfirm15 or FCEO			0.076		
			(0.166)		
Famfirm20 or FCEO				0.081	
				(0.162)	
Famfirm25 or FCEO					0.082
					(0.175)
Firm level controls	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y
Observations	1,503	1,503	1,503	1,503	1,503
R-squared	0.609	0.610	0.612	0.611	0.611

In an unreported robustness test, we use return on assets (ROA) as an alternative measure of firm performance and re-estimate the models of Table 7. ROA is a firm's operating income at the period (t+1) scaled by total assets. Supporting our conjecture that a family firm's performance is sensitive to the definitions of family firms, we find that in the post-crisis period, a family firm defined through at least 5% family ownership or the presence of founder CEO generates better performance. However, at the higher ownership level (e.g., at least 20% family ownership), family firm premium disappears.

4.4.4 Assessing the Association between Family Firms and Financing decision: Sensitivity Analysis

In this section, we examine the impact of a family firm on leverage. We initially replicate the findings of Anderson and Reeb (2003b). We then examine the sensitivity of the relationship between family firms and leverage to different definitions of family firms. The results in Table 8 Panel A (model 2) are consistent with Anderson and Reeb (2003b) when family firms are defined using a 5% ownership threshold. Similarly, we do not find a significant relationship between family firms and leverage when we use other thresholds of ownership levels (models 3 -6). However, there is a weak negative association between founder CEO firms and leverage (model 1). When we classify a family firm using a family ownership threshold of 5% or a founder CEO, we find a significant negative relationship between family firms and leverage (model 7). However, at higher levels of family ownership, the relationship becomes insignificant.

We, then use the financial crisis as an exogenous liquidity shock to firms to identify a causal effect of family firms on leverage in Table 8 Panel B. Similar to the results in Table 8, there is no significant relationship between family firms and leverage in the threshold of ownership levels reported in models 2-6. We find that founder CEO firms, on average, have lower leverage during the financial crisis. When we classify a firm as a family firm because of family ownership (a threshold of 5% and higher) or presence of a founder CEO of the firm, there is a significant negative relationship (both statistically and economically) between family firms and leverage for all ownership levels between 5 and 25% (models 7-11). The significant relationship could be driven by founder CEOs

and supports the intuition in Strebulaev and Yang (2013) that founder CEOs are less inclined to include leverage in capital structure. The results support the hypothesis that the relationship between family firms and leverage is sensitive to the definition of a family firm. The results also provide empirical support for the validity of the concerns raised regarding family firm definitions in Chua, Chrisman, and Sharma (1999). The results further highlight the significance of endogeneity discussed in the family firm literature.

Table 8: Sensitivity of Firm's Leverage to Family Firm Definition

Table 8 Panel A shows the link between the family-firm and firm's leverage using different definitions of family-firms. Panel B explores the relationship in the context of financial crisis. All statistics are firm-level averages. Founder CEO is an indicator variable equals one when one of the founders/key employees of the firm at the time of its formation serves as CEO. Famfirm05 is an indicator for a family firm where founding families have at least 5% ownership stakes in the firms. Famfirm10 is an indicator for a family firm where founding families have at least 10% ownership stakes in the firms. Famfirm15 is an indicator for a family firm where founding families have at least 15% ownership stakes in the firms. Famfirm20 is an indicator for a family firm where founding families have at least 20% ownership stakes in the firms. Famfirm25 is an indicator for a family firm where founding families have at least 25% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms. Leverage is defined as (long-term debt+ short-term debt) /total assets. Crisis is an indicator variable, equals one if the year is 2008 or 2009. The crisis is zero if year is 2005 or 2006 or 2007. All models include the year and industry fixed effects. t-stats are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Leverage										
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Founder CEO	-0.026*										
	(0.051)										
Famfirm05		-0.010									
		(0.384)									
Famfirm10			0.001								
			(0.967)								
Famfirm15				-0.003							
				(0.875)							
Famfirm20					-0.002						
					(0.938)						
Famfirm25						0.008					
						(0.782)					
Famfirm05 or FCEO							-0.022**				
							(0.033)				
Famfirm10 or FCEO								-0.020			
								(0.102)			
Famfirm15 or FCEO									-0.018		
									(0.173)		
Famfirm20 or FCEO										-0.018	
										(0.208)	
Famfirm25 or FCEO											-0.013
											(0.382)
Firm level controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936
R-squared	0.439	0.437	0.436	0.436	0.436	0.436	0.441	0.439	0.438	0.438	0.437

Table 8 Panel B: Sensitivity of firm's leverage to family-firm definition: Financial crisis period

