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Essays on CEO Attributes and Corporate Behavior

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Abstract

A growing literature in economics and finance suggests that corporate executives who set the "tone at the top" play significant roles in various corporate policies and outcomes. In line with this strand of research, the thesis aims at exploring new relationships between CEO attributes and corporate behavior. This thesis consists of three distinct chapters.

The first chapter examines the roles of award-winning CEOs to corporate innovative activities. The empirical analysis reveals that firms led by winners of non-media awards generate more patents and more citations per patent in the second and the third year following the award year, whereas, the difference in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners is either insignificant or weak. There are several possible channels through which award-winning CEOs can affect corporate innovative activities, including award-induced CEO distraction, analyst coverage, employee treatment, and innovation characteristics.

The second chapter examines whether CEOs' legal education affects liquidity costs of the firms that they manage. The empirical analysis suggests that firms headed by CEOs with a law degree (lawyer CEOs) have higher stock market liquidity than firms led by non-lawyer CEOs. Lawyer CEO have an impact on stock liquidity through their influences on firm risks and information transparency. In addition, firms led by CEOs with legal expertise are associated with less stock price delay, smaller market reactions to earnings announcements, and earn fewer insider trading profit. The second chapter highlights the importance of CEOs' personal traits in enhancing financial market quality.

The third chapter examines the economic effects of the executive's legal expertise in the context of credit analysis and the cost of debt capital. The empirical analysis suggests that firms headed by lawyer CEOs enjoy more favorable ratings and have lower costs of debt capital than firms of non-lawyer executives. Other firm stakeholders such as auditors also value CEO legal expertise in the pricing of their services.

Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

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Chapter 1.

Introduction

"Great companies with the way they work, first start with great leaders." -Steve Ballmer, Chief Executive Officer (CEO hereafters) of Microsoft.

Corporate stakeholders are willing to pay a significant amount to hire executives with superior managerial and leadership ability.[1] However, the influence that CEOs have on firm outcomes is unclear. Earlier studies, such as Thomas (1988), find little evidence on the impact of CEOs on their firms' overall performance. However, subsequent works (i.e., Bertrand and Schoar (2003), Mackey (2008), Hambrick and Quigley (2014)) document that the "CEO effect" is significant in explaining variance in firms' profitability. Especially, there is widespread interest in recent literature on whether, and to what extent, personal attributes of executives influence their leadership choices and corporate behavior. Studies document that CEO attributes, including personality traits (Gow, Kaplan, Larcker, and Zakolyukina, 2016), personal lifestyles (Davidson,

[1] In 2012, combined incomes of US's ten highest paid executives could pay the salaries of over 18,300 Americans. (http://www.dailymail.co.uk/news/article-2049405/Meet-Americas-10-highest-paid-bosses-Forbes-list-wealthiest-CEOs.html Accessed on 22 March 2019).

Dey, and Smith, 2015), military background (Benmelech and Frydman, 2015), and exposure to early-life disasters (Bernile, Bhagwat, and Rau, 2017), play significant roles in corporate performance, risk-taking or misconduct. Recent studies suggest that CEO personal traits also matter for earnings quality (Demerjian, Lev, Lewis, and McVay, 2012), credit risk assessment (Kuang and Qin, 2013), corporate social responsibility ratings (Cronqvist and Yu, 2018; Gupta, Nadkarni, and Mariam, 2018; Tang, Mack, and Chen, 2018) or tax decisions (Law and Mills, 2017). Research on the effect of executives on various corporate outcomes and its mechanism(s) is still evolving and has gained significant attention from researchers, practitioners, and regulators. In line with this growing strand of research, this thesis aims at exploring new relationships between CEO attributes and corporate behavior.

This thesis consists of three distinct empirical chapters. Chapter 2, the first empirical chapter, investigates the roles of award-winning CEOs to corporate innovative activities. Innovation has become increasingly important as a major engine of economic growth. The major push for innovation should start from the CEO and the executive leadership of the company who should create a culture that is open to new ideas and nourishes as well as rewards fresh thinking. The academic literature suggests that personal traits of top executives can affect corporate innovative activities (e.g., Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012; Sunder, Sunder, and Zhang, 2017; Islam and Zein, 2019). Several studies, such as Wade, Porac, Pollock, and Graffin (2006), Malmendier and Tate (2009) and Ammann, Horsch, and Oesch (2016), document that the status effect induced by CEOs winning media awards can influence stock returns and operating performance. Thanks to the increase in media visibility after winning awards, CEOs can better signal their ability and effort, thereby gaining more trust from stakeholders and enjoying more favorable business deals. These advantages are important for CEOs in pursuing innovative

projects, which are risky and require high investment. The status effect of winning media awards on corporate innovation has yet to be investigated. To fill the gap in the literature, in the second chapter, we take a further step to examine the effect of non-media award-winning CEOs on corporate innovative success. Unlike media awards, non-media awards are less likely to be influenced by CEOs and firms' strategic disclosure, as documented in Blankespoor and DeHaan (2015). Utilizing a set of non-media award-winning CEOs helps us to better test the exact roles of award-winning CEOs on corporate innovation performance. We find that the difference in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners (predicted winners) is either insignificant or weak. We also find that firms headed by winners of non-media awards generate more patents and more citations per patent in the second and the third year following the award year. We consider possible channels through which award-winning CEOs can affect corporate innovative activities, including award-induced CEO distraction, analyst coverage (He and Tian, 2013), employee treatment (Chang, Leung, and Evan, 2016), and innovation characteristics.

Chapter 3 examines whether corporate executives' style and behavior developed through professional training have important implications for financial market quality. We focus on legal education which can give CEOs an edge in facilitating corporate transparency and risk management and examine whether this special training affects liquidity costs of the firms that they manage. We find that that firms headed by CEOs with a law degree (lawyer CEOs) have higher stock market liquidity than non-lawyer CEO firms and that the appointment of lawyer CEOs lead to an improvement in liquidity. We find that lawyer CEOs have an impact on stock liquidity through their influences on firm risks and information transparency. In addition, firms led by CEOs with legal expertise are associated with less stock price delay, smaller market reactions to earnings

announcements, and earn fewer insider trading profit. This chapter highlights the importance of CEOs' personal traits in enhancing financial market quality.

Chapter 4 examines the economic effects of the executive's legal expertise in the context of credit analysis and the cost of debt capital. Specifically, we employ the executives' legal training as a proxy for the soft information analyzed by credit rating agencies and find that firms headed by lawyer CEOs enjoy more favorable credit ratings than firms led by non-lawyer executives. Empirical analyses also suggest that executives' legal expertise has implications for debt market investors and auditors. This chapter suggests that the executive's legal expertise is an independent factor that debt market participants impound into their credit assessment.

Taken together, the three essays contribute to the extant literature in three significant ways. First, the thesis contributes to a recently evolving line of research investigating the effect of managerial styles, experience, and behavior on various corporate policies and outcomes. Our study is the first to utilize a unique set of CEOs non-media awards in investigating firm innovation outcomes. Chapter 2 provides new evidence on the role of CEO personal traits in corporate innovation by suggesting that changes in CEO status following award competitions matter in firms' innovative activities. The finding contributes to the broader literature that explores how life, career experience, and personal attributes affect CEO style and corporate decisions (Malmendier, Tate, and Yan, 2011; Custodio, Ferreira, and Matos, 2013; Benmelech and Frydman, 2015; Dittmar and Duchin, 2015; Bernile, Bhagwat, and Rau, 2017; Cronqvist and Yu, 2017). In addition, the second essay (Chapter 3) is among the first to highlight the importance of executives' characteristics in enhancing financial market quality.

Second, the thesis contributes to a growing strand of literature that studies drivers of stock liquidity- an important aspect of financial markets. Prior studies document various firm-level characteristics that drive stock liquidity. The thesis contributes to the literature by showing that the CEOs' personal traits play a significant role, incremental to firm-specific characteristics, in understanding stock liquidity. The thesis's findings have a strong implication for future research on financial market quality which should take executives' attributes into consideration if they aim to study liquidity costs of the firm that they manage.

Third and finally, the thesis contributes to a strand of literature investigating determinants of credit risk assessment. To the best of our knowledge, this thesis is the first to examine the effect of lawyer CEOs on credit risk assessments. We find that CEO legal expertise is an important credit risk factor incremental to firm fundamentals. Our paper is aligned with Kuang and Qin (2013), Bonsall, Holzman, and Miller (2017), Cornaggia, Krishnan, and Wang (2017) and Bernile, Bhagwat, and Rau (2017) who show that CEOs' personal traits should be considered when assessing their firms' default risk. The thesis has important implications for investors, credit rating agencies, and other firm stakeholders. Investors, for example. should take into account CEOs' personal traits when making investment decisions as these attributes are associated with corporate disclosure quality and information asymmetry between corporate insiders and outsiders.

The remainder of the thesis is organized as follows. Chapter 2 discusses the first essay. Chapter 3 and Chapter 4 discuss the second and third essays. Chapter 5 provides a conclusion and discusses implications for future research.

Chapter 2.

Award-winning CEOs and corporate innovation

2.1. Introduction

Innovation has become increasingly important as a major engine of economic growth. The empirical literature has identified a number of company characteristics that drive innovation.[2] The major push for innovation should start from the CEO of the company. Indeed, a global survey by PwC (2011) amongst CEOs finds a general belief that the drive to innovation should start at the top. The survey calls it a "misconception" that innovation can be delegated. The CEO and the executive leadership have to create a culture that is open to new ideas and nourishes as well as rewards fresh thinking.[3] In this sense, even though top executives have little direct influence over innovation, they play an essential role in creating an environment that extracts the most value from the firm's human capital, leading to corporate innovation success.[4] The academic literature

[2] For example, studies include company characteristics such as corporate governance (Sapra, Subramanian and Subramanian, 2014)), analyst following (Li, Griffin, Yue, and Zhao, 2013), stock liquidity (Fang, Tian, and Tice, 2014), non-executive employee stock options (Chang, Fu, Low, and Zhang, 2015), and corporate transparency (Zhong, 2018; Brown and Martinsson, 2019).

[3] The PwC survey is available at: https://www.pwc.com/gx/en/corporate-strategy-services/assets/ceosurvey-innovation.pdf (retrieved on March 4, 2019).

[4] Employee compensation (Chang et al., 2015) and employee treatment (Chen, Chen, Hsu, and Podolski, 2016; Chen, Leung, and Evans, 2016) are important factors affecting innovative success.

documents several characteristics of top executives that can affect corporate innovative activities, such as CEO overconfidence (Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012), networking (Faleye, Kovacs, and Venkateswaran, 2014), and managerial ability and skills (Chen, Podolski, and Veeraraghavan, 2015; Custodio, Ferreira, and Matos, 2019).[5] Since CEO characteristics are important to innovation success, a change in CEO attributes could also lead to a change in firm innovation activities.[6]

The status of the CEO is a factor that has the potential to influence innovation. This status can be enhanced by CEOs winning awards. There is a strand of literature that documents the status effect induced by chief executive officers (CEOs) winning media awards and how it influences stock returns and operating performance (Wade, Porac, Pollock, and Graffin, 2006; Malmendier and Tate, 2009; Ammann, Horsch, and Oesch, 2016). Thanks to the increase in media visibility after winning a media award, CEOs increase their status and can gain more trust from stakeholders and enjoy more favorable business deals. These advantages are important for CEOs in pursuing innovative projects, which are risky and require a high investment. However, there is also a downside to winning media awards. Malmendier and Tate (2009) find that the superstar CEOs, who are the winners of media contests, often become the center of attention following their awards.

[5] While this paper focuses on the roles of CEOs and other key stakeholders in corporate innovation, numerous other factors matter for innovation, including stock market liquidity (Fang et al., 2014), equity market development (Hsu, Tian, and Xu, 2014), analyst coverage (Li et al., 2013), anti-takeover provisions (Chemmanur and Tian, 2018), local banking competition (Cornaggia, Mao, Tian, and Wolfe, 2015), firm alliances (Schilling and Phelps, 2007), business groups (Belenzon and Berkovitz, 2010), institutional ownership (Aghion, Van Reenen, and Zingales, 2013), employment non-discrimination acts (Gao and Zhang, 2017), and smoke-free working environments (Gao, Hsu, Li, and Zhang, 2019).

[6] Previous studies show that events that affected top executives such as death and severe health issues (Falato, Kadyrzhanova, and Lel, 2014; Bennedsen, Perez-Gonzalez, and Wolfenzon, 2019; Masulis and Zhang, 2019) and divorce (Galbraith, 2003; Neyland, 2016) are associated with firm performance.

These CEOs then end up spending more time on activities outside the company, such as writing books or sitting on outside boards. In addition, they often end up spending more time on leisure activities. Therefore, it may be possible that the positive status effect on innovation will be outdone by this "burden of celebrity".

In this chapter, we investigate the effect of winning media awards on corporate innovation. Because of the earlier mentioned potential negative effects of winning media awards, we also utilize a set of non-media awards to study their effect on corporate innovation. Using a set of non-media awards helps improve the precision of our test of the role of award-winning CEOs in corporate innovation performance. Our study is aligned with the work of Ammann et al. (2016), who investigate the performance and innovative activity of companies as competitors of either winners or predicted winners.[7] Instead, our paper focuses on winners by comparing them with predicted winners. Therefore, Ammann et al. (2016) study the indirect effect of the awards by looking at the effect on those who do not win awards. We study the direct effect of the actual winners.

We find no significant increase in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners (predicted winners). If anything, the outputs slightly seem to go down, because citations are significantly lower, at the 10%-level, in the 2nd and 3rd year after the award. Contrary to this result, firms headed by winners of non-media awards generate, on average, 0.30% more patents and 0.26% more citations per patent in the 2nd year following the award year, further increasing to 0.78% more patents and 0.56% more citations in

[7] Ammann et al. (2016) find an increase in the risk taking and innovation activity of the competitors of award-winning CEOs, which is associated with a significant positive stock market performance of those competitors subsequent to the award.

the 3rd following the award. The finding is robust to variations in sample size and alternate model specifications.

We further investigate why the effect on innovation for media and non-media awards is different. We first study the potential effect of awards on CEO distraction. Following Da, Engelberg, and Gao (2011, 2015) we use the abnormal changes in the Search Volume Index (SVI) in Google as a measure of market attention. Our results show a significantly positive Abnormal Search Volume Index (ASVI) in the first four weeks following media awards. It is likely that this higher CEO visibility is associated with the CEO distraction documented by Malmendier and Tate (2009). Non-media awards, on the other hand, are only associated with a significantly positive ASVI in the first week following the award week. As a second channel, we study analyst coverage. He and Tian (2013) find that firms covered by more financial analysts generate fewer innovation outputs. They suggest that more analysts following the firm lead to short-term pressure on managers to deliver higher earnings. Therefore, managers are likely to postpone investments and focus on the short-run rather than the long-run. Our results confirm this line of thinking. We find a significant increase in analyst coverage following media awards, whereas there is no increase in analyst coverage for non-media awards. For the third channel, we look at the impact of winning awards on employee treatment. Chen et al. (2016) document that firms with an employee-friendly workplace have greater success in innovations. We find positive coefficients for employee treatment for non-media awards, contributing to the explanation for increasing innovation outputs for these awards. On the other hand, there are non-significant coefficients for the media awards. Finally, for the fourth channel, we look at innovation characteristics. Here we find that firms of CEOs who win non-media awards significantly increase their patent originality, while firms of CEOs who win media awards do not significantly change the originality of their patents.

Our results are consistent with the view that firms led by media award-winning CEOs do not always engage in more innovative activities because of the special nature of innovation activities and the "burden of celebrity." After all, innovation is a high-risk activity that requires a long-term commitment of corporate resources and managerial talent (Holmstrom, 1989). Firms led by non-media award winners appear to benefit from the same status-increasing effect as media award winners, but with less of the outside attention and distractions that the "burden of celebrity" brings. Therefore, induced by the status change following the victory of CEO personal awards, firms led by non-media award winners can benefit from the CEO's reputation and networking to attract the best talent and enjoy more favorable business commitments for risky projects. These benefits make investments in innovation more accessible and eventually boost the innovative activities of firms with non-media award-winning CEOs.

Our study is the first to utilize a unique set of CEOs non-media awards in investigating firm innovation outcomes. Since status changes following non-media award competitions can affect various corporate decisions and stakeholder behaviors, the findings of this study provide a potentially fruitful avenue for future research that investigates stakeholders and corporate outcomes in a non-media setting.

This study also sheds more insight on the literature examining CEOs in the media (see Wade et al. (2006), Malmendier and Tate (2009), and Ammann et al. (2016)). Our paper suggests that changes in CEO status following award competitions also matter in corporate innovative activities. We provide new evidence on the role of CEO personal traits in corporate innovation. The finding contributes to the broader literature that explores how life, career experience, and personal attributes affect CEO style and corporate decisions (Malmendier, Tate, and Yan, 2011;

Custodio, Ferreira, and Matos, 2013; Benmelech and Frydman, 2015; Dittmar and Duchin, 2015; Bernile, Bhagwat, and Rau, 2017; Cronqvist and Yu, 2017).

The remainder of this chapter is organized as follows: Section 2.2 develops the hypotheses. Section 2.3 presents the data and main variables while Section 2.4 discusses our methodology. Section 2.5 discusses the main results. Section 2.6 discusses possible channels. Section 2.7 presents robustness checks and Section 2.8 concludes the chapter.

2.2. Hypothesis Development

2.2.1. Media Awards

CEO media awards are expected to broaden CEOs' media visibility as well as enhance their status and power within the firm (Malmendier and Tate, 2009). This status effect impacts firm innovation activities in several ways. *First*, the increasing media exposure following a CEO's media award announcement could shift power toward award-winning CEOs, hence boosting their risk-taking attitude and even encouraging their overconfidence. Prior literature has shown that firms led by overconfident CEOs tend to achieve higher innovation outputs (Galasso and Simcoe, 2011; Hirshleifer et al., 2012). It is, therefore, possible that award-winning CEOs are more likely to lead their firm to innovation success. *Second,* award-winning CEOs, with increased reputation from receiving awards, are likely to be better trusted by shareholders and other stakeholders (Baik, Farber, and Lee, 2011; Demerjian, Lev, Lewis, and McVay, 2012). These CEOs are therefore less likely to be discouraged from investing in risky innovation projects within the context of career

concerns because their reputation can signal their superior managerial skills (Narayanan (1985)).[8] In addition, winning a media award signals investors and other firm stakeholders that the company is being managed by a capable CEO. Greater trust can thus result in lower financing costs and more favorable business contracts, making investments in innovation easier for firms led by media award-winning CEOs. *Third,* being granted an award offers CEOs more opportunities to build widespread networks, which add value to firm innovation by facilitating investments in corporate innovation, as suggested by Faleye et al. (2014). *Fourth*, opportunities to work with a famous award-winning CEO can attract the best talent. Prior research shows that non-CEO top management team members receive higher pay when they work for a high-status CEO (Graffin, Wade, Porac, and McNamee, 2008). Since employee compensation and treatment are important factors affecting innovative success (Chang et al., 2015; Chen et al., 2016), we can expect firms led by award-winning CEOs to be attractive destinations for the best talent, which is an engine to drive corporate innovation success.[9] Our first hypothesis is as follows.

H1A: *Firms led by media award-winning CEOs generate more ex post innovation output than the matching firms of non-winning CEOs.*

However, a high status from winning media awards does not necessarily guarantee innovation success. A strong reputation is associated with heightened performance expectations, consequently, these expectations could act as a "natural brake" on the unfettered accumulation of CEO power, prestige, and compensation (Fombrun, 1996). While increased media exposure following a CEO's award can boost firm profitability, it can also shift power toward the CEO and

[8] Career concerns refer to managers' attempts to adjust their behavior deliberately to signal their abilities to the labor market and hence their reputation and future career prospects.

[9] We measure innovation output by patents and citations, as described in Section 2.3.B.

induce perquisite consumption in the spirit of Jensen and Meckling (1976). Malmendier and Tate (2009) show that media award-winning CEOs, who become the center of attention following prestigious media awards, often spend more time on activities outside the company, such as writing books, sitting on outside boards, and spending more time on leisure activities. They are also more likely to engage in earnings management to "maintain expected superstar performance as long as possible" (Malmendier and Tate, 2009, p4). Therefore, media award-winning CEOs subsequently underperform relative to non-winning CEOs (Wade et al., 2006; Malmendier and Tate, 2009; Ammann et al., 2016). We expect the distractions and pressure to have a negative impact on companies under the lead of media award-winning CEOs because of extreme media exposure. Our second hypothesis, competing with H1A**,** is as follows.

H1B: *Firms led by media award-winning CEOs generate less ex post innovation output than the matching firms of non-winning CEOs.*

2.2.2. Non-Media Awards

Media coverage is important in shifting CEO status. Although the media exposure of non-media award winners is lower than that of media award winners, we argue that winning non-media awards can shift a CEO's status for two reasons. First, the media also reports information on non-media awards, especially prestigious ones; therefore, non-media award winners are exposed to a particular level of media coverage. Second, even in the extreme case in which non-media awards are not announced through media channels, it is reasonable to assume that the reputation of non-media award-winning CEOs is still well perceived by the target audience of these awards, who could also be close firm stakeholders. Therefore, the advantages CEOs gain from winning non-media awards can affect corporate innovation in the same way as the benefits that media awards bring. In addition, because non-media award winners are less exposed to extreme media coverage,

the negative effects of media awards, such as distractions and pressure, are less likely to affect non-media award-winning CEOs.

H2: *Firms led by non-media award-winning CEOs achieve greater ex post innovation output than the matching firms of non-winning CEOs.*

2.3. Data Description

2.3.1. Data on CEO Awards

We examine the impact of award-winning CEOs on the performance of corporate innovation activities. We obtain a full list from ExecuComp of Standard & Poor's 1500 firms and their CEOs for the period 1992–2010.[10] A database with information related to CEO personal awards does not exist; therefore, we hand-collect data from Marquis Who's Who, one of the most comprehensive databases with CEOs' personal biographical details.[11] We discover that this database sometimes contains incomplete information, that is, several CEOs' personal biographical pages include the name of an award but not the year the award was granted. In such cases, we access the official website of the award, if possible, and manually seek the award information. We also access several other databases, including Notable Names Database (NNDB.com), Reference

[10] We restrict our sample to 1992–2010 due to the unavailability of data on firm patents and citations. We rely on the most up-to-date patent application and citation data from Kogan, Papanikolaou, Seru, and Stoffman (2017), who collect all patent data from Google Patents for the period 1926–2010. Data on firm patents and citations after 2010 are unavailable.

[11] Others who use personal biographical information from Marquis Who's Who to construct their key variables include, for example, Bernile et al. (2017), Benmelech and Frydman (2015), Cronqvist and Yu (2017), Duchin and Sosyura (2013), and Schoar and Zuo (2017).

for Business, Bloomberg.com, Wikipedia, and Google searches, to cross-check the information for each award, as well as other information on CEO characteristics (that will later be used as control variables) obtained from Marquis Who's Who. We are thus able to compile a fine-grained, comprehensive data set with (i) the name of the award, (ii) the year of the award, and (iii) the organization that granted the award.

Motivated by Malmendier and Tate (2009) and Wade et al. (2006), who study CEO media superstars who are winners of media-based CEO of the Year contests, we classify our award sample into two main categories: media-based and non-media–based awards. We define media awards as awards granted by media organizations and non-media awards as those given by non-media agencies. According to the 113th Senate Manual containing the "Standing rules, orders, laws and resolutions affecting the business" of the U.S. Senate, the term *media organization* is defined as those "engaged in disseminating information to the general public through a newspaper, magazine, other publication, radio, television, cable television, or other medium of mass communication."[12] Lacey's (2002, p6) book on key concepts in media studies mentions that "media businesses are organizations that produce media texts." We follow these definitions to categorize media awards as those granted by organizations that produce media products through a newspaper, magazine, other publication, radio, television, or other form of mass communication. Although our definition of media awards is quite broad, the *media* awards in our sample are mostly granted by a magazine, newspaper, or journal. We consider other organizations that do not satisfy these media criteria as non-media organizations. Awards granted by non-media organizations are categorized as non-media awards.