Variables	Leverage					
Models	(1)	(2)	(3)	(4)	(5)	(6)
Founder CEO x Crisis	-0.031**					
	(0.017)					
Famfirm05 x Crisis		-0.005				
		(0.610)				
Famfirm10 x Crisis			-0.008			
			(0.470)			
Famfirm15 x Crisis				-0.004		
				(0.778)		
Famfirm20 x Crisis					0.003	
					(0.887)	
Famfirm25 x Crisis						-0.008
						(0.670)
Crisis	0.025***	0.023***	0.024***	0.023***	0.023***	0.023***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Founder CEO	-0.030**					
	(0.035)					
Famfirm05		-0.010				
		(0.409)				
Famfirm10			0.004			
			(0.807)			
Famfirm15				-0.000		
				(0.987)		
Famfirm20					-0.003	
					(0.914)	
Famfirm25						0.011
						(0.743)
Firm level controls	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	1,503	1,503	1,503	1,503	1,503	1,503
R-squared	0.478	0.470	0.468	0.468	0.468	0.468

Table 8 Panel B: Sensitivity of firm's leverage to family-firm definition: Financial crisis period

Variables	Leverage				
Models	(7)	(8)	(9)	(10)	(11)
Famfirm05 or FCEO x Crisis	-0.018**				
	(0.035)				
Famfirm10 or FCEO x Crisis		-0.022**			
		(0.017)			
Famfirm15 or FCEO x Crisis			-0.024**		
			(0.017)		
Famfirm20 or FCEO x Crisis				-0.025**	
				(0.025)	
Famfirm25 or FCEO x Crisis					-0.024**
					(0.035)
Crisis	0.031***	0.026***	0.026***	0.025***	0.025***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Famfirm05 or FCEO	-0.027**				
	(0.012)				
Famfirm10 or FCEO		-0.019			
		(0.156)			
Famfirm15 or FCEO			-0.019		
			(0.212)		
Famfirm20 or FCEO				-0.019	
				(0.228)	
Famfirm25 or FCEO					-0.016
					(0.328)
Firm level controls	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y
Observations	1,503	1,503	1,503	1,503	1,503
R-squared	0.691	0.476	0.475	0.475	0.474

4.4.5 Assessing the Association between Family Firms and M&A Performance: Sensitivity Analysis

Finally, we examine the sensitivity of the relationship between M&A performance and the definition of family firms. We analyze the cumulative abnormal returns (CARs) within a short event window (-2,2) of 5 days. Specifically, we examine how the CARs vary with different family ownership size and family management (founder CEO). The results of the regressions are reported in Table 9. Overall, we find differences (both economically and statistically) in takeover performance (CARs) depending on the definition of family firms used. When family firms are defined based on ownership, we find a significant positive relationship between family firms and takeover performance at the threshold of 5%. The ties between a family firm and M&A performance become insignificant for higher levels of family ownership (model 2-6). One plausible reason for the insignificant effect of family firms could be fewer deals conducted by family firms at higher ownership levels (only 2.3% deals by family firms defined by Famfim25).

However, we find that founder CEO-run firms make more valuable M&A deals as the market reaction (CARs) is 1.9% higher compared to non-founder-run firms. This magnitude is economically significant given that the mean CARs for the sample is about 0.2%. This finding potentially helps to explain the positive 'founder CEO premium' documented in the literature. We suggest that, one plausible source of the 'founder CEO premium' could be value-enhancing strategic investments, such as M&As by founder CEOs.

We next classify a family firm using the definition that requires either family ownership or founder CEO status (models 7-11). We find a significant positive relationship between family firms and takeover performance for family firms with a threshold level of ownership of 5-10% or where the CEO is a founder. However, as the threshold level of ownership increases, we find a weak or insignificant relationship for family firms with ownership levels of 20 and 25%. The results suggest that positive family firm effect is, most likely, driven by the presence of the founder CEOs. Overall, the

results provide support for our hypothesis that the empirical relationship between a firm's strategic investment policy and family firms is sensitive to the definition of family firms[76].