[12] The 113th Congress Senate Manual is available online at https://www.govinfo.gov/content/pkg/SMAN-113/pdf/SMAN-113.pdf (retrieved March 4, 2019).

In our setting, we restrict our sample to awards that are granted to CEOs for their role as a company leader and we exclude awards that are awarded for personal achievement, such as an award for excellent academic performance in an MBA program. We also exclude awards that are granted to CEOs based on their services/contributions to the community, because these awards are not likely granted based on their firm's past performance but, rather, on the firm's/CEO's personal contribution to the community.[13] Since the awards granted to CEOs for their leadership roles can be predicted, at least partly, by past firm performance and CEO characteristics, this restriction allows us to better run the logit models and construct a matched sample of award winners. More importantly, we exclude these awards because they are not necessarily related to their status as the head of a corporation.[14] Therefore, excluding these awards improves the effectiveness of our selection model, which is discussed in Section 2.4.A.

Using the name of each award, we access the website of the award, if possible, or search the Internet using Google to understand the nature of the award by screening for its description, selection process, and, importantly, the organization who granted the award in order to classify the award as media or non-media.[15] For example, we classify the award Best-Performing CEOs granted by Forbes Magazine as a Media award. We classify the award National Medal of Technology and Innovation as a non-media award because it is bestowed by the President of the

[13] An example of a community award is the Exemplary Community Leadership award, granted by the National Conference for Community and Justice.

[14] We find that a considerable number of CEOs in our sample were awarded social awards because of their own donations and charity services to the community.

[15] The sample of Malmendier and Tate (2009) includes awards from Ernst & Young, which we classify as *Non-media* awards because Ernst & Young is not a media organization. In untabulated results, we repeat our main analysis using a sample that includes the Ernst & Young awards as media awards and find that our results are unchanged. The results are available from the authors upon request.

United States and not by an agency that produces media text, such as a magazine or a newspaper.[16] To separate the effects of winning media awards and non-media awards, respectively, we exclude from our sample CEOs who are granted both media and non-media awards. The full lists of media and media awards are presented in the Appendix. Detailed information on our award sample is reported in Table 2.1.

[Please insert Table 2.1 here]

Panels A and B of Table 2.1 present the number of winners by years and the total number of awards rewarded for media and media awards, respectively. Over the period from 1993 to 2010, there were 212 media award winners and 194 non-media award winners.[17] A CEO can be granted several awards in a given year. Therefore, we also report the number of winners by the total number of awards rewarded each year. Panel C shows the number of award winners by gender. We generally find more male than female winners in both the media and non-media award samples.

2.3.2. Measuring Innovation

We measure innovation activity both as a resource input for R&D and as an innovation output. The resource input is RD, measured as R&D spending scaled by book assets. Measures of innovation outputs are based on the patent activity and impact factors of those patents. Our first measure of innovation output is based on the number of patents applied for by each firm each year.

[16] National Medal of Technology and Innovation is the nation's highest honor for technological achievement, bestowed by the president of the United States on CEOs of America's leading innovators. Information about this award is available at http://www.uspto.gov/learning-and-resources/ip-programs-and-awards/national-medal-technology-and-innovation-nmti. (Retrieved on March 4, 2019).

[17] We start our award sample in 1993 (instead of 1992, when the ExecuComp database begins) because we use one-year-lagged variables for our prediction model to predict award winners.

However, a simple patent count captures innovation success imperfectly, because patent innovations vary widely in technological and economic significance. Citations of a firm's patents can better reflect these patents' technological or economic significance. Therefore, the second measure of innovative output is based on citations per patent, which is measured by the total number of citations of the firm's filed (and eventually granted) patents, scaled by the number of patents filed (and eventually granted). The idea behind the second proxy of innovation output is that more significant and revolutionary patents will be cited more frequently, compared with more trivial patents. However, owing to the finite duration of the sample, citations suffer from truncation bias. Because citations are received for many years after a patent has been filed, patents filed in later years have less time to accumulate citations than those filed in earlier years. To address this issue, we adjust the citation count of each patent following a procedure suggested by Hall, Jaffe, and Trajtenberg (2001, 2005).

We use the patent application and citation data of Kogan et al. (2017), which are also used by Chang, Chen, Wang, Zhang, and Zhang (2019), Cohen, Gurun, and Kominers (2016, 2017) and Lu and Wang (2018).[18] Kogan et al. (2017) collect all patent data from Google Patents for the period 1926–2010.[19] Due to the right-skewed distributions of patent counts and citations per patent, we use the natural logarithm of these variables. Specifically, PATENT is the natural logarithm of one plus the number of patents counts and CITATION is the natural logarithm of one plus the number of citations per patent.

[18] The data are available at https://iu.app.box.com/patents. (Retrieved on March 08, 2019).

[19] The data include all patent applications filed and eventually granted during this period. Kogan et al. (2017) link patent numbers to a firm's Center for Research in Security Prices (CRSP) identifier when the filer is a public firm in the CRSP database. We set firms with missing innovation data as having zero patents and citations.

2.3.3. Control Variables

We construct and collect a number of standard firm-level variables that have been shown to affect innovative activity. Specifically, Hall and Ziedonis (2001) find that firm size is one of the key determinants of innovative activity. Firm size (SIZE) is defined as the natural logarithm of total assets. Consistent with the literature on corporate innovation (Hirshleifer et al., 2012; Li et al., 2013; Chang et al., 2015), we collect and construct other firm-level variables, including the return on assets (ROA), Tobin's Q (TOBIN_Q), leverage (LEVERAGE), and cash holdings (CASH). Specifically, TOBIN_Q is the market value of equity plus total assets minus the book value of equity, all divided by total assets, LEVERAGE is the ratio of total debt to book assets, ROA is the ratio of operating income to book assets, and CASH is measured as cash and assets readily convertible to cash, scaled by book assets.

In addition, we consider controlling for CEO characteristics. The literature documents several CEO attributes that could affect firm performance, such as gender (Huang and Kisgen, 2013), education (Bertrand and Schoar, 2003), tenure (Simsek, 2007), and age. Therefore, we include in our baseline analysis several control variables for CEO characteristics, such as the CEO's age (CEO_AGE), tenure (CEO_TENURE), and gender (FEMALE), where CEO_AGE is the age of the CEO in years, CEO_TENURE is the number of years since the current CEO became the CEO, and FEMALE is a dummy variable that equals one if the CEO is female and zero otherwise. Information on CEO gender, age, and tenure are obtained from ExecuComp. In our robustness check, discussed in Section 2.7, we control for other attributes that relate to CEO educational and demographic backgrounds.

2.4. Methodology

2.4.1. Identification Strategy

Our classification of CEO awards into media and non-media categories allows us to examine the impact of each award group on corporate innovation activities. Our study may be subject to endogeneity issues, in that a change in firm innovation could arise from firm characteristics and not necessarily from CEO characteristics. We address this possibility using a prediction model as an identification strategy. Motivated by the work of Malmendier and Tate (2009), we compare the performance of an award winner's firm to the matched firm's had the CEO not won the award. To do so, we first construct a nearest-neighbor matching estimator. We then estimate a logit regression to identify observable firm and CEO characteristics that predict CEO awards. Finally, we compare the average ex post performance of award winners to the average among all non-winning CEOs.

Similar to the Malmendier and Tate (2009) setting, ours does not allow us to observe the exact criteria used to choose the award winners. To address this concern, we follow Malmendier and Tate (2009) and run a logit regression to predict CEO awards based on firm and CEO characteristics.[20] Specifically, for all firms in our sample, we set the binary dependent variable to one if the firm's CEO won an award in the current year and zero otherwise. We then regress the award indicator on firm size (SIZE), and previous stock returns ($RETURN_{t-1}$ and $RETURN_{t-2}$), as well as control for CEO age (CEO_AGE), tenure (CEO_TENURE), and gender (FEMALE). We

[20] Firm and CEO characteristics do not necessarily present the full criteria used to select an award winner. There is a possibility that unobserved factors can be also relevant to the award selection process. In our matching procedure, we only consider observable characteristics.

add to our prediction model other variables that can affect firm innovation, including the past year's R&D spending scaled by total assets (RD_{t-1}), past year's number of patents ($PATENT_{t-1}$) and citations ($CITATION_{t-1}$), Tobin's Q ($TOBIN\_Q_{t-1}$), and cash holdings ($CASH_{t-1}$). All firm characteristic variables are measured the year preceding the award year. We include year and industry dummies to control for variations in time and industry, respectively.[21] In this setting, we assume the criteria to select winners of media and non-media awards are similar.[22]

We run the logit model separately for media and non-media awards. We then use the predicted values from each logit regression to construct the nearest-neighbor matched sample for the award winners. In each year, we choose, without replacement, the non-winning CEOs with the propensity scores closest to those of each actual media/non-media award winners. We name these samples the predicted media winners and the predicted non-media winners, respectively.

2.4.2. Hypothesis Testing

To test H1A and H1B, we analyze the ex post firm innovation outputs of media award-winning firms and compare these with the sample of predicted media winners, using a regression framework. Specifically, we regress innovation outputs on the MEDIA dummy and several firm-level control variables and CEO characteristic control variables, as described in Section 2.3.C. We use the following regression model:

[21] We use two-digit SIC codes for our industry dummies.

[22] Ideally, we should have included CEO media coverage in our logit model to predict media award winners similar to the approach of Blankespoor and DeHaan (2015). However, we do not have access to the data that they use to construct this measure. Nevertheless, the inclusion of non-media awards in our analysis is helpful in disentangling the effect of media coverage on the relation between CEO awards and corporate innovation.

$$(1)\ INNOVATION_{i,t+k} = \alpha + \beta MEDIA_{i,t} + \sum_{j=1}^{n} \gamma_j FIRM\_CONTROL_{i,j,t} + \sum_{h=1}^{m} \delta_h CEO\_CONTROL_{i,h,t} + \varepsilon_{i,t}$$

where $INNOVATION_{i,t+k}$ is either the measure of innovation input (RD) or innovation output (PATENT and CITATION) of firm i in the k years after the award year. We examine the effect of winning CEO awards on firm innovation output for periods of one year (k = 1), two years (k = 2), and three years (k = 3) following the award year. The dummy variable MEDIA is equal to one if the CEO of the firm wins a media award in the current year and zero if the CEO is a predicted winner. The variable FIRM_CONTROL includes firm size ($SIZE_{t-1}$), stock returns over the past one and two years ($RETURN_{t-1}$ and $RETURN_{t-2,}$ respectively), last year's R&D spending scaled by total assets (RD_{t-1}), the return on assets (ROA_{t-1}), Tobin's Q ($TOBIN\_Q_{t-1}$), leverage ($LEVERAGE_{t-1}$), and cash holdings ($CASH_{t-1}$). The variable $CEO\_CONTROL_{t-1}$ includes the CEO's age in years (CEO_AGE), tenure in years (CEO_TENURE), and gender (FEMALE). We also take into account the industry and year dummies.

To test H2, we run the following regression model:

$$(2)\ INNOVATION_{i,t+k} = \alpha + \beta NON\_MEDIA_{i,t} + \sum_{j=1}^{n} \gamma_j FIRM\_CONTROL_{i,j,t} + \sum_{h=1}^{m} \delta_h CEO\_CONTROL_{i,h,t} + \varepsilon_{i,t}$$

This equation is similar to equation (1), except that we replace MEDIA by the dummy variable NON_MEDIA, which takes the value of one if the CEO wins a non-media award in the current year and zero if the CEO is a predicted winner.

2.5. Results

2.5.1. Univariate Analysis before Matching

Table 2.2 provides summary statistics for firm and CEO characteristics across award-winning CEOs and non-winning CEOs. Panels A and B report the results for media and non-media awards, respectively. The column W−N shows the differences in the mean between award winners and non-winners.

[Please insert Table 2.2 here]

According to Panel A of Table 2.2, on average, firms led by media award-winning CEOs are bigger, hold more cash, have a higher Tobin's Q, are less leveraged, and are more profitable in terms of returns on assets compared to firms run by executives who did not win a media award. The media award winners tend to have a longer tenure and are more likely to be female. The latter result can be explained by the fact that there are several awards granted only to women in our media awards sample.[23] CEOs winning media awards are more likely to hold an MBA or a PhD, tend to attend Ivy League institutions, and are more likely to have a financial or technical educational background. In addition, they tend to own individual patents, are more likely to have been born outside of the United States and are more likely to have been born during the decade leading up to the Great Depression. All these differences between winners of media awards and those that do not win media-awards are statistically significant at the 1%-level. Regarding past returns, there is, however, no statistical difference in the stock returns of the previous one year ($RETURN_{t-1}$) and the previous two years ($RETURN_{t-2}$) between the two groups. With regard to

[23] An example of media awards specifically for women is The Most Powerful Women in American Business, from Fortune Magazine.

our key variables of interest, $PATENT_{t-1}$ and $CITATION_{t-1}$ are statistically higher for award winners, whereas there is no statistical difference in R&D spending between the two groups. The Business Equipment and Shops industry groups are also significantly (at the 1%-level) overrepresented among media winners. These results suggest that media winners are different from media non-winners in a variety of aspects.

Regarding non-media awards, the results from Panel B of Table 2.2 suggest that, on average, firms led by non-media winners are bigger and experience higher returns in the previous year and a higher Tobin's Q compared to firms run by non-media non-winning CEOs. The non-media award-winning CEOs are older, have longer tenure, and are more likely to be women. A few non-media awards are specifically given to female CEOs, which probably leads to the positive and significant coefficient for the variable FEMALE.[24] Non-media award-winning CEOs are significantly distinguishable from non-winners in terms of educational background, demographic factors, and experience. With regard to innovation activities, all three measures $PATENT_{t-1}$, $CITATION_{t-1}$, and RD_{t-1} are significantly higher at the 1%-level for firms led by winning CEOs compared to their peers run by non-winning CEOs. The Business Equipment industry group is significantly (at the 1%-level) over-represented among non-media winners.

2.5.2. Univariate Analysis after Matching

Our main identification approach is to construct a nearest-neighbor matching estimator. Following Malmendier and Tate (2009), we run a logit regression to predict CEO awards based on firm and CEO characteristics. The results of logit model regressions are presented in Table 2.3.

[24] An example of a non-media award granted only to women is the Women of Excellence Award of the National Association for Female Executives.

[Please insert Table 2.3 here]

Columns (1) and (2) of Table 2.3 report the results of the logit model to predict media and non-media awards, respectively. Consistent with the results in Table 2.2, CEOs of larger firms or firms with a higher past one-year return and a higher Tobin's Q are significantly more likely to win awards. Unsurprisingly, CEOs with longer tenure and female CEOs are also more likely to be award winners. These findings apply to both media and non-media awards. Regarding media awards, the past two years' return and cash holdings are important determinants of award winners. These two variables, however, do not significantly predict non-media award winners. These results suggest that the award panels of non-media awards take into account other factors that are not reflected in firm past performance as the criteria for selecting the winners.

In the next step, we use the predicted values from the logit regression to construct the nearest-neighbor matched sample for award winners. In each year, we choose, with replacement, the non-winning CEOs with the propensity scores closest to those of each actual award winner. We name this sample predicted winners. Table 2.2 presents the summary statistics for the predicted winners (P) side by side with the summary statistics for the actual winners (W) and the full sample of non-winners (N). We also test for differences in the firm and CEO characteristics across actual and predicted winners. Column (W−P) shows the results for the differences in means between award winners and predicted winners. Notably, all matching variables that are included in the first-stage estimation are statistically insignificant for both media and non-media awards.

As discussed earlier in the univariate analysis before matching, media (non-media) winners differ from non-winners in a variety of aspects. After the matching procedure is implemented, the winners and predicted winners are homogeneous in all dimensions included in the prediction

model. This homogeneity confirms the quality of the match. Notably, there is no significant difference in innovative activities between winners and predicted winners, whereas the differences between winners and non-winners are very high and significant. The matching procedure generates two homogeneous groups of treated CEOs (winners) and control CEOs (predicted winners) in terms of their firm characteristics, CEO educational and demographic backgrounds. Homogeneity is a key factor that helps minimize endogeneity issues in our regression analysis in the next steps.

2.5.3. Regression Analysis

In our regression framework, the independent variables are innovation activities, measured by PATENT, CITATION, and RD. Our key variable of interest is MEDIA (NON_MEDIA), which is equal to one if the CEO is a winner of a media (non-media) award competition and zero if the CEO is a predicted winner of a media (non-media) award. Other explanatory variables include a set of firm characteristics and CEO characteristics. These variables are described in detail in Appendix A. Table 2.4 presents the regression results after the matching.

[Please insert Table 2.4 here]

Panel A of Table 2.4 presents the results for media awards. According to Column (1), the coefficient of MEDIA is not statistically significant, indicating no statistically significant difference in the number of patents between MEDIA award winners and predicted winners. The results are consistent for a period of one, two, and three years after the award year. Regarding CITATION as the measure of innovation output, Columns (5) and (8) suggest that firms led by media award-winning CEOs generated significantly less citations in the periods of two and three years after the award year. Columns (3), (6), and (9) consistently suggest no significant difference in innovation input (measured by R&D spending) between media winners and predicted winners.

Panel B of Table 2.4 reports the results for non-media awards. The coefficients for innovation outputs PATENT and CITATION are positive but not statistically significant in the year immediately after the award year. These coefficients then become statistically significant at the 5%-level in the second year and at the 1%-level in the third year after the award year, suggesting that firms obtain more patents and citations in the three-year period after their CEOs win non-media awards. The coefficients for innovation input, RD_{t+1}, are not significant. Recalling that, in Table 2.2, the R&D spending of non-media winners and of predicted winners differs insignificantly, we find the regression results suggest that, firms led by non-media award winners generate statistically greater corporate innovation output with relatively similar innovation inputs, compared to firms run by predicted winners, implying greater innovation effectiveness. Regarding economic significance, non-media-winning CEO firms generate, on average, 0.78% more patents and 0.56% more citations compared to predicted winners in the third year after the award. In terms of economic significance, this result is equivalent to two additional patents and 19 more citations.

Overall, award-winning CEO firms maintain their superior performance regarding innovation outputs for at least three years after the award announcement. This persistent effect can be explained by the fact that innovation is a long-term activity. Therefore, the effect of winning a non-media award can be gradually transferred to innovation success.

Regarding control variables, we find that firm size and past R&D spending are positively and significantly associated with firm innovation input and output. These findings hold for both media and non-media award samples and are robust for periods of one, two to three years after the award year. These results are consistent with those of prior studies (e.g., Hirshleifer et al., 2012; Li et al., 2013; Chang et al., 2015) that document that firm size and past R&D spending are two of the main factors that drive innovation activities.

2.6. Possible Channels

In this section, we discuss possible underlying mechanisms through which winning CEO awards can affect corporate innovative activities. The first channel relates to market attention following CEO awards. The second channel relates to analyst-induced pressure. The third channel relates to employee treatment. The fourth and final channel tests for innovation characteristics.

2.6.1. Difference in market attention between media and non-media awards

Why are media and non-media awards different? A plausible distinction is the potential difference(s) of these two awards on CEO distraction. We argue in the previous sections that compared to non-media award winning CEOs, media-award winning CEOs are more likely to become the center of media attention that accelerates their distraction. In this section, we examine potential effects of media and non-media awards on the CEO distraction. Following Da et al. (2011, 2015), we utilize a direct measure of market attention using search frequency in Google, named Search Volume Index (SVI).[25] SVI provides a direct measure of market attention and captures it in a timelier fashion compared to other measures of investor attention (Da et al., 2011). Our procedure is as follows. First, we manually collect the date when each award is granted by searching the official website of the award, executive profiles and company websites, or other databases, including NNDB.com, Reference for Business, Bloomberg.com, Wikipedia, and Google searches. Second, we search and download the weekly SVI for each award-winning CEOs using their names and companies. Our key variable of interest, abnormal search volume index (*ASVI)*, is defined as follows:

(3) $ASVI_t = \log(SVI_t) - \log[\text{Median}(SVI_{t-1},\ldots,SVI_{t-8})]$

[25] Google Trends provides data on search term frequency that goes back to January 2004.

where log (SVI_t) is the logarithm of SVI during week, and log (SVI) is the logarithm of the median value of SVI during the prior 8 weeks. Following Da et al. (2011), we use the median over a longer time window to capture the normal level of median attention that is less likely driven by recent jumps. The higher the ASVI, the higher market demand for information on CEOs, the higher award-induced distraction. We are interested in both short-term (from Week 1 to Week 4) and long-term (from Week 12 to Week 24) windows following the award week (Week 0). We then consider potential effects of media and non-media wards on the CEO distraction and report results in Table 2.5.

[Please insert Table 2.5 here]

According to Table 2.5, there is a significant positive ASVI during the first four weeks following the media-award week. The surge in CEO's media visibility, as induced by the media awards, often leads to higher CEO distraction as documented by Wade et al. (2006) and Malmendier and Tate (2009). With regard to non-media award winners, we find a significant positive ASVI in the first week following the award week. ASVI then becomes insignificantly different from zero from the second week. We also find that the ASVI are significantly higher among media-award winners than no-media award winners during the first four weeks following the award date, which confirms the significance and persistence of media awards on the CEO distraction.

2.6.2. Impact of winning CEO awards on analyst coverage

Financial analysts play significant roles in producing information for the firms they cover and providing performance benchmarks such as stock recommendations or earnings forecasts (Frankel, Kothari, and Weber, 2006; Mohanram and Sunder, 2006; Soltes, 2014; Brown, Call,

Clement, and Sharp, 2015; Huang, Pereira, and Wang, 2017). With a focus on firm creative activities, He and Tian (2013) document that firms covered by a larger number of financial analysts generate fewer innovation outputs. The authors suggest that a larger number of analysts following a firm impose short-term pressure on managers and exacerbate managerial myopia. Managers, in response to such pressure, boost current earnings by passing up long-term investments in risky and innovative projects, eventually resulting in less innovation success (He and Tian, 2013). By examining the decision of an analyst to follow firms, O'Brien and Bhushan (1990) suggest that analysts tend to follow firms with more potential sources of information or with a lower cost of information collection. CEOs, after winning an award, can receive disproportionate attention from clients, competitors, and the media, making their information and performance attractive to financial analysts, which may induce more analyst coverage. Motivated by the seminal work of He and Tian (2013) and a strand of literature examining the roles of analysts in generating corporate-related information[26], we examine the potential impact of winning CEO awards on analyst coverage.

Following Frankel et al. (2006), He and Tian (2013) and Chen et al. (2014), we measure analyst coverage as the average number of analysts following the firm over the year, obtained from the Institutional Brokers Estimate Systems (I/B/E/S) database. Similar to innovation and employee treatment settings, we compare the analyst coverage of an award winner's firm to a predicted winner's firm. Specifically, we construct a nearest-neighbor matching estimator based on firm characteristics described in the baseline models in Table 2.4.[27] We then compare the average ex

[26] See Frankel et al. (2006) for an excellent review of the literature.

[27] We use firm characteristics to construct matching estimators because Bhushan (1989) suggests that firm characteristics are major determinants of the number of analysts following a firm.

post performance of award winners to the average among all non-winning CEOs. We use the regression framework to examine the impact of winning CEO awards on employee treatment schemes. Table 2.6 presents the regression results after the matching.

[Please insert Table 2.6 here]

In our regression framework, the independent variable is the number of analysts following a firm (ANALYST_COV) obtained from the I/B/E/S database. Our key variable of interest is MEDIA (NON_MEDIA), which is equal to one if the CEO is a winner of a media (non-media) award competition and zero if the CEO is a predicted winner of a media (non-media) award. Panel A reports results for the non-media awards and Panel B reports results for the media awards.