Table 9: Sensitivity of family firm definition to firm's M&A performance

Table 9 shows the link between the family firm and firm's M&A performance using different definitions of family firms. CAR is cumulative abnormal return over 5-day even window using market model. Founder CEO is an indicator variable equals one when one of the founders/key employees of the firm at the time of its formation serves as CEO. Famfirm05 is an indicator for a family firm where founding families have at least 5% ownership stakes in the firms. Famfirm10 is an indicator for a family firm where founding families have at least 10% ownership stakes in the firms. Famfirm15 is an indicator for a family firm where founding families have at least 15% ownership stakes in the firms. Famfirm20 is an indicator for a family firm where founding families have at least 20% ownership stakes in the firms. Famfirm25 is an indicator for a family firm where founding families have at least 25% ownership stakes in the firms. Famfirm05 or FCEO are firms where founding families have at least 5% ownership stakes or the CEO is one of the founders of the firms. Famfirm10 or FCEO are firms where founding families have at least 10% ownership stakes or the CEO is one of the founders of the firms. Famfirm15 or FCEO are firms where founding families have at least 15% ownership stakes or the CEO is one of the founders of the firms. Famfirm20 or FCEO are firms where founding families have at least 20% ownership stakes or the CEO is one of the founders of the firms. Famfirm25 or FCEO are firms where founding families have at least 25% ownership stakes or the CEO is one of the founders of the firms. Leverage is defined as (long-term debt+ short-term debt) /total assets. Relative deal size is transaction value over acquirer's market capitalization on 11 day before the announcement date. Subsidiary target is one if the target company is a subsidiary company, otherwise zero. Public target is one if the target company is a public company, otherwise zero. Private target is one if the target company is a private company, otherwise zero. Cross boarder deal is one if the target company is a foreign company, otherwise zero. All models include the year and industry fixed effects. t-stats are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

[76] Our results remain qualitative unchanged when we use method of payment and industry relatedness as additional control variables in the analysis (unreported).

Variables	CAR (-2,2)										
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Founder CEO	0.019**										
	(0.045)										
Famfirm05		0.017**									
		(0.019)									
Famfirm10			0.006								
			(0.585)								
Famfirm15				0.021							
				(0.213)							
Famfirm20					0.012						
					(0.323)						
Famfirm25						-0.018					
						(0.512)					
Famfirm05 or FCEO							0.014**				
							(0.024)				
Famfirm10 or FCEO								0.008**			
								(0.045)			
Famfirm15 or FCEO									0.022**		
									(0.017)		
Famfirm20 or FCEO										0.016*	
										(0.097)	
Famfirm25 or FCEO											0.016
											(0.132)
Public Target	-0.007	-0.003	-0.007	-0.006	-0.006	-0.007	-0.003	-0.003	-0.007	-0.007	-0.007
	(0.639)	(0.870)	(0.644)	(0.674)	(0.669)	(0.656)	(0.835)	(0.892)	(0.632)	(0.636)	(0.636)
Private Target	0.005	0.009	0.005	0.006	0.005	0.004	0.008	0.009	0.005	0.005	0.005
	(0.723)	(0.565)	(0.726)	(0.664)	(0.708)	(0.755)	(0.603)	(0.698)	(0.730)	(0.751)	(0.746)
Subsidiary Target	0.003	0.007	0.002	0.003	0.003	0.002	0.006	0.010	0.003	0.003	0.003
	(0.802)	(0.689)	(0.859)	(0.805)	(0.826)	(0.872)	(0.703)	(0.681)	(0.814)	(0.826)	(0.832)
Friendly Target	0.010	0.012	0.011	0.013*	0.010	0.008	0.010	0.006	0.012	0.010	0.010
	(0.192)	(0.109)	(0.134)	(0.082)	(0.175)	(0.339)	(0.152)	(0.623)	(0.129)	(0.241)	(0.224)
Cross-border Deal	0.001	-0.001	-0.000	-0.000	0.000	0.001	-0.001	-0.003	-0.000	0.000	0.000
	(0.875)	(0.793)	(0.983)	(0.959)	(0.954)	(0.856)	(0.872)	(0.463)	(0.987)	(0.944)	(0.934)
Relative Deal size	-0.031	-0.032	-0.031	-0.032	-0.032	-0.032	-0.032	-0.021*	-0.032	-0.032	-0.031
	(0.337)	(0.307)	(0.328)	(0.320)	(0.321)	(0.323)	(0.303)	(0.059)	(0.314)	(0.312)	(0.335)
Firm level controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	1,009	1,009	1,009	1,009	1,009	1,009	1,009	1,009	1,009	1,009	1,009
R-squared	0.266	0.272	0.261	0.265	0.261	0.261	0.269	0.254	0.271	0.265	0.264

4.5 Discussion and Conclusion

There is considerable debate among financial economists and management scholars about the relationship between family firms and corporate outcomes. The empirical literature finds conflicting results for the effect of family on firm performance, strategic investments and financing policy. Studies use a variety of definitions for family firms making it difficult to provide conclusive evidence on the impact of family firms on corporate outcomes. In this study, we show that the definition of family firms has important implications for the association between family firms and firm outcomes. We employ a unique hand-collected dataset for a long panel (2001-2010) of S&P500 firms and find that the association between family firms and firm outcome measures is sensitive to the definition used. More importantly, exploiting a quasi-natural experiment, we attempt to address the endogeneity of the relationship between a family firm and firm performance and thus facilitate a causal interpretation of this relationship.