According to Panel B of Table 2.6, the coefficients on NON_MEDIA in each of the three years after the award year are indistinguishable from zero, suggesting that there is no evidence for an increase in analyst coverage following CEO personal non-media awards. In contrast, according to Panel A's results, the coefficients on MEDIA are positive and statistically significant at the 1%-level in each of the three years after the award year. The results suggest that there is a significant increase in the number of analysts following a firm after its CEO win a media award. This finding is aligned with Malmendier and Tate (2009) as CEO media awards are more likely to broaden CEO media visibility and hence, attract a larger coverage of financial analysts. As suggested by He and Tian (2013), increasing analyst's coverage exerts more pressure on managers to meet short-term goals and hence, impedes the firm's long-term innovation projects. This finding is consistent with our previous findings that firms led by media award winners generate less innovation success.

2.6.3. Impact of winning CEO awards on employee treatment

Employees are key organizational assets (Zingales, 2000; Maslow, 1943; Herzberg, Mausner, and Snyderman, 1959) and key sources of value creation by inventing new products or building client relationships.[28] Focusing on corporate innovative activities, Chen et al. (2016) document that firms with an employee-friendly workplace are associated with greater innovative success. Similarly, they find that firms with better employee treatment schemes generate more and better patents. Given that human capital plays an essential role in innovative outputs (Hall, 2002), it is worth examining the potential impact of winning CEO awards on employee treatment schemes.

We start by constructing the employee relations score based on the KLD database. Following Bae et al. (2011) and Chen et al. (2016), we construct an employee relations score (RELATION_SCORE) using five strength categories of employee relations, including employee involvement, cash profit-sharing, retirement benefits, union relations, and health and safety. The KLD database assigns a binary rating for each category for each firm-year. RELATION_SCORE is the sum of the rating across the five categories with a higher value indicating a better employee treatment.

To minimize an endogeneity concern that a change in the employee treatment relation of the firm could arise from firm characteristics and not necessarily from the status change following CEO personal awards, following Malmendier and Tate (2009), we compare the employee relation

[28] There is a collective evidence that employee-friendly policies have positive impacts on corporate operational and financial performance (Jiao, 2010; Verwijmeren and Derwall, 2010; Bae, Kang, and Wang, 2011; Edmans, 2011; Faleye and Trahan, 2011; Ertugrul, 2013).

score of an award winner's firm to a predicted winner's firm. Specifically, we construct a nearest-neighbor matching estimator based on firm characteristics described in the baseline models in Table 2.4. We then compare the average ex post performance of award winners to the average among all non-winning CEOs. We use the regression framework to examine the impact of winning CEO awards on employee treatment schemes. Table 2.7 presents the regression results after the matching.

[Please insert Table 2.7 here]

In our regression framework, the independent variable is employee treatment measured by RELATION_SCORE. Our key variable of interest is MEDIA (NON_MEDIA), which is equal to one if the CEO is a winner of a media (non-media) award competition and zero if the CEO is a predicted winner of a media (non-media) award. Panel A reports results for non-media awards and Panel B reports results for media awards.

According to Panel A of Table 2.7, the coefficients for employee treatment in each of the three years after the award year are all not significant. The results suggest that there is no evidence for improvements in employee treatment following CEO personal media awards. Again, these findings are consistent with our findings that a difference in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners is either insignificant or weak.

Regarding non-media award, according to Panel B of Table 2.7, the coefficients on NON-MEDIA in each of the three years after the award year are positive and statistically significant, suggesting that firms, as induced by the status change following CEO personal non-media awards,

exhibit a better employee treatment. [29] As the employee is the engine to innovation, enhancing employee treatment can result in better employee commitment and productivity, which eventually leads to higher innovation success. These results are consistent with our previous findings that firms led by non-media award winners generate better corporate innovative activities.

2.6.4. Innovation characteristics

In this section, we look deeper at the nature of corporate's innovative activities. As our focus is on the impact of CEO personal award on corporate innovation, we examine the influence CEOs have in setting the strategic goals of their firm's innovative activities. We use several measures of innovation strategies.

First, we construct a measure of originality of the patents filed by a firm. Hall et al. (2001) suggest that original patents cite previous patents that belong to a wide range of technological fields. Following Hall et al. (2011), Sunder, Sunder, and Zhang (2017), Chang et al. (2019) and Custodio et al. (2019), we measure the originality score of a patent as one minus the Herfindahl index of the three-digit technology class distribution of all the patents that the patent cites. A higher score indicates a higher level of originality for patents. We follow Chang et al. (2019) to compute a firm-level measure of patent originality (*ORIGINALITY)* as the mean originality score of a firm's new patents in each year.

Second, we classify innovation strategies into exploratory and exploitative strategies, as suggested by Benner and Tushman (2003), Almeida, Hsu, and Li (2013), Manso (2011),

[29] The results are stronger for the first two years and slightly weaker for the third year after the award year, which is consistent with the short-term impact of the status change following CEO personal awards.

Balsmeier, Fleming, and Manso (2017), Chang et al. (2019), and Custodio et al. (2019).[30] Following Chang et al. (2019) and Custodio et al. (2019), we construct proxies for exploitative and exploratory innovations using the extent to which a firm's patents rely on existing versus new knowledge. Specifically, the existing knowledge of a firm includes its existing patents and a set of patents that have been cited by the firm's patents filed over the past five years. We categorize a patent as exploitative if at least 60% of its citations are based on the existing knowledge of the firm and as exploratory if at least 60% of its citations are based on new knowledge. We then define *%EXPLOITATIVE (%EXPLORATORY)* as the number of exploitative (exploratory) patents divided by the total number of patents that each firm applies for each year.

For each measure of innovation strategies, we consider both the full sample and a subsample of innovative firms as in Sunder et al. (2017) since the impact of CEO characteristics on corporate innovation is heterogeneous across firms and varies according to the innovative intensiveness of the firm. Following Hausman, Hall, and Griliches (1984) and Sunder et al. (2017), we define innovative firms as firms reporting positive R&D during the sample period. Table 2.8 reports results obtained by re-estimating the baseline models in Table 2.4 with the dependent variables *ORIGINALITY*, *%EXPLOITATIVE,* and %*EXPLORATORY*.[31]

[Please insert Table 2.8 here]

According to results of Panel A, the MEDIA coefficients are indistinguishable from zero across all model specifications. The results suggest that following CEO personal media awards

[30] Exploitative innovations extend existing knowledge while exploratory innovations require new knowledge or a departure from existing knowledge.

[31] For brevity, we report only the results in the third year after the award year. The results for the first and second year after the award announcement (untabulated) are in line with our baseline results.

firms, there is no significant difference in innovative strategies between media award-winning CEOs and a matched sample of non-winners (predicted winners).

According to results of Panel B, the NON_MEDIA coefficients suggest that firms, as induced by the status change following CEO personal non-media awards, significantly enhance the patent originality (columns (1) and (2)), decrease the fraction of exploitative patents (columns (3), and (4)), and increase the fraction of exploratory patents (columns (5) and (6)). To the extent that patents with higher originality scores represent more impactful inventions and that exploratory patents are riskier and more radical than exploitative patents, the results from Panel A suggest that non-media award-winning CEO are more willing to encourage innovation strategies that pursue exploratory activities and path-breaking innovations.

2.7. Robustness Checks

In this section, we check the robustness of our results and address the sample selection bias as well as the potential omitted variable bias associated with our results. The robustness tests results are reported in Table 2.9 that presents the coefficient estimates and *t*-statistics of the variables of interest, MEDIA and NON_MEDIA, in different specifications.

[Please insert Table 2.9 here]

First, we address the possible sample selection bias. As noted in the previous section, for our main analysis, we restrict our sample to awards granted to CEOs for their roles as a company leader and we exclude awards for personal achievement, as well as awards that are not likely to be selected based on firm performance, such as community awards. To ensure that our core results

still hold, even after considering a larger (but noisier) sample, in the first test, we repeat our tests using a full sample of CEO personal awards. We find that our core results hold for different sample selections. According to Row (1) in Table 2.9, the coefficients of MEDIA are only significant for $CITATION_{t+2}$ and $CITATION_{t+3}$ and are statistically insignificant across other model specifications. The coefficients of NON_MEDIA are statistically significant for patents at the 5%-level for the second and third year following the award year. The level of significance in these subtests is reduced when a noisy sample is taken into consideration, which further confirms the validity of our logit models. By considering a broad (and noisy) sample of various award types and still having our core results hold, we can rule out the possibility of our results being driven by sample selection bias.

Second, we exclude the last two years from the sample to ensure that our results are not subject to potential truncation bias. We report the results of this test in Row (2) of Panel A and Row (2) of Panel B of Table 2.9. The results show that excluding the years 2009 and 2010 does not change our main findings.

Third, to show that our results are not subject to the inclusion of prestigious awards as in Malmendier and Tate's (2009) sample, for media awards (Panel A of Table 2.9), we run two robustness tests. In the first, reported in Row (3a), we only consider the awards considered by Malmendier and Tate (2009) in our media awards sample. In the second test, reported in Row (3b), we exclude those awards of Malmendier and Tate's (2009) sample from our sample. We still find the negative effect of winning a media award on the number of citations when different award samples are considered. Regarding non-media awards (Panel B), we exclude awards granted by Ernst & Young, because, in our setting, we consider Ernst & Young awards non-media awards. However, this award is included in the prestigious awards list of Malmendier and Tate (2009).

Therefore, we exclude awards granted by Ernst & Young to avoid the possible effect of outliers. We report the regression estimates of this test in Row (3) of Panel B. The results show that our baseline results remain robust after excluding awards from Ernst & Young.

Fourth, one issue with the patent data is that many firms do not produce any patents. Therefore, we investigate whether our baseline results are driven by the numerous firms that choose not to innovate. Specifically, we exclude firms that have never had any patents and repeat the analyses. The results of this robustness check, reported in Row (4) of Panel A of Table 2.9 for the media award sample, show that the coefficients of MEDIA on the number of citations are significant in the second and third year after the award year. We also find a weak relation between media award winners and the number of patents in the third year after the award year (at the 10%-level). Regarding the results for the non-media award sample, according to Row (4) of Panel B, the coefficients of NON_MEDIA remain largely positive and significant, consistent with the baseline results.

Fifth, we control for CEO incentives, as measured by the stock option delta and vega, following Core and Guay (2002) and Coles, Daniel, and Naveen (2006).[32] The variable DELTA measures the sensitivity of CEO stock options to a change in the value of the underlying stock, while VEGA measures the sensitivity of CEO stock options to the underlying volatility. It is possible for CEO incentives to drive our results. Nevertheless, the results from Row (5) of Panels A and B indicate that our results are largely unchanged after controlling for CEO incentives.

Sixth, we control for stock liquidity, since Fang et al. (2014) show that stock liquidity matters in corporate innovative activities. The results of this robustness check, reported in Row (6)

[32] We thank Lalitha Naveen for making the data available on her website at https://sites.temple.edu/lnaveen/data.

of Panels A and B, show that the effect of winning CEO awards (either media or non-media ones) on innovation activity is largely independent of the effect of stock liquidity on innovation.

Seventh, we control for CEOs' general managerial skills, since Custodio et al. (2013, 2019) find that firms led by CEOs with greater general managerial skills perform better and are more innovative. We find this additional control variable does not alter our results.

Eighth, institutional ownership is positively associated with innovation (Aghion et al., 2013). Therefore, we control for institutional ownership in Row (8) of Panels A and Panel B. We find that including institutional ownership as an additional control variable does not materially change our baseline results.

Finally, we consider controlling for the corporate governance index (G_INDEX) of Gompers, Ishii, and Metrick (2003), since O'Connor and Rafferty (2012) document a positive relation between governance and innovative activity. We find that our baseline results are robust after controlling for corporate governance.

Overall, the results of our robustness checks suggest that the effect of winning media awards on corporate innovation is rather weak or insignificant and is sensitive to sample selection bias. In contrast, the effect of winning non-media awards on corporate innovation is insignificant in the first year following the award year, but the effect becomes strong in the second and third year after the award.

We also provide additional analyses to rule out alternative explanations for our results in the Internet Appendix. First, we consider controlling for other executive characteristics as executives' personal attributes and characteristics can be associated with corporate behavior. In

our context of innovative activities, it is possible that the results we document so far can be driven by heterogeneity in managerial characteristics between winners and predicted winners. We address these issues and show in Tables A2.1 and A2.2 of the Internet Appendix that controlling for additional CEO characteristics does not change the results of the baseline regressions. In order to make sure that our results are free from endogeneity concerns in the sense that it is the status change following CEO personal awards, not other CEO personal characteristics, that enhances corporate innovation, we also conduct a subsample analysis. Specifically, we re-run our baseline model in Table 2.4 for two subsamples based on CEO tenure: a subsample with tenure less than or equal 3 years and a subsample of with tenure above 3 years. We argue that, if other CEO personal attributes are the key drivers of corporate innovative activities, we should observe favorable impacts on innovation within the first three years of their appointment. In addition, if the status change following CEO personal awards is the key determinant of our documented results, we should continue to observe a significant relation between award-winning CEO and innovation success for a subsample with tenure of above 3 years. We report the results for this test in the Internet Appendix (Table A2.3). The results in this appendix confirm that the effect of winning a non-media award on corporate innovation is independent of CEO characteristics.

2.8. Conclusion

This study builds on previous literature on the effects that award-winning CEOs have on corporate performance. Whereas previous studies look at the impact on stock returns and operating performance, our study investigates the impact on corporate innovation. We also extend the previous literature by looking at not only media awards but also non-media awards. We find that

the difference in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners (predicted winners) is either insignificant or weak. Contrary to this result, we find that firms headed by winners of non-media awards generate more patents and more citations per patent in the second and the third year following the award year.

Our finding that firms led by non-media award winners appear to generate more corporate innovation outputs is consistent with the view that non-media awards are a less biased (and hence better) proxy for personal competence and managerial ability. In addition, firms headed by winners of non-media award are associated with better employee treatment and less analyst-induced pressure following the award, both of which spur innovative activities. Furthermore, induced by the status change following CEO personal awards, firms led by non-media award winners can benefit from the CEOs' reputation and networking to attract the best talent and enjoy more favorable business commitments for risky projects, which makes investments in innovation more manageable and eventually boosts the innovative activities of firms with non-media award-winning CEOs. Non-media award winners are less likely to be the center of media attention; hence they do not suffer from the burden of celebrity.

The broader contribution of this study is that it is the first to utilize a unique set of CEOs' non-media awards in examining firm innovation outcomes. The change in status following non-media award competitions could affect various corporate decisions and stakeholder behaviors. The findings of this study provide a potentially fruitful avenue for future research that investigates stakeholders and corporate outcomes in a non-media setting.

Table 2.1. Award information

This table presents the number of award winners by years and by the number of awards rewarded. Panel A reports award information for a sample of CEOs who received media awards. Panel B displays award information for a sample of CEOs who received non-media awards. CEOs who won both media and non-media awards are excluded. The winners are categorized into four groups: *Winners with 1 award* reports the number of CEOs who only won one award in a particular year; *Winners with 2 awards*, *Winners with 3 awards*, and *Winners with more than 3 awards* display the numbers of CEOs who received two, three, and more than three awards in a given year. Panel C presents award winners (media versus non-media) by gender, where media awards are defined as awards granted by media organizations and non-media awards are awards granted by non-media organizations. Data on CEOs' media and non-media awards were hand-collected from the CEOs' biographies in the Marquis Who's Who database.

Panel A: Number of winners—Media awards

Year	Winners with 1 award	Winners with 2 awards	Winners with 3 awards	Winners with more than 3 awards	Total winners	Total awards
1993	8	1	0	0	9	10
1994	10	0	0	0	10	10
1995	31	0	0	0	31	31
1996	9	0	1	0	10	12
1997	2	0	0	0	2	2
1998	7	0	0	0	7	7
1999	3	0	0	0	3	3
2000	3	0	0	0	3	3
2001	5	0	0	0	5	5
2002	6	1	0	0	7	8
2003	8	0	0	0	8	8
2004	6	2	0	0	8	10
2005	6	1	1	1	9	15
2006	11	0	1	0	12	14
2007	7	7	0	2	16	29
2008	15	6	1	2	24	38
2009	13	7	0	2	22	37
2010	15	9	1	1	26	40
Total	165	34	5	8	212	282

Panel B: Number of winners—Non-media awards

Year	Winners with 1 award	Winners with 2 awards	Winners with 3 awards	Winners with more than 3 awards	Total winners	Total awards
1993	4	0	0	0	4	4
1994	8	1	0	0	9	10
1995	6	2	0	0	8	10
1996	10	2	1	0	13	17
1997	7	3	0	0	10	13
1998	12	0	1	0	13	15
1999	8	2	0	0	10	12

2000	9	1	0	1	11	17
2001	21	1	0	0	22	23
2002	2	3	0	0	5	8
2003	10	2	0	0	12	14
2004	10	2	0	0	12	14
2005	8	1	0	0	9	10
2006	10	0	0	0	10	10
2007	8	2	0	0	10	12
2008	9	0	0	0	9	9
2009	15	0	0	0	15	15
2010	12	0	0	0	12	12
Total	169	22	2	1	194	225

Panel C: Number of winners by gender

Year	**Media award winners**			**Non-media award winners**		
	Male winners	Female winners	Total winners	Male winners	Female winners	Total winners
1993	9	0	9	4	0	4
1994	10	0	10	8	1	9
1995	31	0	31	8	0	8
1996	10	0	10	13	0	13
1997	2	0	2	10	0	10
1998	7	0	7	13	0	13
1999	3	0	3	10	0	10
2000	2	1	3	11	0	11
2001	4	1	5	21	1	22
2002	6	1	7	5	0	5
2003	7	1	8	11	1	12
2004	6	2	8	11	1	12
2005	6	3	9	9	0	9
2006	11	1	12	10	0	10
2007	12	4	16	10	0	10
2008	18	6	24	9	0	9
2009	17	5	22	13	2	15
2010	17	9	26	10	2	12
Total	178	34	212	186	9	194

Table 2.2. Summary statistics by firm

This table reports summary statistics for both firm and CEO characteristics. Panel A shows the results for media awards, while Panel B shows the results for non-media awards. The non-media awards are awards granted by non-media organizations. Data on CEOs' media and non-media awards are hand-collected from their biographies in the Marquis Who's Who database. In each panel, the winners (W) sample is based on all firms whose CEOs were winners of media awards (Panel A) or non-media awards (Panel B) in a particular year. The non-winners (N) sample consists of the remaining firms whose CEOs did not win any award in a given year. The predicted winners (P) are chosen from the non-winners (N) as those with propensity scores closest to those of each actual award winner (W). The propensity scores are constructed using predicted values from the logit model in Table 2.3. The matching procedure is carried out for each year t in which an award was conferred, with replacement. The variable PATENT is the logarithm of one plus the number of patents granted during the year and CITATION is the logarithm of one plus the number of citations summed across all patents applied for during the year. The numbers of patents and citations are obtained from Kogan et al. (2017) and are adjusted for truncation bias following Hall et al. (2001, 2005). The variable RD is the annual R&D expenditure scaled by the total book value of assets; $RETURN_{t-1}$ and $RETURN_{t-2}$ are the compound returns from the one and two years prior to the award year t, respectively; Size is the logarithm of the total book value of assets; TOBIN_Q is market value of equity plus total assets minus the book value of equity, all divided by total assets; LEVERAGE is the ratio of total debt to book assets; ROA is the ratio of operating income to book assets; and CASH is measured as cash and assets readily convertible to cash, scaled by book assets. Information on firm characteristics is obtained from CRSP and Compustat. The variable CEO_AGE is the CEO age in years; CEO_TENURE is the number of years since the current CEO became CEO; and FEMALE is a dummy variable that equals one if the CEO is female and zero otherwise. Information on CEO age, tenure, and gender is obtained from ExecuComp. The variable MBA takes the value of one if the CEO has an MBA degree; IVY equals one if the CEO attended one of the Ivy League institutions, FINTECH_EDUC takes the value of one if the CEO has a technical or financial educational background; Military takes the value of one if the CEO served in the military, PhD equals one if the CEO has a PhD degree; DEPRESSION_CEO takes the value of one if the CEO was born in the period from 1920 to 1929; INVENTOR_CEO equals one if the CEO has his or her own patent; and FOREIGN_CEO equals one if the CEO was born outside the United States. Information on CEO educational and demographic backgrounds was obtained from the Marquis Who's Who. Variables with the subscript t - 1 are measured at the end of the year prior to the award year t. The column W−N shows the differences in means between award winners and non-winners and W−P shows the differences in means between award winners and predicted winners. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	Winners (W)				**Non-winners (N)**				**Predicted winners (P)**				**Differences in mean**	
	Obs	Mean	Med	SD	Obs	Mean	Med	SD	Obs	Mean	Med	SD	W–N	W–P
Panel A: Media awards														
Matching variables														
RD_{t-1}	212	0.044	0.006	0.065	15,514	0.043	0.005	0.090	212	0.042	0.007	0.072	0.001	0.002
$PATENT_{t-1}$	212	2.157	1.158	2.397	14,236	1.150	0.000	1.691	212	2.236	1.386	2.532	1.007***	-0.079
$CITATION_{t-1}$	212	1.413	0.000	1.572	14,236	0.999	0.000	1.404	212	1.487	1.457	1.531	0.414***	-0.074
$RETURN_{t-1}$	212	0.203	0.120	0.515	15,514	0.169	0.087	0.725	212	0.217	0.129	0.623	0.034	-0.014
$RETURN_{t-2}$	212	0.191	0.000	0.673	15,514	0.169	0.000	0.884	212	0.052	0.000	0.642	0.021	0.139
$SIZE_{t-1}$	212	4.320	4.241	1.831	15,514	2.547	2.390	1.519	212	4.031	3.999	1.882	1.773***	0.289
$TOBIN\_Q_{t-1}$	212	1.053	1.056	0.029	15,514	1.039	1.040	0.031	212	1.052	1.055	0.029	0.014***	0.001

ROA_{t-1}	212	0.091	0.085	0.099	15,514	0.050	0.060	0.171	212	0.108	0.094	0.118	0.041***	-0.017
$CASH_{t-1}$	212	0.187	0.116	0.183	15,514	0.154	0.078	0.179	212	0.184	0.086	0.209	0.033***	0.003
CEO_AGE	212	57.156	56.000	6.593	15,514	57.819	58.000	6.370	212	57.314	58.000	6.843	-0.663	-0.158
CEO_TENURE	212	9.844	6.000	4.337	15,514	7.943	5.000	3.955	212	9.497	6.000	4.726	1.901***	0.347
FEMALE	212	0.160	0.000	0.368	15,514	0.018	0.000	0.132	212	0.107	0.000	0.309	0.143***	0.053
Other variables														
$LEVERAGE_{t-1}$	212	0.144	0.119	0.130	15,470	0.157	0.000	0.363	212	0.174	0.136	0.172	-0.035***	-0.03
MBA	212	0.236	0.000	0.426	15,514	0.121	0.000	0.326	212	0.219	0.000	0.415	0.079***	0.017
IVY	212	0.274	0.000	0.447	15,514	0.172	0.000	0.413	212	0.225	0.000	0.419	0.153***	0.049
FINTECH_EDUC	212	0.250	0.000	0.434	15,514	0.047	0.000	0.212	212	0.219	0.000	0.415	0.078***	0.031
MILITARY	212	0.066	0.000	0.249	15,514	0.048	0.000	0.213	212	0.053	0.000	0.225	0.019	0.013
PHD	212	0.212	0.000	0.410	15,514	0.004	0.000	0.060	212	0.142	0.000	0.350	0.164***	0.07
DEPRESSION_CEO	212	0.019	0.000	0.136	15,514	0.008	0.000	0.089	212	0.012	0.000	0.108	0.015***	0.007
INVENTOR_CEO	212	0.028	0.000	0.166	15,514	0.034	0.000	0.181	212	0.030	0.000	0.170	0.020***	-0.002
FOREIGN_CEO	212	0.071	0.000	0.257	15,514	1.150	0.000	1.691	212	0.053	0.000	0.225	0.037***	0.018

Fama–French 12 industries

	Winners (W)			**Non-winners (N)**				**Predicted winners (P)**			
Consumer nondurables	15.09%	Business Equipment	29.72%	C. nond	9.00%	Bus. eq	22.24%	C. nond	7.33%	Bus. eq	32.98%
Consumer durables	1.42%	Shops	20.28%	C. dur	3.97%	Shops	15.13%	C. dur	3.14%	Shops	20.42%
Manufacturing	9.43%	Health	5.19%	Man.	17.18%	Health	10.58%	Man.	10.47%	Health	6.28%
Energy	4.25%	Other	12.26%	Energy	5.82%	Other	11.47%	Energy	6.28%	Other	9.42%
Chemicals	2.36%			Chem.	4.61%			Chem.	3.66%		

Panel B: Non-media awards

Matching variables														
RD_{t-1}	194	0.058	0.031	0.071	15,532	0.043	0.005	0.090	194	0.070	0.023	0.113	0.015**	-0.012
$PATENT_{t-1}$	194	2.625	2.303	2.401	14,521	1.145	0.000	1.688	194	2.584	2.079	2.464	1.480***	0.041
$CITATION_{t-1}$	194	1.792	2.001	1.587	14,521	0.994	0.000	1.401	194	1.779	1.945	1.560	0.798***	0.013
$RETURN_{t-1}$	194	0.344	0.126	1.955	15,532	0.167	0.087	0.693	194	0.240	0.138	0.907	0.177***	0.104
$RETURN_{t-2}$	194	0.148	0.000	0.505	15,532	0.170	0.000	0.885	194	0.119	0.000	0.548	-0.022	0.029
$SIZE_{t-1}$	194	3.752	3.815	1.766	15,532	2.556	2.397	1.528	194	3.636	3.633	1.928	1.196***	0.116
$TOBIN\_Q_{t-1}$	194	1.047	1.048	0.028	15,532	1.039	1.040	0.031	194	1.050	1.052	0.030	0.008***	-0.003
ROA_{t-1}	194	0.069	0.067	0.100	15,488	0.051	0.060	0.171	194	0.085	0.073	0.168	0.019	-0.016
$CASH_{t-1}$	194	0.146	0.071	0.163	15,532	0.154	0.079	0.180	194	0.170	0.110	0.170	-0.008	-0.024
CEO_AGE	194	70.320	71.000	9.631	15,532	67.779	68.000	9.380	194	70.829	70.000	10.447	2.541***	-0.509
CEO_TENURE	194	10.113	7.000	9.770	15,532	7.942	5.000	7.667	194	11.453	7.000	11.272	2.172***	-1.340
FEMALE	194	0.041	0.000	0.199	15,532	0.019	0.000	0.138	194	0.029	0.000	0.169	0.022**	0.012
Other variables														
$LEVERAGE_{t-1}$	194	0.170	0.138	0.158	15,532	0.179	0.153	0.179	194	0.164	0.122	0.175	-0.009	0.006
MBA	194	0.227	0.000	0.420	15,532	0.157	0.000	0.364	194	0.182	0.000	0.387	0.070***	0.045
IVY	194	0.216	0.000	0.413	15,532	0.121	0.000	0.327	194	0.200	0.000	0.401	0.095***	0.016
FINTECH_EDUC	194	0.345	0.000	0.477	15,532	0.171	0.000	0.412	194	0.200	0.000	0.401	0.174***	0.145
MILITARY	194	0.072	0.000	0.259	15,532	0.047	0.000	0.212	194	0.059	0.000	0.236	0.025*	0.013

PHD	194	0.320	0.000	0.468	15,532	0.047	0.000	0.211	194	0.106	0.000	0.309	0.273***	0.214
DEPRESSION_CEO	194	0.015	0.000	0.124	15,532	0.004	0.000	0.060	194	0.012	0.000	0.108	0.012***	0.003
INVENTOR_CEO	194	0.088	0.000	0.283	15,532	0.007	0.000	0.085	194	0.041	0.000	0.199	0.080***	0.047
FOREIGN_CEO	194	0.113	0.000	0.318	15,532	0.033	0.000	0.179	194	0.065	0.000	0.247	0.080***	0.048

Fama–French 12 industries

	Winners (W)			**Non-winners (N)**				**Predicted winners (P)**			
Consumer nondurables	4.64%	Business Equipment	39.69%	C. nond	9.14%	Bus. eq	22.12%	C. nond	6.74%	Bus. eq	33.16%
Consumer durables	2.06%	Shops	15.46%	C. dur	3.96%	Shops	15.19%	C. dur	8.81%	Shops	13.47%
Manufacturing	18.04%	Health	6.19%	Man.	17.07%	Health	10.57%	Man.	13.47%	Health	11.40%
Energy	2.58%	Other	6.70%	Energy	5.84%	Other	11.54%	Energy	3.11%	Other	7.77%
Chemicals	4.64%			Chem.	4.58%			Chem.	2.07%		

Table 2.3. Logit models to predict awards

Columns (1) and (2) report the results for the logit models that predict media and non-media award winners, respectively. The binary dependent variable equals one if the firm's CEO won an award in the current year and zero otherwise. The variables $RETURN_{t-1}$ and $RETURN_{t-2}$ are the compound returns from the one and two years prior to the award year, respectively; SIZE is the logarithm of the total book value of assets; RD is the annual R&D expenditure scaled by the total book value of assets; PATENT is the logarithm of one plus the number of patents granted during the year; CITATION is the logarithm of one plus the number of citations summed across all patents applied for during the year; TOBIN_Q is market value of equity plus total assets minus the book value of equity, all divided by total assets; LEVERAGE is the ratio of total debt to book assets; ROA is the ratio of operating income to book assets; CASH is measured as cash and assets readily convertible to cash, scaled by book assets; CEO_AGE is the CEO age in years; CEO_TENURE is the number of years since the current CEO became CEO; and FEMALE is a dummy variable that equals one if the CEO is female and zero otherwise. Variables with the subscript t - 1 are measured at the end of the year prior to the award year t. Industry dummies is the dummy for the two-digit Standard Industrial Classification (SIC) industry code. Industry and year dummies are not reported here for brevity. The *z*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	(1) **Media awards**	(2) **Non-media awards**
$RETURN_{t-1}$	0.164**	0.160**
	(2.003)	(2.358)
$RETURN_{t-2}$	0.138**	0.031
	(2.104)	(0.338)
$SIZE_{t-1}$	0.908***	0.426***
	(12.392)	(6.269)
$TOBIN\_Q_{t-1}$	28.759***	8.379**
	(6.904)	(2.469)
RD_{t-1}	-0.926	0.336
	(-0.669)	(0.346)
$PATENT_{t-1}$	0.010	0.044
	(0.157)	(0.268)
$CITATION_{t-1}$	0.046	0.107
	(0.535)	(0.603)
ROA_{t-1}	-0.708*	-0.072
	(-1.701)	(-0.164)
$CASH_{t-1}$	2.362***	-0.710
	(3.919)	(-1.149)
CEO_AGE	-0.029***	0.017
	(-3.191)	(1.371)
CEO_TENURE	0.046***	0.035***
	(4.898)	(3.543)
FEMALE	3.009***	1.684***
	(10.616)	(4.192)
Year dummies	Yes	Yes
Industry dummies	Yes	Yes
No. of obs.	13,633	12,999
Pseudo-R^2	0.308	0.234

Table 2.4. Impact of winning CEO awards on innovation

This table reports the regression results for the sample that includes winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results for media and non-media awards, respectively. Columns (1) to (9) report the regression estimates for each ordinary least squares (OLS) regression with different dependent variables. The dependent variables are PATENT, CITATION, and RD, where PATENT is the logarithm of one plus the number of patents applied for during the year and CITATION is the logarithm of one plus the number of citations per patent. The numbers of patents and citations are obtained from Kogan et al. (2017) and are adjusted for truncation bias following Hall et al. (2001, 2005). The variable RD is the annual R&D expenditure scaled by the total book value of assets, t is the award year, and t + 1, t + 2, and t + 3 represent one, two, and three years after the award year t, respectively. The independent variables include MEDIA (a dummy variable equal to one if the CEO won at least one media award in year t and zero otherwise); NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise); $RETURN_{t-1}$ and $RETURN_{t-2}$ (the compound returns from one and two years prior to the award year t, respectively); SIZE (the logarithm of the total book value of assets); RD_{t-1} (the previous year's annual R&D expenditure scaled by the total book value of assets); TOBIN_Q (market value of equity plus total assets minus the book value of equity, all divided by total assets); LEVERAGE (the ratio of total debt to book assets); ROA (the ratio of operating income to book assets); CASH (measured as cash and assets readily convertible to cash, scaled by book assets); CEO_AGE (the age of CEOs in years); CEO_TENURE (the number of years since the current CEO became CEO), and FEMALE (a dummy variable that equals one if the CEO is female and zero otherwise); and Industry dummies is the dummy for the two-digit SIC industry code. Industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

Panel A: Media awards

	1 year after the award year			**2 years after the award year**			**3 years after the award year**		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
MEDIA	-0.325	-0.076	0.004	-0.101	-0.298*	-0.004	-0.057	-0.281*	-0.002
	(-0.994)	(-0.709)	(1.146)	(-0.918)	(-1.794)	(-0.159)	(-0.526)	(-1.786)	(-0.491)
$RETURN_{t-1}$	-0.123	0.028	-0.003	0.065	0.156	-0.008**	-0.047	-0.069	-0.007**
	(-0.718)	(0.242)	(-0.998)	(0.389)	(1.414)	(-2.430)	(-0.267)	(-0.640)	(-2.088)
$RETURN_{t-2}$	0.043	-0.039	-0.001	0.125	0.077	0.002	0.188	0.072	0.005
	(0.342)	(-0.466)	(-0.481)	(0.948)	(0.885)	(0.755)	(1.078)	(0.662)	(1.626)
$SIZE_{t-1}$	0.608***	0.186***	0.001	0.531***	0.186***	0.000	0.460***	0.183***	-0.000
	(11.289)	(5.217)	(0.837)	(9.517)	(5.032)	(0.241)	(7.817)	(5.024)	(-0.027)
$TOBIN\_Q_{t-1}$	8.061**	8.211***	-0.054	5.964	7.711***	-0.002	4.966	7.990***	-0.025
	(2.010)	(3.090)	(-0.716)	(1.457)	(2.841)	(-0.030)	(1.166)	(3.031)	(-0.320)
RD_{t-1}	8.707***	4.204***	0.728***	10.413***	6.226***	0.756***	8.531***	4.454***	0.762***
	(5.346)	(3.895)	(23.630)	(5.871)	(5.294)	(22.565)	(4.996)	(4.212)	(24.711)
$LEVERAGE_{t-1}$	-0.963	-0.347	-0.018	-1.260**	-0.806**	-0.024**	-1.032*	-0.747**	-0.017
	(-1.575)	(-0.856)	(-1.529)	(-2.133)	(-2.057)	(-2.135)	(-1.678)	(-1.960)	(-1.526)
ROA_{t-1}	-1.621*	-1.485**	0.029*	-1.934**	-1.193*	-0.020	-1.226	-1.566***	-0.022

	(-1.764)	(-2.440)	(1.655)	(-2.016)	(-1.876)	(-1.079)	(-1.285)	(-2.652)	(-1.284)
$CASH_{t-1}$	0.641	1.017***	0.019*	0.150	0.126	0.012	-0.340	-0.079	0.028**
	(1.113)	(2.664)	(1.701)	(0.243)	(0.309)	(1.025)	(-0.545)	(-0.205)	(2.525)
CEO_AGE	-0.012	-0.002	-0.000	0.004	0.003	0.000	-0.009	-0.005	0.000
	(-1.297)	(-0.289)	(-0.510)	(0.403)	(0.543)	(0.877)	(-0.708)	(-0.705)	(0.483)
CEO_TENURE	-0.012	-0.001	0.000	-0.017*	-0.004	0.000	-0.006	-0.001	0.000
	(-1.320)	(-0.101)	(0.820)	(-1.880)	(-0.714)	(0.008)	(-0.571)	(-0.154)	(0.318)
FEMALE	0.167	0.324*	-0.005	0.215	0.463***	-0.003	0.233	0.336**	-0.000
	(0.656)	(1.921)	(-1.034)	(0.822)	(2.665)	(-0.611)	(0.866)	(2.019)	(-0.040)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	350	350	350	341	341	341	329	329	329
Adjusted R^2	0.672	0.598	0.798	0.666	0.550	0.777	0.641	0.572	0.816

Panel B: Non-media awards

	1 year after the award year			**2 years after the award year**			**3 years after the award year**		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
NON_MEDIA	0.184	0.153	0.001	0.299**	0.257**	0.004	0.784***	0.562***	0.001
	(0.726)	(0.859)	(0.012)	(2.476)	(2.341)	(1.096)	(3.154)	(3.138)	(0.154)
$RETURN_{t-1}$	0.047	0.015	-0.000	0.066	0.021	-0.002	0.073	0.031	-0.002
	(0.845)	(0.388)	(-0.089)	(1.177)	(0.573)	(-1.302)	(1.219)	(0.923)	(-1.141)
$RETURN_{t-2}$	-0.197	-0.121	0.002	-0.182	-0.090	0.002	-0.214	-0.001	-0.005
	(-1.215)	(-1.094)	(0.377)	(-1.124)	(-0.844)	(0.537)	(-1.231)	(-0.013)	(-0.963)
$SIZE_{t-1}$	0.708***	0.204***	0.001	0.596***	0.149***	0.003**	0.597***	0.110***	-0.000
	(11.633)	(4.897)	(0.527)	(10.075)	(3.829)	(2.002)	(9.107)	(2.950)	(-0.013)
$TOBIN\_Q_{t-1}$	7.460*	6.041**	-0.232**	3.016	3.887	-0.142	2.248	6.377**	-0.162
	(1.843)	(2.185)	(-2.039)	(0.760)	(1.493)	(-1.488)	(0.509)	(2.537)	(-1.140)
RD_{t-1}	5.070***	2.366***	0.524***	5.005***	1.968**	0.410***	5.310***	1.774**	0.360***
	(4.089)	(2.794)	(15.058)	(4.060)	(2.433)	(13.881)	(3.964)	(2.328)	(8.347)
$LEVERAGE_{t-1}$	-1.131*	-0.588	-0.001	-0.813	-0.206	-0.007	-1.065*	-0.139	0.008
	(-1.925)	(-1.465)	(-0.060)	(-1.330)	(-0.514)	(-0.475)	(-1.651)	(-0.379)	(0.387)
ROA_{t-1}	-0.280	-0.286	0.049**	0.540	0.046	0.067***	0.427	-0.298	0.084***
	(-0.408)	(-0.610)	(2.532)	(0.798)	(0.103)	(4.092)	(0.586)	(-0.719)	(3.572)
$CASH_{t-1}$	0.610	0.280	0.088***	1.047	1.071**	0.094***	1.392*	0.229	0.111***

	(0.840)	(0.566)	(4.315)	(1.424)	(2.221)	(5.315)	(1.710)	(0.494)	(4.228)
CEO_AGE	0.010	0.005	-0.000	0.023	0.013	-0.000	0.025*	0.006	0.000
	(0.738)	(0.571)	(-0.826)	(1.644)	(1.445)	(-1.055)	(1.675)	(0.744)	(0.895)
CEO_TENURE	-0.011	0.001	-0.000	-0.020+	-0.003	0.000	-0.016	-0.011	-0.000
	(-0.960)	(0.091)	(-0.865)	(-1.698)	(-0.362)	(0.623)	(-1.174)	(-1.500)	(-0.687)
FEMALE	1.197**	0.078	0.014	0.691	0.123	0.027**	1.432**	0.073	-0.003
	(2.471)	(0.234)	(1.013)	(1.434)	(0.389)	(2.373)	(2.447)	(0.219)	(-0.172)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	329	329	329	326	326	326	304	304	304
Adjusted R^2	0.671	0.555	0.691	0.687	0.559	0.687	0.662	0.600	0.503

Table 2.5. Abnormal Google search volume surrounding the award weeks

This table reports the Abnormal Google Search Volume (ASVI) surrounding the award weeks. Following Da et al. (2011), ASVI is defined as the difference between the logarithm of SVI during week *t* and the logarithm of the median value of SVI during the prior 8 weeks. *t*-stats are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	ASVI *t*					
	Week 1	Week 2	Week 3	Week 4	Week 12	Week 24
Media-award winning CEOs	0.182***	0.136***	0.063*	0.031*	0.008	0.015
	(3.43)	(2.59)	(1.95)	(1.70)	(0.17)	(0.32)
Non-media award winning CEOs	0.098*	0.057	0.012	0.005	-0.011	0.009
	(1.92)	(1.60)	(0.85)	(0.21)	(-0.19)	(0.11)
Difference in mean	0.084***	0.079**	0.051**	0.026*	0.019	0.006
	(2.60)	(2.14)	(1.99)	(1.68)	(0.69)	(0.15)

Table 2.6. Impact of winning CEO awards on analyst coverage

This table reports the regression results for the sample that includes winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results for non-media and media awards, respectively. The dependent variables are ANALYST_COV, where ANALYST_COV is the average number of analysts following the firm over the year, obtained from the Institutional Brokers Estimate Systems (I/B/E/S) database. The independent variables include MEDIA (a dummy variable equal to one if the CEO won at least one media award in year t and zero otherwise); NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise); $RETURN_{t-1}$ and $RETURN_{t-2}$ (the compound returns from one and two years prior to the award year t, respectively); SIZE (the logarithm of the total book value of assets); TOBIN_Q (market value of equity plus total assets minus the book value of equity, all divided by total assets); RD_{t-1} (the previous year's annual R&D expenditure scaled by the total book value of assets); LEVERAGE (the ratio of total debt to book assets); ROA (the ratio of operating income to book assets); CASH (measured as cash and assets readily convertible to cash, scaled by book assets); and Industry dummies is the dummy for the two-digit SIC industry code. Industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	1 year after the award year	**2 years after the award year**	**3 years after the award year**
	$ANALYST\_COV_{t+1}$	$ANALYST\_COV_{t+2}$	$ANALYST\_COV_{t+3}$
Panel A: Media Awards			
MEDIA	2.116***	2.618***	2.313***
	(2.859)	(3.118)	(2.787)
$RETURN_{t-1}$	1.175**	1.533**	1.517**
	(2.069)	(2.503)	(2.342)
$RETURN_{t-2}$	0.861	0.880	1.518**
	(1.465)	(1.394)	(2.372)
$SIZE_{t-1}$	3.899***	3.744***	3.615***
	(12.471)	(10.415)	(10.879)
$TOBIN\_Q_{t-1}$	0.220***	0.167***	0.188***
	(4.215)	(2.897)	(2.981
RD_{t-1}	26.105***	22.117***	11.131*
	(3.616)	(2.788)	(1.685)
$LEVERAGE_{t-1}$	-7.421**	-5.801	-5.562
	(-2.118)	(-1.216)	(-1.304)
ROA_{t-1}	13.261***	14.338***	11.475***
	(4.337)	(3.875)	(3.719)
$CASH_{t-1}$	7.614***	7.361***	8.619***
	(2.621)	(2.461)	(2.785)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
No. of obs.	350	341	329
Adjusted R^2	0.571	0.542	0.511
Panel B: Non-media Awards			
NON_MEDIA	0.274	0.309	0.381
	(1.026)	(1.065)	(0.754)
$RETURN_{t-1}$	0.238	0.184	0.222
	(1.165)	(0.910)	(1.018)

$RETURN_{t-2}$	-0.212	-0.171	0.075
	(-0.521)	(-0.462)	(0.117)
$SIZE_{t-1}$	3.472***	3.590***	3.478***
	(15.675)	(16.291)	(12.163)
$TOBIN\_Q_{t-1}$	0.029	0.034	0.021
	(0.561)	(0.742)	(0.415)
RD_{t-1}	20.566***	18.717***	18.249***
	(4.538)	(4.599)	(5.215)
$LEVERAGE_{t-1}$	-5.326**	-2.421	-0.855
	(-2.381)	(-1.077)	(-0.672)
ROA_{t-1}	9.615***	11.084***	10.281***
	(3.214)	(3.672)	(2.787)
$CASH_{t-1}$	7.282***	10.061***	9.383***
	(2.693)	(3.271)	(3.077)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
No. of obs.	329	326	304
Adjusted R^2	0.589	0.622	0.570

Table 2.7. Impact of winning CEO awards on employee treatment

This table reports the regression results for the sample that includes winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results for non-media and media awards, respectively. The dependent variables are RELATION_SCORE, where RELATION_SCORE is employee relations score constructed based on the KLD database. The independent variables include MEDIA (a dummy variable equal to one if the CEO won at least one media award in year t and zero otherwise); NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise); $RETURN_{t-1}$ and $RETURN_{t-2}$ (the compound returns from one and two years prior to the award year t, respectively); SIZE (the logarithm of the total book value of assets); TOBIN_Q (market value of equity plus total assets minus the book value of equity, all divided by total assets); RD_{t-1} (the previous year's annual R&D expenditure scaled by the total book value of assets); LEVERAGE (the ratio of total debt to book assets); ROA (the ratio of operating income to book assets); CASH (measured as cash and assets readily convertible to cash, scaled by book assets); and Industry dummies is the dummy for the two-digit SIC industry code. Industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	1 year after the award year	**2 years after the award year**	**3 years after the award year**
	$RELATION\_SCORE_{t+1}$	$RELATION\_SCORE_{t+2}$	$RELATION\_SCORE_{t+3}$
Panel A: Media Awards			
MEDIA	-0.167	-0.138	0.011
	(-1.307)	(-0.675)	(0.061)
$RETURN_{t-1}$	0.001	-0.066	0.058
	(0.002)	(-0.293)	(0.267)
$RETURN_{t-2}$	-0.010	0.277	0.243
	(-0.041)	(0.634)	(0.482)
$SIZE_{t-1}$	0.200***	0.233***	0.381***
	(3.771)	(3.083)	(3.754)
$TOBIN\_Q_{t-1}$	0.001	0.006	-0.001
	(0.171)	(0.183)	(-0.376)
RD_{t-1}	3.201*	2.569	2.007
	(1.645)	(0.882)	(0.921)
$LEVERAGE_{t-1}$	-0.711	-0.697	-0.072
	(-1.063)	(-0.603)	(-0.046)
ROA_{t-1}	0.130	-0.697	-0.854
	(0.139)	(-0.501)	(-0.983)
$CASH_{t-1}$	-0.219	0.548	0.163
	(-0.309)	(0.613)	(0.182)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
No. of obs.	136	108	91
Adjusted R^2	0.377	0.322	0.291
Panel A: Non-media Awards			
NON_MEDIA	0.362***	0.313***	0.274**
	(2.896)	(2.615)	(2.204)
$RETURN_{t-1}$	-0.095	-0.018	0.179
	(-0.289)	(-0.046)	(0.954)
$RETURN_{t-2}$	0.150	-0.061	-0.069

	(0.531)	(-1.067)	(-1.174)
$SIZE_{t-1}$	0.246***	0.303***	0.267***
	(4.379)	(4.415)	(4.783)
$TOBIN\_Q_{t-1}$	-0.011	-0.002	0.003
	(-0.575)	(-0.018)	(0.173)
RD_{t-1}	0.618	1.157	2.112
	(0.415)	(0.988)	(1.247)
$LEVERAGE_{t-1}$	1.117	1.128*	1.003*
	(1.264)	(1.677)	(1.813)
ROA_{t-1}	-0.198	0.544	-0.067
	(-0.117)	(0.618)	(-0.056)
$CASH_{t-1}$	0.385	0.271	0.197
	(0.612)	(0.277)	(0.283)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
No. of obs.	130	117	111
Adjusted R^2	0.341	0.322	0.337