We also show that the capital structure decisions in family firms differ from those in non-family firms and provide comprehensive evidence on the sensitivity of this relationship to the specific definition of family firms used as well as attempting to address endogeneity. We also find that founder CEO run firms and family firms with low levels of ownership (a minimum of 5%) threshold make more valuable M&A deals. However, the relationship does not persist at higher levels of family ownership which supports our claim for the sensitivity of the relationship between family firm measures and a firm's strategic investment policy.

Overall, we show that the association of family firms and various measures of firm performance documented so far in the literature is sensitive to the family firm definition. Therefore, prior results should be evaluated with caution. Although we incorporate both the levels of ownership and management in defining family firms, it would be more interesting to know which measure (ownership or family management) is more appropriate to define family firms. We will further explore this aspect in the future. Besides, there could be other important dimensions that could make family firms distinct from non-family-firms. For example, Chua et al. (1999) argue that data on a firm's intention, vision and behavior are necessary to identify family businesses within a sample delineated by

the components of family involvement. We show that consideration of the differences in levels of ownership and active management involvement by the founding families alone validates the concern raised in the literature and provides empirical support for this concern. In the future, we plan to extend our work that could contribute to resolving such conflicting evidence in the extant literature. Besides, although we restrict our sample to the year 2010 to compare our findings to the prior literature, further robustness tests exploiting data from the year beyond 2010 could strengthen our baseline conclusion of this study. Thus., we would extend our sample beyond 2010 in the future. Finally, adding additional layers to differentiate family firms further by considering the family vision and exploring why founder-run firms show better performance during the GFC period could strengthen our conclusions and thus could be the subject of future research.

Chapter 5

Conclusion

This thesis consists of three independent, self-contained essays which focus on agency conflicts and the role of governance in mitigating such conflicts. The overarching objective of this thesis is to design sharp experiments and deploy unique datasets to advance the strand of the corporate governance literature that seeks to understand various forms of agency conflicts that plague modern corporations.

The first essay highlights the importance of a flexible and accommodating managerial labor market to ensure adequate risk-taking. Utilizing the staggered legal shock from the adoption of Inevitable Disclosure Doctrine (IDD) as quasi-experiments, the first essay shows that the stricter enforceability of post-employment restrictions exacerbates a manager's career concerns that potentially causes risk-related agency conflicts. Such risk-related conflicts impose real costs on firms by distorting decisions on which managers arguably, have real influence. Specifically, the study shows that after the adoption of IDD when the firm's optimal strategy is to adopt less conservative corporate policies, firms with CEOs whose career concerns exacerbate relatively more, on average, adopt more conservative corporate policies. Further analysis shows that such conservative corporate policies are suboptimal from the perspective of shareholders. Thus, this essay advances the literature on risk-related agency conflicts by lending empirical support to existing theories on risk-related agency conflicts.

The second essay focuses on other forms of agency conflicts, namely private benefits extraction and empire-building by powerful managers, and the role of effective governance in mitigating such conflicts. Utilizing the concurrent passage of the Sarbanes-Oxley Act of 2002 (SOX) and NYSE/NASDAQ listing regulation changes (collectively, "SOX") as a quasi-experiment, this essay shows that exogenous improvement in board-level governance can initiate a strategic resource reallocation in powerful CEO managed firms. After such an exogenous improvement in board-level governance, firms led by powerful CEOs increase innovation inputs (R&D expenditures) and produce more innovation outputs (patents) that are scientifically more important and economically more valuable. Powerful CEO managed firms are more likely to pay dividends and reduce investments in capital expenditures. Investment quality also improves, manifesting in better takeover performance. Thus, the results in this essay emphasize the need for

striking the right balance between the executive power and corporate board power that can divert the energy and efforts of powerful CEOs to value maximizing corporate policies.

The third essay of the thesis highlights the importance of a consistent set of definitions of a family firm in the literature to reconcile the conflicting findings regarding the effect of founding family ownership and management on the firm-level policies and outcomes. Empirical studies utilize a wide variety of definitions of family-firms, and as such, the conclusion of these studies is likely to be sensitive to how family firms are defined. Additionally, some studies do not distinguish between family ownership and family management while defining a family firm. More importantly, pervasive endogeneity also hinders a causal interpretation of the observed association between the founding family and firm-level outcomes. Utilizing an extensive hand-collected unique dataset on family ownership and founder CEO status from proxy filings of S&P500 firms for a long panel (2001-2010) the third essay shows that the documented relationship between family firms and firm performance is quite sensitive to the precise definition of family firms used in the family firm literature. The findings of this essay are particularly policy-relevant since it documents that, in assessing the influence of family firm on firm performance, financing and investment decisions, stakeholders or policy-makers should consider the significant heterogeneity among family-firms that arises from differences in the financial stakes involved and provision of human capital by founder families.

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