Table 2.8. Effects of Impact of winning CEO awards on Innovation Strategies

This table reports the regression results for the sample that includes non-media winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results when $ORIGINALITY_{t+3}$, $EXPLOITATIVE_{t+3}$, and $EXPLORATORY_{t+3}$ are the dependent variables. The originality score of a patent as one minus the Herfindahl index of the three-digit technology class distribution of all the patents that the patent cites. ORIGINALITY is the mean originality score of a firm's patents in each year. EXPLOITATIVE (EXPLORATORY) is the proportion of exploitative (exploratory) patents. A patent is categorized as exploitative if at least 60% of its citations are based on the firm's existing knowledge, and as exploratory if at least 60% of its citations are based on new knowledge. The independent variables include NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise) and a set of control variables for CEO and firm characteristics similar to those in Table 4 (not reported here for brevity). The industry and year dummies are included but not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	ORIGINALITY		EXPLOITATIVE		EXPLORATORY	
	All firms	Innovative firms	All firms	Innovative firms	All firms	Innovative firms
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Media awards						
MEDIA	0.025	0.031	-0.031	-0.022	0.031	0.016
	(1.132)	(1.036)	(-0.683)	(-0.571)	(0.533)	(0.482)
All controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	180	157	175	163	175	163
Adjusted R^2	0.361	0.325	0.489	0.513	0.541	0.610
Panel B: Media awards						
NON_MEDIA	0.018*	0.024**	-0.071**	-0.058**	0.075**	0.061**
	(1.946)	(2.157)	(-2.281)	(-1.963)	(2.016)	(1.985)
All controls	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	213	201	213	207	213	207
Adjusted R^2	0.177	0.141	0.472	0.466	0.428	0.431

Table 2.9: Other robustness checks

This table presents the results for several robustness checks. Panels A and B show the regression estimates of MEDIA and NON_MEDIA, respectively, in the regression model, with PATENT, CITATION, and RD as the dependent variables. The variable MEDIA is a dummy variable that equals one if the CEO won at least one media award in year t and zero otherwise and NON_MEDIA is a dummy variable that equals one if the CEO won at least one non-media award in year t and zero otherwise. Columns (1) to (9) show the regression estimates for each OLS regression with different dependent variables. The dependent variables are PATENT, CITATION, and RD, where PATENT is the logarithm of one plus the number of patents applied for during the year and CITATION is the logarithm of one plus the number of citations per patent. The numbers of patents and citations are obtained from Kogan et al. (2017) and are adjusted for truncation bias following Hall et al. (2001, 2005). The variable RD is annual R&D expenditure scaled by the total book value of assets. Year *t* is the award year and years $t + 1$, $t + 2$, and $t + 3$ represent the one, two, and three years after the award year *t*, respectively. The row *Baseline results* shows the baseline regression estimates (previously reported in Table 4). In Row (1), we add to the baseline sample non-CEO awards, which are awards awarded for contributions/achievements that do not include the CEO's roles (such as awards for social contribution). In Row (2), the last two years of the sample are excluded. In Row (3a) of Panel A, only awards in the sample of Malmendier and Tate (2009) are considered and, in Row (3b), awards from the sample of Malmendier and Tate (2009) are excluded from the set of media awards. In Row (3) of Panel B, awards from Ernst & Young are excluded from the lists of non-media awards. In Row (4), firms that never had any patents are excluded. In Row (5), the two variables *DELTA* and *VEGA* are added to the baseline regression, where *DELTA* is the natural logarithm of one plus the dollar change in wealth associated with a 1% change in the firm's stock price and *VEGA* is the natural logarithm of one plus the dollar change in wealth associated with a 1% change in the standard deviation of the firm's returns. In Row (6), the variable *AMIHUD* is added to the baseline regression, where *AMIHUD* is stock illiquidity, measured following Amihud (2002). In Row (7), the variable *GENERAL_SKILL* is added to the baseline regression, where *GENERAL_SKILL* is a dummy variable that takes the value of one if the general managerial index is above the median of the sample value and zero otherwise. The general managerial index is obtained from (Custodio et al., 2013). In Row (8), the variable *IO* is included in the baseline regression, where *IO* is institutional ownership, computed as the fraction of outstanding common shares owned by all 13F reporting institutions. In Row (9), the variable *G_INDEX* is added to the baseline regression, where *G_INDEX* is a dummy variable that is equal to one if the governance index of the firm is above the median governance index and zero otherwise. The governance index is from Gompers et al. (2003).

Panel A: Media awards

	1 year after the award year			**2 years after the award year**			**3 years after the award year**		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
Baseline results	-0.325	-0.076	0.004	-0.101	-0.298*	-0.004	-0.057	-0.281*	-0.002
	(-0.994)	(-0.709)	(1.146)	(-0.918)	(-1.894)	(-0.159)	(-0.526)	(-1.786)	(-0.491)
(1) Including non-CEO awards	-0.217	-0.018	0.002	-0.150	-0.186**	-0.003	-0.115	-0.267*	-0.003
	(-1.620)	(-0.228)	(0.623)	(-1.584)	(-2.129)	(-0.772)	(-1.330)	(-1.928)	(-0.854)
(2) Excluding 2009 and 2010	-0.049	-0.133	-0.001	-0.061	-0.107*	0.004	-0.074	-0.331*	-0.006
	(-0.342)	(-1.511)	(-0.243)	(-1.376)	(-1.838)	(0.003)	(-0.585)	(-1.927)	(-0.407)
(3a) Including only awards Malmendier and Tate (2009)	-0.035	-0.029	-0.005	-0.043	-0.028**	-0.001	-0.267	-0.217*	0.001
	(-0.156)	(-0.216)	(-1.118)	(-0.059)	(-2.189)	(-0.352)	(-1.251)	(-1.713)	(0.064)
(3b) Excluding awards in Malmendier and Tate (2009)	-0.115	-0.013	-0.004	-0.061	-0.116**	-0.001	-0.049	-0.133*	-0.001
	(-0.656)	(-0.125)	(-0.944)	(-0.376)	(-2.114)	(-0.006)	(-0.343)	(-1.912)	(-0.241)
(4) Excluding firms that never had any patents	0.049	0.133	-0.001	-0.061	-0.207*	-0.006	-0.199*	-0.133*	-0.001
	(0.343)	(0.512)	(-0.241)	(-0.376)	(-1.713)	(-1.005)	(-1.699)	(-1.866)	(-0.189)
(5) Controlling for CEO incentives (DELTA and VEGA)	0.049	0.133	-0.001	-0.061*	-0.103*	-0.006	-0.213	-0.165*	0.005
	(0.336)	(0.505)	(-0.218)	(-1.675)	(-1.787)	(-0.433)	(-1.142)	(-1.693)	(0.361)
	0.047	0.129	-0.002	-0.063	-0.109**	-0.008	-0.073	-0.319*	0.005

(6) Controlling for stock liquidity (AMIHUD)	(0.313)	(0.511)	(-0.242)	(-0.384)	(-2.105)	(-0.442)	(-0.65)	(-1.837)	(0.55)
(7) Controlling for CEO general managerial skills (GENERAL)	0.049	0.133	-0.001	-0.162	-0.105**	-0.006	-0.093	-0.328*	0.005
	(0.341)	(0.509)	(-0.242)	(-0.375)	(-2.408)	(-1.44)	(-0.833)	(-1.906)	(1.357)
(8) Controlling for institutional ownership (IO)	-0.049	-0.133	-0.001	-0.064	-0.206*	0.003	-0.150	-0.231**	0.005
	(-0.343)	(-1.512)	(-0.241)	(-0.362)	(-1.844)	(0.006)	(-1.237)	(-2.150)	(0.357)
(9) Controlling for corporate governance (G_INDEX)	0.049	0.133	-0.001	-0.071	-0.106*	-0.001	-0.172	-0.165**	0.005
	(0.343)	(1.512)	(-0.241)	(-0.379)	(-1.709)	(-0.002)	(-0.758)	(-2.094)	(0.173)

Panel B: Non-media awards

	1 year after the award year			2 years after the award year			3 years after the award year		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
Baseline results	0.184	0.153	0.001	0.299**	0.257**	0.004	0.784***	0.562***	0.001
	(0.726)	(0.859)	(0.012)	(2.476)	(2.341)	(1.096)	(3.154)	(3.138)	(0.154)
(1) Including non-CEO awards	0.088	0.049	-0.001	0.109**	0.204**	0.001	0.718***	0.501***	-0.002
	(0.667)	(0.549)	(-0.251)	(2.383)	(2.250)	(0.278)	(3.084)	(3.013)	(-0.340)
(2) Excluding 2009 and 2010	0.255	0.163	-0.004	0.263**	0.302**	0.003	0.660***	0.586***	-0.002
	(1.228)	(1.392)	(-0.633)	(2.425)	(2.290)	(0.568)	(2.979)	(3.062)	(-0.307)
(3) Excluding Ernst & Young awards	0.115	0.056	-0.004	0.181**	0.305**	-0.003	0.608***	0.577***	-0.006*
	(0.704)	(0.513)	(-0.919)	(2.474)	(2.041)	(-0.685)	(3.111)	(2.703)	(-1.662)
(4) Excluding firms that never had any patents	0.179	0.121	0.003	0.205**	0.323**	0.004	0.732***	0.667***	-0.003
	(0.852)	(1.622)	(0.481)	(2.135)	(2.473)	(0.758)	(3.120)	(3.430)	(-0.417)
(5) Controlling for CEO incentives (DELTA and VEGA)	0.213	0.052	0.004	0.261**	0.243**	-0.003	0.729***	0.549***	0.002
	(1.141)	(1.431)	(1.214)	(2.372)	(2.243)	(-0.767)	(2.647)	(3.230)	(0.428)
(6) Controlling for stock liquidity (AMIHUD)	0.182	0.124	-0.004	0.227**	0.315***	-0.001	0.701***	0.570**	0.002
	(0.924)	(1.141)	(-0.645)	(1.961)	(2.939)	(-0.226)	(3.271)	(3.274)	(0.443)
(7) Controlling for CEO general managerial skills (GENERAL)	0.197	0.120	-0.003	0.202**	0.306***	-0.001	0.819***	0.663***	0.002
	(1.013)	(1.112)	(-0.417)	(2.571)	(2.895)	(-0.192)	(3.235)	(3.226)	(0.510)
(8) Controlling for institutional ownership (IO)	0.199	0.145	0.002	0.231**	0.291***	0.003	0.687***	0.559***	-0.003
	(0.962)	(1.264)	(0.418)	(2.234)	(2.932)	(0.693)	(3.528)	(2.898)	(-0.513)
(9) Controlling for corporate governance (G_INDEX)	0.097	0.232	0.011	0.144**	0.200**	0.006	0.428***	0.466***	0.002
	(0.312)	(1.163)	(1.375)	(2.429)	(2.346)	(0.727)	(2.410)	(2.786)	(0.224)

Appendix 2A. Variable definitions

Variable	Definition	Source
PATENT	The logarithm of one plus the number of patents applied for during the year.	Kogan et al. (2017)
CITATION	The logarithm of one plus the number of citations per patent during the year. The number of citations is adjusted for truncation bias following Hall et al. (2001, 2005).	Kogan et al. (2017)
RD	R&D spending scaled by total assets.	Compustat
MEDIA	A dummy that equals one if the CEO won at least one media award in a given year and zero otherwise.	Marquis Who's Who
NON_MEDIA	A dummy that equals one if the CEO won at least one non-media award in a given year and zero otherwise.	Marquis Who's Who
SIZE	The logarithm of firm size, which is measured by total assets.	ExecuComp
$RETURN_{t-1}$; $RETURN_{t-2}$	Stock returns one or two years before the award year.	CRSP
ROA	The ratio of operating income to book assets.	Compustat
LEVERAGE	The ratio of total debt to book assets.	Compustat
CASH	Measured as cash and assets readily convertible to cash, scaled by book assets.	Compustat
TOBIN'S Q	Market value of equity plus total assets minus the book value of equity, all divided by total assets.	Compustat
AGE	CEO age, measured in years.	ExecuComp
CEO_TENURE	CEO tenure, which is the number of years since the current CEO became CEO.	ExecuComp
FEMALE	A dummy that equals one if the CEO is female and zero otherwise.	ExecuComp
MBA	A dummy that takes the value of one if the CEO has an MBA degree and zero otherwise.	Marquis Who's Who
PHD	A dummy that equals one if the CEO has a PhD and zero otherwise	Marquis Who's Who
IVY	A dummy that equals one if the CEO attended an Ivy League institution and zero otherwise.	Marquis Who's Who
FINTECH_EDUC	A dummy that takes the value of one if the CEO has a technical or financial	Marquis Who's Who

	educational background and zero otherwise.	
MILITARY	A dummy that takes the value of one if the CEO served in the military and zero otherwise.	Marquis Who's Who
INVENTOR_CEO	A dummy that equals one if the CEO has his or her own patent and zero otherwise.	Marquis Who's Who
DEPRESSION_CEO	A dummy that takes the value of one if the CEO was born in the period from 1920 to 1929 and zero otherwise.	Marquis Who's Who
FOREIGN_CEO	A dummy that equals one if the CEO was born outside the United States and zero otherwise.	Marquis Who's Who
DELTA	Natural logarithm of one plus the dollar change in wealth associated with a 1% change in the firm's stock price.	Lalitha Naveen's website: https://sites.temple.edu/lnaveen/data
VEGA	Natural logarithm of one plus the dollar change in wealth associated with a 1% change in the standard deviation of the firm's returns.	Lalitha Naveen's website: https://sites.temple.edu/lnaveen/data
AMIHUD	Stock illiquidity measured following Amihud (2002).	CRSP
IO	Institutional ownership computed as the fraction of outstanding common shares owned by all 13F reporting institutions.	Thompson Reuters Institutional 13F
GENERAL_SKILL	General managerial skills over the executive's lifetime work experience.	Custodio et al. (2013)
G_INDEX	A dummy that equals one if the governance index of the firm is above the median governance index and zero otherwise. The governance index is from Gompers et al. (2003).	Gompers et al. (2003)
ANALYST_COV	Average number of analysts following the firm over the year.	Institutional Brokers Estimate Systems (I/B/E/S)
RELATION_SCORE	Employee relations score, computed as the sum of the rating across the five strength categories of employee relations, including employee involvement, cash profit-sharing, retirement benefits, union relations, and health and safety.	KLD

Appendix 2B. List of CEO media awards

Name of award	Organization
Laurel Citation	Aviation Week & Space Technology Magazine
Laurel Award	Aviation Week & Space Technology Magazine
The World's Best CEOs	Barron's Magazine
Top Manager	Business Week
The Top 25 Managers	Business Week
CEO of the Year	CEO Magazine
CEO of the Year	Chief Executive Magazine
One of the 50 Who Matter Now	CNNMoney.com Business 2.0
Computer Reseller News Hall of Fame	Computer Reseller News
CEO of the Year	Electronics Business Magazine
Man of the Year	Financial Times
The 100 Most Powerful Women	Forbes Magazine
The Most Powerful Women in American Business	Fortune Magazine
The 40 Under 40	Fortune Magazine
Technology Leader of the Year	Industry Week
CEO of the Year	Industry Week
Industry Achievement Award	InfoWorld magazine
Top CEO	Institutional Investor Magazine
The 30 Most Powerful Women in America	Ladies Home Journal
The 50 Most Powerful People in Hollywood	Premiere Magazine
Retail Executive of the Year	Retail Merchandiser magazine
The 100 Most Influential Women in Business	San Francisco Business Time
Innovation Award in Communications	The Economist
The 50 Women to Watch	The Wall Street Journal
Man of the Year	Time Magazine
The Top 50 Cyber Elite	Time Magazine
Person of the Year	Time Magazine
The 100 Most Influential People in the World	Time Magazine
Manager of the Year	Stark's Truck & Off-Highway Ledger
Number One on the List of Best CEOs	Worth Magazine

Appendix 2C. List of CEO non-media awards

Name of award	Organization
Scientist of the Year Award	Achievement Rewards for College Scientists
Industrialist of the Year Award	America-Israel Chamber of Commerce
Medal Achievement Award	American Electronics Association
CEO Coach of the Year	American Football Coaches Foundation
Appeal of Conscience Award	Appeal of Conscience Foundation
Distinguished Information Sciences Award	Association Information Tech. Professionals
Ada Lovelace Award	Association Women in Computing
Bio-IT Champion	Bio-ITWorld
Golden State Award	Board Directors California Council for International Trade
Person of the Year	Brazilian-American Chamber of Commerce
Excellence in Management Award	California Institute Technology Management Association
Manufacturer of the Century	California Institute Technology Management Association
California Industrialist of the Year	California Museum of Science and Industry and the California Museum Foundation
Director of the Year Award for the Enhancement of Economic Values	Corporate Director Forum
Cap Gemini Ernst & Young Leadership Award for Global Integration	Ernst & Young
Ernst & Young Entrepreneur of the Year	Ernst & Young
Dr. Morris Chang Exemplary Leadership Award	Fabless Semiconductor Association
Bower Award in Business Leadership	Franklin Institute
Leadership and Vision Award	French-America. Chamber of Commerce San Francisco
Hall of Fame	Greater Cincinnati and Northern Kentucky Business
Christopher Columbus Award	Greater Columbus Chamber of Commerce
Statesman of the Year	Harvard Business School
Excellence in Leadership Communication Award	International Association Business Communicators
Cinema Digital Technological Award	International Film Festival
Award for Excellence in Business, Engineering & Tech	John M. Olin School of Washington University
Warren Bennis Award for Leadership	Linkage Organization
Women of Excellence Award	National Association Female Executives
Industrial Leadership Award	National Defense Industrial Association
Executive of the Year	National Management Association
American Spirit Award	National Retail Federation
Bob Hope Distinguished Citizen Award	National Security Industrial Association
National Medal of Technology	President of the United States
Annual Business Management Award	Société de Chimie Industrielle
International Palladium Medal	Société de Chimie Industrielle
Excellence in Leadership Award	Stanford Graduate School of Business
M. Eugene Merchant Manufacturing Medal	American Society of Mechanical Engineers

Dr. Morris Chang Exemplary Leadership Award	Fabless Semiconductor Association
Fleet Admiral Chester W. Nimitz Award	Navy League of the United States
Rear Admiral John J. Bergen Leadership Medal, Navy League	United States New York Council
Award for Business Excellence	University California School Business Administration
Daniel J. Epstein Engineering Management Award	University of Southern California
National Sales Hall of Fame	William Paterson University Foundation
Ronald H. Brown Standards Leadership Award	World Standards Day Planning Committee
International Achievement Award	World Trade Club

Internet Appendices for Chapter 2
Award-winning CEOs and corporate innovation

A. CEO Characteristics

Prior studies suggest that executives' personal attributes and characteristics can be associated with corporate behavior. In our context of innovative activities, it is possible that the results we document in the paper are driven by heterogeneity in managerial characteristics between winners and predicted winners. Therefore, we control for several executive characteristics that are documented in the literature. Specifically, we hand-collect data on executives' educational background from Marquis Who's Who. Following Bertrand and Schoar (2003) and Cronqvist, Makhija, and Yonker (2012), we construct a dummy variable, MBA, which takes the value of one if a CEO has an MBA degree and zero otherwise. Second, we test if CEOs who attended Ivy League institutions behave differently.[33] Third, we follow Benmelech and Frydman (2015) and construct a dummy variable, PHD, that takes the value of one if a CEO has a PhD and zero otherwise. Fourth, we control for a CEO's technical or financial educational background using the dummy variable FINTECH_EDUC, which takes the value of one if the CEO has an educational background in financial or technical areas following Benmelech and Frydman (2015).

[33] Following Benmelech and Frydman (2015), we use a dummy variable IVY that equals one if the CEO attended one of eight Ivy League universities and zero otherwise. The eight Ivy League institutions are Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, the University of Pennsylvania, Princeton University, and Yale University.

In addition, we control for the CEO's military experience, as documented by Benmelech and Frydman (2015). We use a dummy variable, MILITARY, that takes the value of one if the CEO served in the military and zero otherwise. Finally, we include other CEO personal characteristics that could affect corporate innovation, such as DEPRESSION_CEO (which takes the value of one if the CEO was born in the period from 1920 to 1929), INVENTOR_CEO (which equals one if the CEO has his or her own patent), and FOREIGN_CEO (which equals one if the CEO was born outside the United States).[34] We rerun the baseline regression and add each of the above-mentioned CEO characteristics variables and report the regression estimates in Columns (1) to (8) of Table A2.1 (for the media awards sample) and Table A2.2 (for the non-media awards sample). In Column (9), we show the regression results when we include all eight control variables in our baseline regression.

[Please insert Table A2.1 here]

In Table A2.1, we find that, with regard to media awards, controlling for additional CEO characteristics does not change the results of the baseline regressions. The effects of winning media awards on patent and R&D spending remain insignificant in three-year period after the award year. However, winning media awards results in significantly fewer citations for award-winning CEO firms in the third year following the award year, compared to those firms led by predicted winners. The results are robust to controlling for several CEO characteristics. The results in Table A2.1 are consistent with previous findings.[35]

[34] We define DEPRESSION_CEO following Malmendier and Tate (2005) and Malmendier and Nagel (2011).

[35] The results (untabulated) for the first- and second-year period after the award year are consistent with the baseline results. Specifically, after controlling for CEOs' educational and demographic backgrounds, the effects of winning media (non-media) awards on innovation outputs are insignificant in the first-year period after the award. In the

[Please insert Table A2.2 here]

In Table A2.2, the coefficients of NON_MEDIA are all statistically significant across all model specifications. Thus, the effect of winning a non-media award on corporate innovation is independent of the above-mentioned CEO characteristics. Regarding CEO characteristics, the results suggest that firms led by CEOs with a financial education, a Ph.D. degree, or their own patents tend to have more patents in the three-year period following the award year, whereas firms run by Depression era CEOs tend to achieve fewer patents during the same period.[36]

B. Impact of winning CEO awards on innovation: Subsample analysis

Our results are robust after controlling for a large set of personal attributes and characteristics of executives that are well-documented in the literature. However, the results are still not free from endogeneity concerns. As manager fixed attributes can account for up to 30% of variations in firm innovation productivity (Cho, Halford, Hsu, and Ng, 2016), there could be a possibility that other unobserved/ undocumented managerial characteristics drive our results. To ensure that it is status change following CEO personal awards, not other CEO personal characteristics, that enhances corporate innovation, we conduct a subsample analysis. Specifically, we re-run our baseline model in Table 2.4 for two subsamples based on CEO tenure: a subsample

second-year period after the award year, the coefficients for NON_MEDIA are positive and significant while the effects of winning media awards on patents (citations) are insignificant (negative).

[36] Our results are aligned with those of He and Hirshleifer (2018), who find that companies managed by CEOs with a PhD produce more patents, and Islam and Zein (2019), who document that high-tech firms led by CEOs with their own patent are associated with greater innovation outputs.

with tenure less than or equal 3 years and a subsample of with tenure above 3 years.[37] We argue that, if other CEO personal attributes are the key drivers of corporate innovative activities, we should observe favorable impacts on innovation within the first three years of their appointment.[38] In addition, if the status change following CEO personal awards is the key determinant of our documented results, we should continue to observe a significant relation between award-winning CEO and innovation success for a subsample with tenure of above 3 years. We report the results for this test in Table A2.3.

[Please Insert Table A2.3 here]

In Table A2.3 we find evidence to support the latter conjecture. The coefficients for innovation outputs in the each of the three years after the award year are all positive and statistically significant at the 5%-level or better, suggesting that it is the status change following CEO personal awards, not other CEO personal characteristics, that explains the significant difference in corporate innovation outputs between non-media award-winning CEOs and a matched sample of predicted winners. Overall, the results in Table A2.3 confirm that the effect of winning a non-media award on corporate innovation is independent of CEO characteristics.

[37] In these subsamples, the CEO is less likely to be hired with the goal of enhancing innovation. Therefore, selection bias concerns are mitigated.

[38] As it can take up to several years from the starting an innovation to the final outputs (innovation grants), we consider the effect of winning awards for each year from t+1 to t+3 (with t = 0 as award year), allowing more time for the effect to take place in innovation output.

Table A2.1. Controlling for CEO characteristics—Media awards

This table reports the regression results for the sample that includes media winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results when $PATENT_{t+1}$ or $CITATION_{t+1}$ is the dependent variable, respectively, where PATENT is the logarithm of one plus the number of patents applied for during the year and CITATION is the logarithm of one plus the number of citations per patent. The numbers of patents and citations are obtained from Kogan, Papanikolaou, Seru, and Stoffman (2017) and are adjusted for truncation bias following Hall, Jaffe, and Trajtenberg (2001, 2005). The year t is the award year and year t + 3 represents the third year after the award year t. The independent variables include MEDIA (a dummy variable equal to one if the CEO won at least one media award in year t and zero otherwise) and a set of control variables for CEO and firm characteristics similar to those in Table 2.4 (not reported here for brevity). The column Main shows the results of the baseline regression (previously reported in Panel B of Table 2.4). Columns (1) to (9) have an additional dummy variable, including MBA (that takes the value of one if the CEO has an MBA degree), IVY (that equals one if the CEO attended one of the Ivy League institutions), FINTECH_EDUC (that takes the value of one if the CEO has a technical or financial educational background), MILITARY (that takes the value of one if the CEO served in the military), PHD (that equals one if the CEO has a PhD), DEPRESSION_CEO (that takes the value of one if the CEO was born in the period from 1920 to 1929), INVENTOR_CEO (that equals one if the CEO has his or her own patent), and FOREIGN_CEO (that equals one if the CEO was born outside the United States). Data for these nine additional variables are hand-collected from Marquis Who's Who. Industry is a dummy for the two-digit SIC industry code. The industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	Main	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent variable *$PATENT_{T+3}$*										
MEDIA	-0.057	-0.197	-0.200	-0.098	-0.146	-0.214	-0.113	-0.162	-0.202	-0.079
	(-0.526)	(-1.305)	(-1.114)	(-0.841)	(-0.759)	(-1.043)	(-1.108)	(-1.202)	(-1.232)	(-0.982)
MBA		0.317								0.166
		(1.611)								(0.805)
IVY			0.041							-0.003
			(0.193)							(-0.021)
FINTECH_EDUC				0.475**						0.407*
				(2.502)						(1.821)
MILITARY					-0.912**					-0.849*
					(-2.157)					(-1.921)
PHD						0.082				-0.025
						(0.325)				(-0.102)
DEPRESSION_CEO							-1.381			-0.971
							(-1.167)			(-0.743)
INVENTOR_CEO								0.327		0.102
								(0.712)		(0.244)
FOREIGN_CEO									0.202	0.215
									(0.591)	(0.093)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	329	329	329	329	329	329	329	329	329	329
Adjusted R^2	0.572	0.579	0.551	0.608	0.619	0.615	0.626	0.613	0.609	0.638

Panel B: Dependent variable *CITATION*$_{t+3}$										
MEDIA	-0.281*	-0.199*	-0.186*	-0.263*	-0.244**	-0.272*	-0.305**	-0.189**	-0.219**	-0.195*
	(-1.786)	(-1.793)	(-1.698)	(-1.914)	(-2.011)	(-1.937)	(-2.118)	(-1.961)	(-1.991)	(-1.945)
MBA		0.166								0.112
		(1.358)								(0.641)
IVY			0.148							0.146
			(1.123)							(1.023)
FINTECH_EDUC				0.171						0.119
				(1.393)						(0.638)
MILITARY					-0.082					0.037
					(-0.370)					(0.146)
PHD						0.037				-0.001
						(0.284)				(-0.018)
DEPRESSION_CEO							-0.945**			-0.052**
							(-2.244)			(-2.269)
INVENTOR_CEO								0.101		-0.036
								(0.347)		(-0.132)
FOREIGN_CEO									0.264	0.205
									(1.233)	(1.127)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	329	329	329	329	329	329	329	329	329	329
Adjusted R^2	0.572	0.561	0.544	0.563	0.575	0.541	0.578	0.562	0.551	0.583

Table A2.2. Controls for CEO characteristics—Non-media awards

This table reports the regression results for the sample that includes non-media winners and predicted winners. Predicted winners (P) are chosen from the non-winners (N) as those with the propensity scores closest to those of each actual award winner (W). Panels A and B report the results when $PATENT_{t+1}$ or $CITATION_{t+1}$ is the dependent variable, respectively, where PATENT is the logarithm of one plus the number of patents applied for during the year and CITATION is the logarithm of one plus the number of citations per patent. The numbers of patents and citations are obtained from Kogan, Papanikolaou, Seru, and Stoffman (2017) and are adjusted for truncation bias following Hall, Jaffe, and Trajtenberg (2001, 2005). The year t is the award year and year t + 1 represents the year after the award year t. The independent variables include NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise) and a set of control variables for CEO and firm characteristics similar to those in Table 4 (not reported here for brevity). The column Main shows the results of the baseline regression (previously reported in Panel B of Table 2.4). Columns (1) to (9) have an additional dummy variable, including MBA (that takes the value of one if the CEO has an MBA degree), IVY (that equals one if the CEO attended one of the Ivy League institutions), FINTECH_EDUC (that takes the value of one if the CEO has a technical or financial educational background), MILITARY (that takes the value of one if the CEO served in the military), PHD (that equals one if the CEO has a PhD), DEPRESSION_CEO (that takes the value of one if the CEO was born in the period from 1920 to 1929), INVENTOR_CEO (that equals one if the CEO has his or her own patent), and FOREIGN_CEO (that equals one if the CEO was born outside the United States). Data for these nine additional variables are hand-collected from Marquis Who's Who. Industry is a dummy for the two-digit SIC industry code. The industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10%-levels, respectively.

	Main	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent variable *$PATENT_{T+1}$*										
NON_MEDIA	0.784***	0.643***	0.729***	0.531**	0.649***	0.625**	0.722***	0.669***	0.723***	0.614***
	(3.154)	(3.047)	(2.875)	(2.471)	(3.097)	(2.554)	(3.112)	(2.839)	(3.108)	(2.973)
MBA		0.261								0.215
		(1.189)								(0.893)
IVY			0.391*							0.106
			(1.806)							(0.384)
FINTECH_EDUC				0.317**						0.236**
				(2.083)						(1.967)
MILITARY					-0.538					-0.576
					(-1.467)					(-1.322)
PHD						0.511**				0.382*
						(2.483)				(1.706)
DEPRESSION_CEO							-0.354**			-0.073**
							(-2.512)			(-2.211)
INVENTOR_CEO								0.649*		0.168
								(1.815)		(0.384)
FOREIGN_CEO									-0.435	-0.322
									(-1.342)	(-0.967)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	304	304	304	304	304	304	304	304	304	304
Adjusted R^2	0.662	0.631	0.646	0.637	0.645	0.650	0.652	0.639	0.658	0.671
Panel B: Dependent variable *CITATION*$_{T+1}$										
NON_MEDIA	0.562***	0.553***	0.514***	0.476***	0.557***	0.522***	0.576***	0.528***	0.547***	0.489***
	(3.138)	(3.023)	(2.984)	(2.870)	(3.046)	(2.946)	(3.017)	(3.064)	(2.997)	(3.011)
MBA		0.137								0.163
		(0.971)								(1.216)
IVY			-0.015							-0.152
			(-0.106)							(-0.948)
FINTECH_EDUC				0.244**						0.277*
				(2.082)						(1.916)
MILITARY					-0.361*					-0.361*
					(-1.833)					(-1.687)
PHD						0.187				0.142
						(1.376)				(0.755)
DEPRESSION_CEO							-0.529			-0.497
							(-0.913)			(-0.893)
INVENTOR_CEO								0.261		0.112
								(0.326)		(0.362)
FOREIGN_CEO									-0.081	-0.083
									(-0.344)	(-0.358)
CEO characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	304	304	304	304	304	304	304	304	304	304
Adjusted R^2	0.600	0.589	0.603	0.592	0.564	0.602	0.551	0.566	0.597	0.611

Table A2.3: Impact of winning CEO awards on innovation: Subsample Analysis

These results are as per Table 2.4, except that two subsamples analyses based on CEO tenure are included. The first subsample includes observations with CEO tenure less than or equal to 3 years while the second subsample includes those with CEO tenure of above 3 years. Panels A and B report the results for media and non-media awards, respectively. The dependent variables are PATENT, CITATION, and RD, where PATENT is the logarithm of one plus the number of patents applied for during the year and CITATION is the logarithm of one plus the number of citations per patent. The numbers of patents and citations are obtained from Kogan, Papanikolaou, Seru, and Stoffman (2017) and are adjusted for truncation bias following Hall, Jaffe, and Trajtenberg (2001, 2005). The variable RD is the annual R&D expenditure scaled by the total book value of assets, t is the award year, and t + 1, t + 2, and t + 3 represent one, two, and three years after the award year t, respectively. The independent variables include MEDIA (a dummy variable equal to one if the CEO won at least one media award in year t and zero otherwise); NON_MEDIA (a dummy variable equal to one if the CEO won at least one non-media award in year t and zero otherwise); $RETURN_{t-1}$ and $RETURN_{t-2}$ (the compound returns from one and two years prior to the award year t, respectively); SIZE (the logarithm of the total book value of assets); MB (the ratio of the market capitalization value to the book equity value); RD_{t-1} (the previous year's annual R&D expenditure scaled by the total book value of assets); TOBIN_Q (the ratio of market assets to book assets); LEVERAGE (the ratio of total debt to book assets); ROA (the ratio of operating income to book assets); Cash (measured as cash and assets readily convertible to cash, scaled by book assets); CEO_AGE (the age of CEOs in years); CEO_TENURE (the number of years since the current CEO became CEO), and FEMALE (a dummy variable that equals one if the CEO is female and zero otherwise); and Industry dummies is the dummy for the two-digit SIC industry code. Industry and year dummies are not reported here for brevity. The *t*-statistics are reported in parentheses. The superscripts ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Non-media awards

	1 year after the award year			2 years after the award year			3 years after the award year		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
Subsample: Tenure ≤ 3 years									
NON_MEDIA	0.161	0.118	-0.003	0.217	0.308	-0.005	0.005	0.204	-0.012
	(0.52)	(0.64)	(-1.09)	(0.57)	(0.95)	(-0.58)	(0.02)	(0.63)	(-0.68)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	104	104	104	104	104	104	104	104	104
Adjusted R^2	0.712	0.700	0.816	0.722	0.412	0.667	0.611	0.373	0.689
Subsample: Tenure > 3 years									
NON_MEDIA	0.224	0.183	0.005	0.659**	0.452**	0.005	0.718***	0.496***	0.001
	(1.02)	(1.43)	(0.97)	(2.56)	(2.43)	(0.81)	(3.23)	(3.14)	(0.42)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	0.608	0.525	0.561	0.633	0.615	0.591	0.660	0.612	0.596
Adjusted R^2	225	225	225	225	225	225	225	225	225

Panel B: Media awards

	1 year after the award year			2 years after the award year			3 years after the award year		
	(1) $PATENT_{t+1}$	(2) $CITATION_{t+1}$	(3) RD_{t+1}	(4) $PATENT_{t+2}$	(5) $CITATION_{t+2}$	(6) RD_{t+2}	(7) $PATENT_{t+3}$	(8) $CITATION_{t+3}$	(9) RD_{t+3}
Subsample: Tenure ≤ 3 years									
MEDIA	-0.382	-0.304	0.004	-0.153	-0.143	-0.013	-0.371	-0.085	-0.011
	(-0.52)	(-0.68)	(0.45)	(-1.17)	(-1.41)	(-1.15)	(-1.42)	(-1.51)	(-1.16)
All controls									
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	97	97	97	95	95	95	95	95	95
Adjusted R^2	0.881	0.826	0.815	0.874	0.777	0.773	0.867	0.833	0.834
Subsample: Tenure > 3 years									
MEDIA	-0.192	-0.133	-0.005	-0.184	-0.258**	0.001	-0.046	-0.333**	0.005
	(-1.05)	(-1.26)	(-0.84)	(-1.02)	(-2.44)	(0.04)	(-0.26)	(-1.97)	(1.59)
All controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	232	232	232	232	232	232	232	232	232
Adjusted R^2	0.600	0.651	0.679	0.633	0.582	0.814	0.640	0.652	0.786

Chapter 3.

Do Corporate Executives Matter for Stock Liquidity? Evidence from Legal Training

"*As leaders we need to be persuasive to many constituencies in communicating our strategic vision and describing the path where we will take our business. All of those requirements rely in no small part on skills I developed in law school and honed as a practicing lawyer*."- Jeff Smisek, CEO of Continental Airlines CEO, a Former Corporate Lawyer in Houston.

3.1. Introduction

Liquidity is an important aspect of financial markets and is thus an area of focus for researchers, investors, and regulators (Stiglitz, 1981; Sadka and Scherbina, 2007; Chordia, Roll, and Subrahmanyam, 2008; Goyenko, Holden, and Trzcinka, 2009; Næs, Skjeltorp, and Ødegaard, 2011).[39] Stock liquidity has strong implications for firm performance (Fang, Noe, and Tice, 2009), financing costs (Amihud and Mendelson, 1986), the level of corporate innovation (Fang, Tian, and Tice, 2014), accounting practice (Chen, Rhee, Veeraraghavan, and Zolotoy, 2015), payout policies (Jiang, Ma, Shi, 2017), and default risk (Brogaard, Li, and Xia,

[39] Stock liquidity generally refers to how quickly a significant quantity of a company's stocks can be bought or sold without substantially affecting its price (Holden, Jacobsen, and Subrahmanyam, 2014).

2017), and corporate tax decisions (Chen, Ge, Louis, Zolotoy, 2019). A large body of research documents various firm-level characteristics and macroeconomic factors driving stock market liquidity.[40] However, whether corporate managers, who involved in the "tone at the top," matter for secondary markets remains under-investigated. This association between corporate managers and a firm's stock liquidity is possible, given a growing literature in accounting and finance showing that managerial styles and behavior play significant roles in various corporate policies and outcomes.[41]

Motivated by the burgeoning legal literature that shows a growing proportion of executive lawyers in U.S. corporations (Kwak, To, and Suk, 2012; Hopkins, Maydew, and Venkatachalam, 2015; Morse, Wang, and Wu, 2016) and documents the strategic roles of executive lawyers in business development and risk management (Jagolinzer, Larcker, and Taylor, 2011; Heineman, 2012; Sorkin, 2012; Ham and Koharki, 2016), this chapter aims to fill the void in the literature by examining whether, and to what extent, the legal expertise of chief executive officers (CEOs) affects financial market quality.

Why managers' legal education should matter for their firms' behavior, in general, and for the liquidity of the secondary market, in particular? The legal education literature suggests that law classrooms provide special learning opportunities that other schools cannot provide, and the law school classroom experience has a lifelong effect on law learners. [42] Such legal

[40] See, for example, Grullon, Kanatas, and Weston (2004), Attig, Fong, Gadhoum, and Lang (2006), Chung, Elder, and Kim (2010), Kale and Loon (2011), Balakrishnan, Billings, and Kelly (2014), Marshall, Nguyen, Nguyen, and Visaltanachoti (2018), and Nagar, Schoenfeld, and Wellman (2019).

[41] To name a few, Bertrand and Schoar (2003), Malmedier and Tate (2005), Bamber, Jiang, and Wang (2010), Malmedier, Tate, and Yan (2011), Benmelech and Frydman (2015), Dittmar and Duchin (2016), Schoar and Zou (2017), and Bernile, Bhagwat, and Rau (2017).

[42] See, for example, "*Minds are trained here, trained for complex thinking, not for repetitive functionary tasks. The law classroom is not like the college classroom where one typically read, absorbed, and regurgitated facts*

training and experience are therefore likely to shape the managerial styles and behavior of law graduates when they become managers later on.[43] Managers' legal expertise should particularly matter for investors' trading decisions, for two reasons. First, corporate disclosure quality is among the most important factors driving investors' trading decisions. Specifically, investors tend to invest more in firms with high financial disclosure quality (Healy, Hutton, and Palepu, 1999; Bushee and Noe, 2000; Lawrence, 2013). One of the most important features of a sound legal education is to train students to "think like a lawyer" (Mudd, 1983), which means

> In the first instance, thinking with care and precision, reading and speaking with attention to nuance and detail. It means paying attention to language, but also understanding that words can have myriad meanings and can often be manipulated. It thus also means paying attention to context and contingency. (Slaughter, 2002, p. 1)

These unique skills and experience acquired from law school classrooms are likely to impact the quality of corporate disclosures and hence investment decisions since many firms' disclosure decisions are made by their top management (Kwan et al., 2012).

Second, investors and other firm' stakeholders often take corporate fraud and managerial misconducts into their investment decisions (Karpoff and Lott, 1993; Dechow, Sloan, and Sweeney, 1996; Lowry and Shu, 2002; Griffin, Grundfest, and Perino, 2004; Iqbal, Shetty, and Wang, 2007; Bradley, Cline, and Lian, 2014; Arena and Julio, 2015; Gibson, Sohn, Tanner, and Wagner, 2018).[44] A series of serious corporate malfeasances (e.g., WorldCom, Enron,

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or theories to justify class presence and give an overall impression of your awareness of the subject. What occurs in your first year's education is far less tangible than in other disciplines" (Brown, 1999, page 1137)

[43] "Legal education is about training people who, in many different ways, are future leaders in their society." See https://law.yale.edu/system/files/china-lawdocuments/point_of_order_why_legal_education_matters.pdf, accessed May 1, 2019.

[44] For example, a direct consequence of corporate misconduct is lower stock market participation (Yenkey, 2018). In addition, litigation risk is one of the main long-standing explanations of IPO underpricing (Ibbotson, 1975;

Xerox), followed by the subprime crisis and the Bernie Madoff scam, have betrayed investors' trust over recent decades, significantly affecting their investment decisions.[45] Prior research studying determinants of corporate misconduct suggests that personality traits of corporate managers play significant roles in their firms' likelihood of fraud risk (Dechow et al., 1996; Benmelech and Frydman, 2015; Davidson, Dey, and Smith, 2015; Hutton, Jiang, and Kumar, 2015; Liu, 2016; Banerjee, Humphery-Jenner, Nanda, and Tham, 2018; Adhikari, Agrawal, and Malm, 2019). Since executives with intensive legal training are sensitive to litigation risk, their legal training is likely to impact their firms' litigation risk profile and therefore affect firm outsiders' trading decisions.

Using a comprehensive sample of Standard & Poor's (S&P) 1500 firms over the period of 1992 to 2013, we find that around 8.5% of firms in our sample are run by CEOs with a law degree and that firms headed by lawyer CEOs have higher stock market liquidity than firms led by non-lawyer CEOs. The magnitude of this effect is economically significant, with firms led by lawyer CEOs, on average, having about 4.6% lower average annual bid-ask spreads compared to firms headed by non-lawyer CEOs. These results are robust to different specifications and controls such as firm characteristics, CEO characteristics as well as the year- and firm-fixed effects.

We pursue several identification strategies to make sure that our results are not driven by an omitted correlated variable bias. First, we control for firm-fixed effects in all regressions to account for time-invariant firm-specific omitted variables. Second, we address potential

Tinic, 1988; Drake and Vetsuypens, 1993; Lowry and Shu, 2002; Banerjee, Dai, and Shrestha, 2011; Ferris, Hao, and Liao, 2013).

[45] Trust underlies most financial transactions (Gurun, Stoffman, and Yonker, 2018) and lack of trust discourages investors investing in stocks (Guiso, Sapienza, and Zingales, 2008). From laboratory experiments, Gibson et al. (2018) suggest that a majority of surveyed investors choose to choose to invest in managerial honesty even if this implies lower promised returns

endogeneity concerns by tracing cases of CEO turnovers where we can identify the legal education changes between the new and old CEOs. We find that an appointment of a CEO with legal training increases firm liquidity and decreases liquidity costs, whereas, the opposite is true following an appointment of a CEO without legal background compared to their predecessors. In addition, we consider several alternative explanations and find that lawyer CEOs have an influence on stock liquidity independent of the effect of CEO ability, CEO network centrality, or corporate governance.

We further examine the mechanism through which the legal expertise of the CEOs affects the stock liquidity of the firms that they manage. Kale and Loon (2011) show that lower volatility of cash flows and returns, as driven by greater market power, leads to better stock liquidity. Lang, Lin, and Maffett (2012) document greater liquidity for firms with greater transparency. Our results suggest that firms led by lawyer CEOs have lower return volatility (lower firm risk) and better financial report comparability (higher transparency). Since firm risk and transparency are important factors in determining a stock's liquidity (Glosten and Milgrom, 1985; Kyle, 1985; Diamond and Verrecchia, 1991; Healy and Palepu, 2001; Attig et al., 2006; Kale and Loon, 2011; Ravi and Hong, 2014), our results suggest that lawyer CEO have an impact on stock liquidity through their influences on firm risks and information transparency.

Next, we find that firms headed by CEOs with legal expertise are associated with less stock price delay and weaker market reactions to earnings announcements. We further examine the effect of lawyer CEOs on the profitability of insider trading. If legal expertise of the executives shapes the way their firms commit to transparency and legally compliant behavior, firm insiders are likely to take that into account when considering using private information for their informed trading. We find that firms led by CEOs with legal expertise tend to earn fewer

insider profits, confirming the important roles of executive's legal training in reducing information asymmetry, which in turn, contributes to lower liquidity costs.

Our paper contributes to two main strands of literature. First, this paper contributes to a recently evolving line of research investigating the effect of managerial styles and behavior on various corporate policies and outcomes. This paper, to our knowledge, is among the first to highlight the importance of executives' characteristics in their firms' liquidity costs. Our paper is related to a contemporaneous paper of Egginton and McCumber (2019) which suggests that managers' network centrality matters for stock liquidity. We find that CEO legal expertise is an important liquidity factor, incremental to firm fundamentals and managers' network.

Second, this paper contributes to a growing strand of literature that studies the drivers of stock liquidity. My paper suggests that the CEOs' personal traits play a significant role, incremental to firm-specific characteristics, in understanding the liquidity costs of the firms that they manage. My findings are aligned with Gibson, Sohn, Tanner, and Wagner (2018) who conduct laboratory experiments and find that a majority of surveyed investors consider managerial characteristics when making investment decisions, even if this implies lower promised returns.

The remainder of this chapter proceeds as follows. Section 3.2 discusses the related literature. Section 3.3 describes the data collection and our sample. Section 3.4 discusses our baseline regression findings and empirical analyses that address endogeneity issues. In Sections 3.5, we discuss the economic mechanisms through which lawyer CEOs affect stock liquidity. We provide additional analyses and robustness checks in Section 3.6. Section 3.7 concludes this chapter.

3.2. Related literature

In this section, we discuss the related literature. We start by briefly discussing the determinants of stock market liquidity documented in prior studies. We then discuss our prediction of the possible relation between Lawyer CEO and stock liquidity.

There is an extant literature documenting that stock market liquidity can be driven by various firm-level characteristics, such as firm size (Harris, 1994, Chae, 2005), R&D intensity, advertising expenditure (Grullon, Kanatas, and Weston, 2004; Kale and Loon, 2011), leverage ratio, analyst coverage (Roulstone, 2003; Balakrishnan et al., 2014), institutional ownership (Rubin, 2007), price inverse, trading volume, and corporate governance (Chung et al., 2010). Recent studies find that macroeconomic conditions also matter for liquidity costs. Specifically, liquidity tends to be lower in economic downturns (Naes, Skjeltorp, Ødegaard, 2011) and during periods with high uncertainty regarding government economic policy (Marshall, Nguyen, Nguyen, and Visaltanachoti, 2018; Nagar, Schoenfeld, Wellman, 2019).

A growing literature in economics and finance suggest that corporate executives who have "tone at the top" play significant roles in various corporate policies and outcomes. For instance, corporate executives' personal traits can explain a considerable proportion of corporate investment and financing decisions (Bertrand and Schoar, 2003; Malmedier and Tate, 2005, Malmedier, Tate, and Yan, 2011; Galasso and Simcoe, 2011; Hirshleifer, Low, and Teoh, 2012; Kaplan, Klebanov, and Sorensen, 2012; Graham, Harvey, and Puri, 2013; Dittmar and Duchin, 2016; Sunder, Sunder, and Zhang, 2017; Schoar and Zou, 2017), merger and acquisition decisions (Malmendier and Tate, 2008; Bernile, Bhagwat, and Rau, 2017), corporate disclosure and financial report quality (Bamber, Jiang, and Wang, 2010; Wang, 2010; Lewis, Walls, and Dowell, 2014; Jia, Lent, and Zeng, 2014; Davidson, Dey, and Smith, 2015; Hilary, Huang, and Xu, 2017), financial misconduct (Benmelech and Frydman, 2015; Biggerstaff, Cicero, and

Puckett, 2015; Koch-Bayram and Wernicke, 2018), or tax decisions (Dyreng, Hanlon, and Maydew, 2010; Demerjian, Lev, Lewis, and McVay, 2012; Chyz, 2013; Gaertner, 2014; Olsen and Stekelberg, 2015; Koester, Shevlin, and Wangerin, 2016; Law and Mills, 2017). Recent studies document a new characteristic, namely executive's legal expertise, and suggest that executive lawyers account for a considerable proportion in the U.S. corporations (Kwak, To, and Suk, 2012; Hopkins, Maydew, and Venkatachalam, 2015; Morse, Wang, Wu, 2016) and play strategic roles in business development and risk management (Jagolinzer, Larcker, and Taylor, 2011; Heineman, 2012; Sorkin, 2012; Ham and Koharki, 2016).

Motivated by these strands of literature, our study examines whether the executive's legal expertise affects their firms' stock liquidity. Our paper is related to Egginton and McCumber (2019) which finds that managers' network centrality matters for stock liquidity.

Prior studies suggest that corporate transparency and risk-taking are important factors in determining a stock's liquidity. Specifically, firms that have a poor information environment are associated with wider bid-ask spreads or lower stock liquidity (Glosten and Milgrom, 1985; Healy and Palepu, 2001; Brockman and Chung, 2003; Attig et al., 2006; Chung et al., 2010; Lang, Lin, and Maffett, 2012; Ravi and Hong, 2014). In addition, as suggested by Peress (2010) and Kale and Loon (2011), the lower volatility of cash flows and stock return gives investors more precise information about the stock price and make the price less sensitive to order flow, and hence better stock liquidity. As executive lawyers play strategic roles in business development and risk management (Heineman, 2012; Sorkin, 2012) and are endowed with gatekeeping responsibilities (Jagolinzer, Larcker, and Taylor, 2011; Krishnan, Wen, and Zhao, 2011; Kwak, Ro, and Suk, 2012; Choudhary, Schloetzer, and Sturgess, 2013; Hopkins, Maydew, and Venkatachalam, 2015; Goh, Lee, and Ng, 2015; Jiang, Wintoki, and Xi, 2018), we argue that CEOs with legal expertise can affect stock liquidity through their influences on

firm risks and information transparency. We, therefore, predict a positive relation between CEO's legal training and stock market liquidity.

3.3. Data and variables

In this section, we present our data and sample selection. We first describe the sample. We then discuss our main measures for stock liquidity, lawyer CEOs, and control variables. Finally, we provide the descriptive statistics of the variables used in our study.

3.3.1. Data and the sample

We obtain information on stock prices, stock returns, and trading volumes from CRSP. Compustat is our source for firm-specific accounting data. We obtain data for the number of analysts following from the Institutional Brokers' Estimate System database and Institutional ownership data from Thomson Reuters Institutional (13F) holdings. To avoid the effects of outliers, we winsorize all continuous variables at the first and 99th percentiles. Following prior studies (e.g., Chung et al., 2010; Kale and Loon, 2011), we drop stocks with share prices of less than $5 at the end of the year.[46] Our final sample consists of 19,480 firm-year observations spanning 1992 – 2013. We provide a detailed description of the variables in Appendix 3A.

3.3.2. Measures of stock liquidity

In our empirical analysis, we employ two measures of liquidity. The first measure is based on the price impact ratio developed by Amihud (2002). Amihud is one of the best cost-

[46] Our main findings remain unchanged when we consider all common stocks with no price restriction or with annual share price of $1 or more.

per-dollar-volume proxies as suggested in Fond, Holden, and Trzcinka (2017). Amihud's price impact ratio of stock *i* in year *y* is defined as:

$$Amihud's\ ratio_{i,y} = T_y^{-1} \sum \frac{|r_{i,t,y}|}{vol_{i,t,y}}, \quad (1)$$

where *r* is the return and *vol* is the dollar volume of stock *i* on day *t* in year *y*. The summation is over *T*, the number of days in year *y* for which the ratio $\frac{|r_{i,t,y}|}{vol_{i,t,y}}$ is defined ($vol_{i,t,y} \neq 0$).

In our analysis, we multiply the value by 10^5. Smaller values of Amihud's ratio imply higher liquidity since a smaller value suggests that the stock price is less responsive to trades. We take the natural logarithm of Amihud's price impact ratio to normalize them. To avoid confusion, we multiply the logarithm of Amihud's price impact ratio by -1, such that higher values are associated with higher liquidity and vice versa. Thus, our first measure of liquidity is the inverse of the natural logarithm of Amihud's ratio (*INV_LN_AMIHUD*).

Our second measure of liquidity is based on the bid-ask spread. We estimate daily bid-ask spreads for each stock following the Corwin and Schultz (2012) method which uses daily high and low prices from CRSP to estimates a daily bid-ask spread, as follows:[47]

$$CSPREAD = \frac{2(e^{\alpha}-1)}{1+e^{\alpha}}, \quad (2)$$

where:

$$\alpha = \frac{\sqrt{2\beta}-\sqrt{\beta}}{3-2\sqrt{2}} - \sqrt{\frac{\gamma}{3-2\sqrt{2}}}, \quad \beta = \sum_{j=0}^{1}\left[\ln\left(\frac{H_{t+j}^{O}}{L_{t+j}^{O}}\right)\right]^2, \quad \gamma = \left[\ln\left(\frac{H_{t,t+1}^{O}}{L_{t,t+1}^{O}}\right)\right]^2,$$

where $H_{t,t+1}^{O}$ ($L_{t,t+1}^{O}$) are high and low prices over days *t* and *t* + 1.

[47] We thank Shane Corwin and Paul Schultz for making their code available on their website: https://www3.nd.edu/~scorwin/HILOW_Estimator_Sample_002.sas.

We estimate daily bid-ask spreads for all U.S.-based common stocks (SHRCD=10 or 11) trading on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the NASDAQ.[48] We then compute the annual quoted spread for each stock based on average daily quoted spread over a year (*CSPREAD*). As with Amihud's (2002) price impact ratio measure, we take the natural logarithm of *CSPREAD* for normalization and multiply it by -1 to ensure that larger values represent higher levels of liquidity and vice versa. Thus, our second measure of liquidity is the inverse of the natural logarithm of *CSPREAD* (*INV_LN_CSPREAD*).

We also use three other liquidity measures. First, we use the effective spread that is constructed from high-frequency data. It is often used as the benchmark measure and compared with illiquidity measures constructed using low-frequency data (Goyenko et al., 2009; Hasbrouck, 2009). The effective spread for each trade is defined as the ratio of the absolute value of the difference between the trade price and the midpoint of the bid-ask quote over the trade price. The daily relative effective spread for the stock is then computed as the trading volume-weighted average of the relative effective spread of all the trades during the day. We annualize the effective spread (*ESPREAD*) by calculating the average daily effective spread over a year. Consistent with the previous two measures of liquidity, we take the natural logarithm of *ESPREAD* and multiply it by -1. Thus, our third measure of liquidity is the inverse of the natural logarithm of *ESPREAD* (*INV_LN_ESPREAD*).

Our next measure of liquidity is based on the quoted spread. The quoted spread is the implicit trading cost for market orders when a trade occurs at the quoted price with no price improvement. We calculate the quoted spread of stock *i* for day *t*, as follows:

[48] We also conduct robustness checks based on NYSE stocks only and NYSE and AMEX stocks only and report results in Section 3.4.2.

$$Quoted\ spread_{i,t} = \frac{(Ask_{i,t} - Bid_{i,t})}{Mean_{i,t}}, \quad (3)$$

where, for day *t*, *Ask* is the closing asking price, *Bid* is the closing bid price, and *Mean* is the mean of the closing *Ask* and *Bid* prices. Our annual measure of stock liquidity is the average daily quoted spread over a year, *QSPREAD*. We then take the natural logarithm of *QSPREAD* for normalization and multiply it by -1 to ensure that larger values represent higher levels of liquidity and vice versa. We denote our quoted spread measure as *INV_LN_QSPREAD*.

Our final measure of liquidity is the bid-ask spread estimated following the Abdi and Ranaldo (2017) method which estimates the bid-ask spread when quote data are not available.[49] As suggested by Abdi and Ranaldo (2017), their approach provides the highest cross-sectional and average time-series correlations with the effective spread benchmark and delivers the most accurate estimates for less liquid stocks.

3.3.3. Measure of Lawyer CEOs

We obtain a full list of ExecuComp of Standard & Poor's 1500 firms and their CEOs for the period of 1992–2013. We hand-collect information on the personal characteristics and educational background of the executives from *Marquis Who's Who* and *BoardEx*, which are two of the most comprehensive databases with CEOs' personal biographical details.[50] We classify a manager as a lawyer CEO, with *LAWYER_CEO* dummy equal to 1 if the CEO has a law degree ("LLB," "BCL," "LLM," "LLD," and "JD") or if the CEO has a Ph.D. in Jurisprudence.

[49] We thank Angelo Ranaldo and Farshid Abdi for making their code available at their website: http://www.farshidabdi.net/data/index.html

[50] Others who use personal biographical information from *Marquis Who's Who* to construct their key variables include, for example, Bernile et al. (2017), Benmelech and Frydman (2015), Cronqvist and Yu (2018), Duchin and Sosyura (2013), and Schoar and Zuo (2017).

To control for other known CEO characteristics, we hand-collect information on CEO's country of birth, educational qualifications, gender, year of birth, and various other personal biographical details from *Marquis Who's Who* and BoardEx databases. Specifically, from a full list of firms and their CEOs from Execucomp, we manually search CEO names in the *Marquis Who's Who* and *BoardEx* databases to find their biographies. We also access several other databases, including *Notable Name Database* (*NNDB.com), Reference for Business, Bloomberg.com, Wikipedia*, or *Google* searches in the last instance, to cross-check the information for each CEO characteristic obtained from *Marquis Who's Who*. This process allows us to compile a comprehensive and fine-grained data set of several CEO attributes. We also compute CEO risk incentives measured by the natural logarithm of *DELTA* and *VEGA* from compensation contract data following the methodology in Core and Guay (2002). Finally, following Campbell et al. (2011), Hirshleifer, Low, and Teoh (2012), and Kim, Wang, and Zhang (2016), we construct the modified Malmendier and Tate (2005) option-based measure of CEO overconfidence and define a CEO as overconfident if the CEO holds options that are more than 67% in the money at least twice during the sample period. The variable *HOLDER_67* is a dummy variable that takes the value of one for such a CEO and zero otherwise.

3.3.4. Firm-level control variables

We include a number of firm-specific control variables that account for the heterogeneity in the level of information asymmetry between firms, as well as other observable factors that might influence a firm's stock liquidity. We control for firm size since larger firms could simultaneously exhibit higher investor interest and lower spreads because of less adverse selection risk.[51] Similarly, tangible assets' payoffs are easier to observe and, therefore, can

[51] Harris (1994) and Chae (2005) use firm size as a proxy for the degree of public information available about the stock.

reduce asymmetric information problems. Furthermore, high R&D and advertising expenditure expenses could increase asymmetric information problems (Grullon, Kanatas, and Weston, 2004; Kale and Loon, 2011). Therefore, we include the natural logarithm of assets (*LOGASSET*), asset tangibility (*TANGIBILITY*), R&D intensity (*R&D*), advertising intensity (*ADVERTISING*), and the debt ratio (*LEVERAGE*) as control variables. We also control for the natural logarithm of the number of analysts (*ANALYST)* following the company, since firms that are widely followed by analysts have lower spreads due to higher trading activity (Roulstone, 2003; Balakrishnan et al., 2014). Moreover, we control for institutional ownership, measured as the percentage of shares held by 13-F institutions (*INST_OWN*), as institutional investors play significant roles in gathering information and reducing adverse selection costs to market makers (Rubin, 2007).

Prior research shows that a significant portion of cross-sectional and time series variation in spreads can be explained by stock characteristics such as share price and return volatility. According to Harris (1994), the inverse of the stock price captures a large portion of the variation in tick size-induced binding constraints on spreads, especially when spreads are measured in relative terms. We, therefore, include *PRICE_INVERSE* and *IDIOVOL* as additional control variables in our regressions. We include *DOLVOL* (in millions) to control for trading volume (Chung et al., 2010) as our final control variable.

3.3.5. Descriptive statistics

Panel A of Table 3.1 presents the descriptive statistics for the variables. For each variable, we provide information about the total number of observations, the mean and median values, the standard deviation, and the values at the 25th and 75th percentiles.

[Insert Table 3.1 about here]

The proportion of CEOs with legal degrees in our sample accounts for 8.5% of the total number of companies. Approximately 11% of the CEOs have an MBA degree, about 2% have a Ph.D. and about 7% of the CEOs graduated from prestigious universities (Ivy League). The proportions of foreign CEOs and female CEOs are rather small (both around 2%). A typical CEO in our sample has about seven years of experience. These statistics are consistent with those reported by Benmelech and Frydman (2015), Law and Mills (2017), and Pan, Wang, and Weisbach (2018). In terms of risk incentives, the mean values of the logarithms of the CEOs' *Delta* and *Vega* are 5.486 and 3.930, respectively, which is consistent with prior studies (e.g., Billings, Gao, and Jia, 2014; Chen, Gul, Veeraraghavan, and Zolotoy, 2015).

Regarding firm characteristics, the average firm in our sample has the logarithm of firm size (*LOGASSETS*) of 7.198, a leverage ratio of 0.171, a ratio of tangible assets to total assets of 0.481, a ratio of R&D to total assets of 3.3%, an institutional ownership of about 68%, and a ratio of advertising expenses to total assets of 1%. Our liquidity measures and firm characteristics are in line with prior studies (Chung et al., 2010; Kale and Loon, 2011; Atawnah Balachandran, Duong, and Podolski, 2018).

We compare the characteristics of firms with and without lawyer CEOs in Panel B of Table 3.1. We find that firms run by lawyer CEOs tend to be larger and have higher leverage and lower R&D expense. We also find that the stock liquidity of firms led by lawyer CEOs are significantly higher than those of firms led by non-lawyer CEOs.

3.4. Main results

In this section, we examine the relation between Lawyer CEOs and stock liquidity. We start our analysis by presenting the baseline regression results. We further present several

robustness checks based on alternative model specifications, alternative measures of stock liquidity and controlling for CEO characteristics.

3.4.1. Baseline regression results

In this subsection, we provide the baseline OLS regression results. For each liquidity measure (*INV_LN_AMIHUD* and *INV_LN_CSPREAD)*, we present two regression specifications, one without any firm-specific control variables and one with firm-specific control variables. In all regression models, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with stock liquidity. We also lag all independent variables by one year relative to the liquidity measures to avoid potential reverse causality issues.

[Insert Table 3.2 about here]

We present the baseline regression results in Table 3.2. We find that the estimated coefficient for the variable *LAWYER_CEO* is positive and significantly related to all measures of stock market illiquidity. This finding implies that firms headed by lawyer CEOs have higher stock market liquidity than firms led by non-lawyer CEOs. The magnitude of this effect is economically significant, with firms led by lawyer CEOs, on average, having about 4.6% lowers average annual bid-ask spreads compared to firms headed by non-lawyer CEOs. Regarding control variables, we observe that liquidity is higher for larger firms and firms with higher price while stock liquidity is lower for firms with higher leverage. These findings are consistent with prior studies on the determinants of stock market liquidity (see, among others, Chung et al., 2010; Kale and Loon, 2011; Attawnah et al., 2018).

3.4.2. Sensitivity Analysis

We supplement the baseline regression results from Table 3.2 with various robustness tests to ensure that our results are not sensitive to specific model specifications, particular

measures of liquidity or sample selections. Specifically, we consider alternative model specifications in Panel A of Table 3.3. In Model (1), we use two-way cluster-robust standard errors, clustered by firm and year, to correct for cross-sectional and time-series dependence (Petersen, 2009; Gow, Ormazabal, and Taylor, 2010). In Model (2), we perform the baseline regression using the Fama-Macbeth cross-sectional regression with Newey-West adjusted t-statistics. In Model (3), to circumvent the effect of outliers, we use the median regression with robust standard error.

In Panel B of Table 3.3, we consider three alternative measures of stock liquidity to ensure that our results are specific to the choice of the bid-ask spread and the Amihud illiquidity as our main liquidity measures. In Models (4) – (6), we use effected spread, quoted spread, and the bid-ask spread estimated using the closing price as alternative liquidity measures (Goyenko et al., 2009; Hasbrouck, 2009; Abdi and Ranaldo, 2017).

We consider additional control variables in Panel C. In Model (7), we perform the baseline regression model with additional control for corporate governance (*GINDEX*, Gompers et al., 2003) given Chung et al.'s (2010) findings that corporate governance has a positive effect on stock liquidity. In Models (8) and (9), we further control for the business cycle and economic policy uncertainty given that liquidity tends to be lower in economic downturns (Naes, Skjeltorp, Ødegaard, 2011) and during periods with high uncertainty regarding government economic policy (Marshall, Nguyen, Nguyen, and Visaltanachoti, 2018; Nagar, Schoenfeld, Wellman, 2019).[52,53] In Model (9), we control for product market competition as stock liquidity increases with market power (Peress, 2010; Kale and Loon,

[52] We thank Nicholas Bloom and Scott Baker for making their EPU index available at https://nbloom.people.stanford.edu/research.

[53] We source business cycle data from NBER.

2011).[54] In Model (11), we control for CEO network centrality as Egginton and McCumber (2019) find it matters for stock liquidity. Finally, in Model 12, we include all additional control variables (Models 7 – 11) in our regression. The coefficient of *LAWYER_CEO* remains positive and statistically significant.

In Panel D of Table 3.3, we perform a robustness check where we exclude the firm-year observations during the financial crisis period (2007-2008) (Model 13). We further remove stocks that are not a member of the S&P500 index (Model 14) or include only stocks traded in NYSE (Model 15) to ensure that our results are nor driven by small and illiquid stocks[55] or institutional features of stock exchanges.[56] Finally, one may expect that the documented effect of CEOs' legal expertise on their firms' stock liquidity is mainly driven by a subset of firms with extremely high litigation risk. This concern stems from the possibility that managers with legal training tend to be sensitive to litigation risk arising from corporate misreporting. To ensure that our results are not subject to sample selection bias, we rerun the baseline equations after excluding firms with high litigation risk. We define firms having high litigation risk if these firms belong to the top quintile litigation risk measure estimated following Kim and Skinner (2012). We report the result of this test in Model (16). Overall, the results from additional tests suggest that the effect of CEO legal expertise on stock liquidity is robust across various model specifications and sampling methods.

[54] Following Gaspar and Massa (2006), Peress (2010), and Kale and Loon (2011), we use the Lerner index to capture product market threats. Specifically, we measure *Lerner index* as the ratio of operating profit to sales, where operating profit is sales less cost of goods sold, along with selling, general and administrative expenses. A low (high) Lerner index indicates relatively low (high) market competition.

[55] Schoenfeld (2017) finds that when a firm joins the S&P 500 index, voluntary disclosure increases with the level of ownership assumed by index funds, and this increase in disclosure is associated with increased stock liquidity.

[56] Gao and Ritter (2010) suggest that researchers should take into account the institutional features as the way volume is reported on NASDAQ is not similar to that on NYSE and AMEX.

[Insert Table 3.3 about here]

3.4.3. Identification Strategy

While we find a robust positive relation between CEO legal training and stock liquidity, our findings could suffer from an omitted correlated variable bias. Specifically, firms could endogenously appoint lawyer CEOs based on certain firm characteristics. At the same time, these characteristics could influence stock liquidity. Even though we control for various firm characteristics in our baseline regression model, there could be other unobservable factors for which we fail to control. In the discussion that follows, we make several attempts to alleviate this concern.

First, we control for firm-fixed effects in all regressions to account for time-invariant firm-specific omitted variables. *Second*, to mitigate a concern that some industries are more likely to recruit CEOs with a legal background and the effect of Lawyer CEO on stock liquidity are concentrated on certain industries, we use the industry-adjusted liquidity measures that account for potential industry-specific omitted variables. Results, reported in Appendix Table A3.2, are consistent with previous findings. *Third,* we address potential endogeneity concerns by tracing cases of CEO turnovers where we can identify the legal education changes between the new and old CEOs. Specifically, to identify cases of significant change in the educational background between CEOs, we use a dummy variable *CEO_CHANGE*, which takes a value of one if the new CEO is from a non-Lawyer CEO to a Lawyer CEO or from a Lawyer CEO to a non-Lawyer CEO and zero otherwise. Firm-year observations with *CEO_CHANGE* equals one are considered treated firms. Each firm-year observation in the treated group is matched with a firm-year observation in the control group (*CEO_CHANGE* equals zero) using the nearest-neighbor propensity score matching procedure. The matched pair is obtained in the year before the CEO turnover takes place and is based on firm size, book-to-market ratio, and industry. We

use a dummy variable *POST*, which takes the value of one if year observation is in the three-year period after and zero in the three-year period before the turnover and zero otherwise.

To avoid potential noises from other corporate events, we only consider the period of three years before and three years after the turnover. We use the interaction term *CEO_CHANGE×POST*, which is the interaction between two dummy variables, *CEO_CHANGE* and *POST*, to capture the *Difference-in-Difference* effect of CEO legal background on stock liquidity. We rerun our baseline regression with the addition of the interaction term *CEO_CHANGE ×POST*.

[Insert Table 3.4 about here]

Table 3.4 reports the results of this CEO turnover analysis. In our sample, there are 99 cases where there are changes from non-lawyer CEOs to lawyer CEOs and 119 cases whether lawyer CEOs are replaced by non-lawyer CEOs. The coefficients on our variable of interest, *CEO_CHANGE×POST*, are significantly positive for cases where there are changes from non-lawyer CEOs to lawyer CEOs (columns (1) and (3)) and significantly negative for cases where lawyer CEOs are replaced by non-lawyer CEOs (columns (2) and (4)). The magnitude of this effect is also economically significant. In column (3), the coefficient of 0.098 on *CEO_CHANGE×POST* indicates that the firm's average annual bid-ask spread reduces by approximately 9.8% after a new CEO with legal training joins the firm. In column (4), the coefficient of -0.111 on *CEO_CHANGE×POST* indicates that firm's average annual bid-ask spread increases by approximately 11% when the new CEOs do not have legal background compared to their predecessors.

Overall, the turnover results indicate that an appointment of a CEO with legal training increases firm liquidity and decreases liquidity costs, whereas, the opposite is true following an appointment of a CEO without legal background compared to their predecessors. The

significant changes in stock liquidity in cases of CEO appointment help further address the concerns for endogeneity issues.

3.4.4. Propensity score matching

We further use propensity score matching, whereby we compare the liquidity costs of firms with lawyer CEOs and liquidity costs of matched firms with non-lawyer CEOs. Specifically, we obtain the propensity score using a logit regression, with all control variables as specified in the baseline regression in Table 3.2. We then perform nearest-neighbor matching within a caliper of 0.001 without replacement. We discuss the descriptive statistics of the control and treatment firms are reported in Panel A of Table 3.5. Column 3 of Panel A (Treatment – Control) shows no statistical difference between the characteristics of the treatment and control firms. Nevertheless, the average liquidity measures are higher for the treatment group relative to the control group.

In addition to documenting the average treatment effect, we perform a regression analysis on the reduced sample of matched control and treatment firms. Consistent with previous analyses, we report the results of estimating the baseline regression with year- and firm- fixed effects in Panel B of Table 3.5. The results continue to suggest a positive and significant coefficient for *LAWYER_CEO* with a relatively similar magnitude (0.098 vs. 0.136) compared to baseline results in Table 3.2. Taken together, the analyses presented in Table 5 highlight that my findings are not driven by systematic differences between firms with and without lawyer CEOs.

[Insert Table 3.5 about here]

3.5. Possible channels

Having established a positive relation between lawyer CEOs and stock liquidity of the firms that they manage, we now examine the underlying economic mechanisms for this relation. We argue that CEO legal training helps reduce liquidity costs because of its roles in enhancing the firm's information environment and reducing stock volatility. We examine these possible channels in the following discussions.

3.5.1. Firm disclosure channel

Executive lawyers are often endowed with gatekeeping responsibilities. A collective body of prior research shows significant effects of lawyers on the likelihood of compliance breaches of accounting and insider regulations.[57] Krishnan, Wen, and Zhao (2011), for example, suggest that the presence of directors with a legal background on the audit committee is associated with higher financial reporting quality. Jagolinzer et al. (2011) find that GCs reduce the extent of insider trading based on private knowledge and rent extraction. Kwak et al. (2012) find the presence of top management with legal expertise to be associated with more accurate management earnings forecast disclosures. In a recent study, Henderson et al. (2018) find that firms led by lawyer CEOs are associated with both lower litigation frequency and less severe litigation and tend to pursue conservative corporate policies. Executives and directors with legal expertise also tend to be more conservative in exploiting private information when making insider trades (Jiang, Wintoki, and Xi, 2018). Taken together, these studies suggest that CEOs with legal training tend to be associated with a more transparent corporate information environment.

[57] See, for example, Jagolinzer, Larcker, and Taylor (2011), Krishnan, Wen, and Zhao (2011), Kwak, Ro, and Suk (2012), Choudhary, Schloetzer, and Sturgess (2013), Hopkins, Maydew, and Venkatachalam (2015), Goh, Lee, and Ng (2015).

Previous studies have established that firms that have poor information environment are associated with wider bid-ask spreads or lower stock liquidity (Glosten and Milgrom, 1985; Healy and Palepu, 2001; Brockman and Chung, 2003; Attig et al., 2006; Chung et al., 2010; Lang, Lin, and Maffett, 2012; Ravi and Hong, 2014). As executives' legal training helps increase information transparency and hence reduces information asymmetry between the insiders and outside owners/liquidity providers, liquidity providers are therefore more likely to post smaller spreads for stocks of these companies, resulting in higher stock liquidity.

To investigate the information asymmetry channel, we employ two commonly-used proxies for information asymmetry, including 1) financial reporting opacity (*OPAQUE*), and 2) financial statement comparability (*COMPARABILITY*). Our first measure, *OPAQUE*, is the financial reporting opacity measure of Hutton, Marcus, and Tehraninan (2009). Following Hutton et al. (2009), Kim, Li, and Zhang (2011), and Kim and Zhang (2016), we measure *OPAQUE* as a three-year moving sum of absolute discretionary accruals, where discretionary accruals are estimated with the modified Jones (1991) model, following Dechow, Sloan, and Sweeney (1995).

Our second proxy for information asymmetry is financial report comparability.[58] Financial report comparability measures how closely a firm's financial reports follow its actual economic performance. De Franco et al (2011) find that higher financial statement comparability enriches firm's information environment by lowering the cost of acquiring information and increasing the overall quantity and quality of information about the firms. Financial report comparability is, therefore, negatively associated with the degree of information asymmetry.

[58] We thank Rodrigo Verdi for making the financial report comparability data available through his website http://mitmgmtfaculty.mit.edu/rverdi.

To test the effect of lawyer CEOs on corporate information environment, we present two regression specifications, with and without any firm-specific control variables. We control for firm size, asset tangibility, R&D intensity, and leverage ratio as these firm-level characteristics can affect asymmetric information problems (Grullon, Kanatas, and Weston, 2004; Kale and Loon, 2011). Following Rubin (2007), De Franco et al. (2011), and Balakrishnan et al. (2014), we further control for institutional ownership and analyst coverage as institutional investors and financial analysts play roles in reducing adverse selection costs and information asymmetry. In all regression models, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with corporate information environment.

We report the results of these tests in Panel A of Table 3.6. We find a statistically significant negative relation between CEO legal expertise and financial reporting opacity and a significantly positive relation between executive legal training and financial statement comparability. The results are consistent and support our conjecture that CEO legal training reduces firm information asymmetry, which results in lower liquidity costs.

[Insert Table 3.6 about here]

3.5.2. Return Volatility Channel

Another possible channel through which CEO legal training could influence stock liquidity is return and cash flow volatility. The law literature suggests that executives with legal training play strategic roles in business development and risk management (Heineman, 2012; Sorkin, 2012) and tend to pursue conservative corporate policies in investment and R&D expenditure (Henderson et al., 2018), which, in turn, leads to lower future cash flow volatility. As suggested by Peress (2010) and Kale and Loon (2011), the lower volatility of cash flows and stock return gives investors more precise information about the stock price and make the

price less sensitive to order flow. Firms with lower volatility, as a result, have lower price impact and therefore better stock liquidity. We conjecture that CEO legal training is associated with higher stock liquidity by reducing the volatility of cash flow and stock returns.

To test this conjecture, we use three different measures of volatility, including 1) idiosyncratic volatility estimated from Fama-French four-factor model, 2) stock return volatility (Brogaard, Li, and Xia, 2017), and 3) earnings volatility based on standard deviation of quarterly earnings over the previous four years (Graham, Li, and Qiu, 2008; Hasan, Hoi, Wu, and Zhang, 2014). Consistent with the prior channel, we present two regression specifications, with and without any firm-specific control variables. In all regression models, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with corporate information environment.

We report the results of this test in Panel B of Table 3.6. The coefficients on our variable of interest, *LAWYER_CEO*, are negative and statistically significant across different model specifications, suggesting that executive legal expertise tends to be associated with lower volatility of cash flows and stock returns. The results are consistent with our prediction that CEO legal training is associated with higher stock liquidity by reducing stock return volatility and earnings volatility.

Overall, Table 3.6's results suggest the changes in executive legal training, at least in part, can be explained by whether firms headed by lawyer CEOs have lower information asymmetry and/or whether lawyer CEOs reduce both cash flow and return volatility compared to their predecessors, from a stock liquidity point of view.

3.6. Further Analyses

In this section, we consider several additional analyses. First, we examine the effect of lawyer CEOs on stock liquidity after controlling for a set of other CEO characteristics that have been well-documented in the literature. We then discuss possible alternative explanations. Next, we study the effect of lawyer CEOs on stock price efficiency and on market reactions to corporate earnings announcements. Finally, we further examine the effect of lawyer CEOs on the profitability of insider trading. We discuss these analyses in detail below.

3.6.1. Other CEO characteristics

A large body of finance and economic literature investigates several attributes of corporate executives that shape their managerial styles or affect the information environment of the firms they manage. Aier, Comprix, Gunlock, and Lee (2005), for example, show that financial expertise and educational background of executives are related to the likelihood of accounting restatements. Malmendier and Tate (2005) show that managerial overconfidence can account for corporate investment distortions. Cronqvist, Makhija, and Yonker (2012) find a consistent and positive correlation between corporate level and CEO personal leverage. Pan, Wang, and Weisbach (2015) document a decline of return volatility over CEO tenure.

To ensure that our results are not driven by other CEO characteristics, we consider controlling for various CEO characteristics such as experience, skills, educational background and their risk incentives from the compensation contracts. Specifically, we modify our baseline regression by including *GENERAL*, *MBA*, *PHD*, *IVY_EDUC*, *FINTECH_EDUC*, *DEPRESSED_BABY*, *DELTA* and *VEGA*, *FEMALE*, *CEO_AGE*, and *TENURE*.

In our setting, *MBA* and *PHD* are dummy variables that take values of one if the CEO holds an MBA degree or a Ph.D. degree and zero otherwise. *IVY_EDUC* is a dummy variable that takes a value of one if the CEO attended one of the Ivy-League institutions and zero

otherwise.[59] *FOREIGN_CEO* is a dummy that takes values of one if the CEO is foreign-born. *DELTA* (*VEGA)* is the natural logarithm of one plus the dollar change in wealth associated with a 1% change in the firm's stock price (the standard deviation of the firm's returns) (Coles, Daniel, and Naveen, 2006; Core and Guay, 2002). *TENURE* and *MALE_CEO* refer to CEO tenure and gender. *GENERAL* refers to the general managerial skills of the CEOs over their executive lifetime work experience, estimated following Custódio, Ferreira, and Matos (2013). Following Campbell et al. (2011), Hirshleifer, Low, and Teoh (2012), and Kim, Wang, and Zhang (2016), we construct the modified Malmendier and Tate (2005) option-based measure of CEO overconfidence and define a CEO as overconfident if the CEO holds options that are more than 67% in the money at least twice during the sample period. The variable *HOLDER_67* is a dummy variable that takes the value of one for such a CEO and zero otherwise. Depending on the availability of data for each control variable, these analyses have sample sizes varying between 16,917 firm-year observations to 19,480 firm-year observations.

[Insert Table 3.7 about here]

We report regression results controlling for various CEO characteristics in Table 3.7. In each model of Table 3.7 (Models 1 to 10), we augment our baseline model with each of the above additional CEO characteristics. In Model 11, we include all additional CEO characteristics in our regression. Regression results from Panel A and Panel B show that the sign and statistical significance of coefficient estimates on *LAWYER_CEO r*emain unchanged after controlling for each (or all) of the above-mentioned CEO characteristic variables. Taken together, these findings suggest that the effect of CEO legal training on stock liquidity is not confounded by any of the above CEO characteristics.

[59] The Ivy institutions include Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, the University of Pennsylvania, Princeton University, and Yale University.

3.6.2. Alternative explanations

CEO ability

One possible concern about our *LAWYER_CEO* variable is that it simply captures CEO ability and firms led by CEOs with higher ability may perform better from a stock liquidity point of view. Results from Table 3.6 seem to provide some evidence to this argument. The coefficient on *IVY_EDUC* and *GENERAL_SKILLS* are positive and significant, suggesting that CEOs with higher general managerial skills over their executive life work experience are associated with higher stock liquidity. While we, in Table 3.7, already control for CEO's managerial skills and other educational background and still document a statistically and economically effect of CEO legal expertise and stock liquidity, it is possible that the *LAWYER_CEO* can still pick up certain aspects of a CEO's ability that are not manifested in educational record or work experience. To rule out the possibility that the effect of Lawyer CEO on stock liquidity operates only through the effect of executive ability on stock liquidity, we conduct the following test. First, we regress stock liquidity on several measures of CEO ability (including four other educational backgrounds and work experience: *IVY_EDUC, MBA, PHD,* and *GENERAL_SKILLS*) and obtain the residuals from the regression. The residuals from this regression reflect the proportion of stock liquidity not explained by CEO ability. We then use these residuals as proportions of stock liquidity not explained by CEO ability, regress them on the main independent variable of interest, *LAWYER_CEO,* and other control variables as in the baseline models in Table 3.2. We report the findings of this test in Panel A of Table 3.8. We find that the effect of *LAWYER_CEO* on the proportion of stock liquidity not explained by CEO ability still positive and statistically (and economically) significant. This finding shows that lawyer CEOs have an influence on stock liquidity independent of the effect of CEO ability.

CEO Network

Several studies document that social networks of executives affect various corporate outcomes (e.g., Hwang and Kim, 2009; Engelberg, Gao, and Parsons, 2012; Fracassi and Tate, 2012; Ishii and Xuan, 2014; El-Khatib, Fogel, and Jandik, 2015; Karolyi, 2018; Fogel, Jandik, and McCumber, 2018) and market outcomes (e.g., Hochberg, Ljungqvist, and Lu, 2007; Cohen, Frazzini, and Malloy, 2008; Kuhnen, 2009; Griffin, Shu, and Topaloglu, 2012). Network centrality also plays roles in mitigating the ability of managers to misinform market participants (Fogel, Jandik, and McCumber, 2018) and lowering the incentive to distort information if network effects insulate managers from disciplinary turnover (El-Khatib, Fogel, and Jandik, 2015). In a related paper, Egginton and McCumber (2018) suggest that improved stock liquidity can be attributed to efficient information flows afforded by executive network position. Schoolmates are obviously parts of CEO networks (in our case, schoolmates at law schools), and one may concern that the CEO legal training simply captures CEO network and the improved stock liquidity is solely driven by CEO network centrality.

To address this concern, we conduct the following tests.[60] First, in one of our robustness checks in Table 3.3, after controlling for executive network centrality, the coefficients of *LAWYER_CEO* in this regression (Model 11) are 0.074 (for Amihud measure) and 0.057 (for bid-ask measure), whereas, the coefficients of *LAWYER_CEO* in our full baseline model (Models 3 and 6 in Table 3.2) are 0.086 (for Amihud) and 0.046 (for bid-ask spread). This result indicates that the effect of *LAWYER_CEO* on stock liquidity is independent of network centrality, both quantitatively and qualitatively.

Second, if the effect of *LAWYER_CEO* on stock liquidity operate solely through the effect of CEO network on stock liquidity, we expect the coefficient of *LAWYER_CEO* to be

[60] We thank Jared Egginton and William McCumber for providing their network centrality data that allows us to conduct this test.

insignificant once we remove the proportion of stock liquidity explained by executive network centrality. Using a similar approach as in the previous section, we find it is not the case.[61] In Panel B of Table 3.8, we find that the effect of *LAWYER_CEO* on the proportion of stock liquidity not explained by the executive network is still statistically positive and economically significant. The findings confirm that *LAWYER_CEO* have an influence on stock liquidity independent of the effect of network centrality.

Corporate Governance

The importance of corporate governance for corporate information environment and risk-taking has been intensively documented in the literature (e.g., Diamond, and Verrecchia. 1991; Schleifer and Vishny, 1997; Hefline and Shaw, 2000; Perotti, and Thadden, 2003; O'Neill and Swisher, 2003; John et al., 2008; Laeven and Levine, 2009; Acharya et al., 2011; Armstrong et al., 2012). In the context of stock liquidity, Chung et al. (2010) find that firms with better corporate governance have higher stock liquidity. A potential concern is that our findings of the effect of lawyer CEO on stock liquidity could be driven by the strength of the firm's corporate governance. While we already control for corporate governance in one of the robustness checks (Model 7 in Table 3.3), it does not rule out the possibility that lawyer CEOs affect stock liquidity only through their effect on corporate governance. We address this concern using a consistent approach to the previous sections. Specifically, we first regress stock liquidity on a corporate governance measure, namely the *G-INDEX* by Gompers et al. (2003) and obtain the residuals. The residuals from these regressions reflect the proportion of stock

[61] Specifically, we regress stock liquidity on CEO network centrality measure and obtain the residuals from the regression. The residuals from this regression reflect the proportion of stock liquidity not explained by executive network. We then use regress these residuals on our main independent variable of interest, *LAWYER_CEO*, and other control variables as in the baseline models in Table 3.2. We report results for this test in Panel B of Table 3.8.

liquidity not explained by governance. We then regress these residuals on *MILITARY* in the baseline model and report the findings of these tests in Panel C of Table 3.8. We find that the effect of *LAWYER_CEO* on the proportion of stock liquidity not explained by governance remains positive and significant. These findings further confirm that lawyer CEOs have an influence on stock liquidity independent of the effect of governance.

[Insert Table 3.8 about here]

CEO long-term effect

There could several circumstances that affect the performance of CEOs during their first few years of their tenure. To make sure that our findings are not driven by firm's existing policies or temporary transition period when a new CEO is appointed, we rerun our baseline after excluding the first two years of tenure to capture the more representative long-run effect of lawyer CEOs. The results reported in Appendix A3.2 remain quantitatively similar to our baseline results.

3.6.3. Lawyer CEOs, Stock Price Efficiency, and Market Reactions to Earnings Announcements

While documenting an association between managerial characteristics and secondary market liquidity is a novel contribution, it is also important to understand whether, and to what extent, CEO legal training is associated with stock price efficiency. This association is intuitive, since Subrahmanyam and Titman (2001) suggest that higher liquidity enhances the informational efficiency of stock prices. We further consider the effect of CEO legal training on market reactions to corporate earnings announcements, one of the most important channels of communication between firms and their outside stakeholders.

To capture price efficiency, we use a price delay measure proposed by Hou and Moskowitz (2005), which captures the average delay with the stock price movements in response to information.[62] Price delay (*PRICE_DELAY*) is defined as 1- (R-squared for restricted model / R-squared of non-restricted model). The non-restricted model is specified as follows:

$$r_{i,t} = \alpha_i + \beta_i R_{m,t} + \sum_{n=1}^{4} \delta_i^{(-n)} R_{m,t-n} + \varepsilon_{i,t} \quad (4)$$

where $r_{i,t}$ is the return on stock *i* in week *t* and $R_{m,t}$ is the return on the CRSP value-weighted market index in week *t*. The higher the value of *PRICE_DELAY*, the less the stock price efficiency. To account for variations in stock price efficiency across industries, I also consider an industry-adjusted measure of price delay, *IND_PRICE_DELAY*, as the difference between a firm price delay and an average price delay of the industry that this firm belongs to.

To capture the market reactions to corporate earnings announcement, we use cumulative abnormal returns during the five-day period surround earnings announcement dates, *CAR (-2, +2)*, following Brown and Warner (1985). We source earnings announcement dates from Compustat. The choice of a 5-day window surrounding earnings announcements enables us to capture stock returns as contemporaneous responses to earnings information, pre-announcement leakage, or a post-announcement delayed price response, if there is any.[63] We

[62] The price delay measure (commonly known as price synchronicity) has been intensively employed in the market microstructure literature. See, for example, Saffi and Sigurdsson (2010), Griffin, Kelly, and Nardari (2010), Boehmer and Wu (2012), and Brogaard et al. (2017)

[63] Previous works have found that earnings announcement dates are sometimes off by a day or more (e.g., DellaVigna and Pollet, 2009; DeHaan et al., 2015). In untabulated results, we find that our main findings are robust to the choices of earnings announcements window. Specifically, our results remain qualitatively unchanged when we use CAR (-1, +1) or CAR (-3, +3) to capture market reactions to earnings announcements.

also consider the absolute value of CAR, denoted as *ABS_CAR*, to account for both favorable and unfavorable announcements.

As higher stock liquidity enhances the informational efficiency of stock price (Subrahmanyam and Titman, 2001), we conjecture that firms led by lawyer CEOs are associated with higher stock price efficiency. We also predict that the market is less surprised by earnings announcements of firms headed by CEOs with legal expertise given the roles of lawyer CEOs in enhancing corporate transparency. We test these conjectures, we present two regression specifications, with and without firm-specific control variables. We include all control variables as in the baseline models. In all models, we also control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with corporate information environment. Following earnings announcements literature, to test the relation between lawyer CEOs and market reactions to earnings announcements, we further control for standardized unexpected earnings (*SUE*) and an indicator for the firm's fiscal fourth quarter. Following Livnat and Mendenhall (2006), we compute *SUE* as seasonally adjusted quarterly earnings per share divided by the share price at the end of the quarter to control for post-earnings announcement drift (Bernard and Thomas, 1989, 1990).

We report the results of these tests in Table 3.9. In Panel A, the coefficients on Lawyer CEO are negative and statistically significant across different model specifications, suggesting that firms headed by CEOs with legal training are associated with higher stock price efficiency. In Panel B, we find a significantly negative relation between *CAR(-2,+2)* and lawyer CEOs, which is consistent with our prediction that the market tends to be less surprised by earnings announcements of firms headed by CEOs with legal expertise.

[Insert Table 3.9 about here]

3.6.4. Lawyer CEOs and Profitability of Insider Trading

Our results thus far have shown that CEOs with legal training are associated with more transparent information environment and less volatile stock returns, which result in higher stock liquidity. If legal expertise of the executives shapes the way their firms commit to transparency and legally compliant behavior, it is more likely that firms' stakeholders will take that into account when they consider using private information for their informed trading. We, therefore, conjecture that insiders of firms led by lawyer CEOs tend are less likely to engage in their use of private information and thus earn lower returns on their insider trading. [64]

To test this possibility, we consider the profitability of insider trading. We obtain insider transaction data from 2IQ Global Insider database, which contain information about each insider transaction of corporate insiders. Following prior studies (e.g., Jagolinzer et al., 2011; Cohen, Malloy, Pomorski, 2012; Dai, Parwada, and Zhang, 2015; Ali and Hirshleifer, 2017), we focus on open market purchases and sales by insiders, and hence we exclude options exercises and private transactions. We merge the open-market transactions data with security-level data from CRSP and accounting data from COMPUSTAT. We focus on common stocks (CRSP share codes 10 and 11) listed on NYSE, AMEX, and NASDAQ. Our procedure is as follows. First, following prior literature on insider trading (e.g., Jagolinzer et al., 2011; Gao, Lisic, and Zhang, 2014; Dai, Parwada, and Zhang 2015), we define profitability of insider trading as the average risk-adjusted return for each transaction calculated over the 180 days

[64] We knowledge a possible prediction. Specifically, legal training might help insiders to obtain higher insider profit as legal expertise enables insiders to defend themselves as well as allow them to identify the gray area between legal and illegal use of private information for profit-making transactions. To that extent, legal training of insiders might be related to higher insider trading profit.

following the transaction and relative to the Fama-French-Cahart 4 factor model.[65, 66] Specifically, the trade-specific profit is defined as follows:

$$(R_i - R_f) = \alpha + \beta_1 (R_{mkt} - R_f) + \beta_2 SMB + \beta_3 HML + \beta_4 UMD + \varepsilon, \quad (4)$$

where R_i is the daily return to firm *i;* R_f and R_{mkt} are the daily risk-free interest rate and market return; *SMB*, *HML*, and *UMD* are the size, book-to-market, and momentum factors from Fama and French (1993) and Cahart (1997). Trade-specific profit is equal to alpha for purchases or minus alpha for sale transactions. We then compute the annual insider profit for each stock based on average daily profit over a year and use this as our dependent variable.

To examine whether the legal expertise of executive has a spillover effect to other corporate insiders when using private information for their profit-making trading, we present two regression specifications, with and without firm-specific control variables. Following previous studies in insider trading (e.g., Huddart and Ke, 2007; Jagolinzer et al., 2011; Skaife, Veenman, and Wangerin, 2013; Gao et al., 2014; Dai et al., 2015), we control for firm size, book-to-market ratio, R&D intensity, analyst following, institutional ownership, firm age, and return volatility as these firm-level characteristics are associated with insider trading profitability and corporate information asymmetry. Specifically, we control for firm size as insiders buy more in smaller firms (Seyhun, 1986) and trade more profitably in smaller firms

[65] As suggested by Huddart and Ke (2007), there are three reasons for measuring returns over a six-month period. First, six months is the shortest plausible trading horizon for an insider because section 16(b) of the Securities and Exchange Act of 1934 provides that insiders must disgorge profits attributable to offsetting purchases and sales that occur within six months of each other. Second, prior studies find that abnormal return extend for six or more months following insider transaction date. Finally, the abnormal returns following insider transaction can be detected 12 or more months after the trade and the price drift after the trade is small in months 9 through 12 (Seyhun 1998), suggesting that estimating return over a horizon much longer than 6 months may introduce noise to the estimated variable.

[66] We find that our results are not sensitive to the choice of 180-day period. We alternatively consider the profit measured over the 120-day or 90-day period and find our results (reported in Table 3.9) are robust.

(Lakonishok and Lee, 2001). We control for book-to-market ratio as insiders trade as contrarians (Rozeff and Zaman, 1988, Piotroski and Roulstone, 2005; Skaife et al., 2013). We further control for analyst following as Frankel and Li (2004) suggest that analyst following is significantly related to insider profitability. We use institutional ownership and firm age to control for variation in information asymmetry and use return volatility, as suggested by Frankel and Li (2004) as our final control variable. We also control for year- and industry-fixed effects to control for time- and industry-invariant factors that could be associated with insider profitability. We report results for this test in Table 3.10.

[Insert Table 3.10 about here]

The coefficients on our variable of interest, *LAWYER_CEO*, are negative and statistically significant across different model specifications or alternative time horizons to measure insider profitability, suggesting that firms led by CEOs with legal expertise tend to earn fewer insider profits. Our results, together with the findings of Jiang, Wintoki, and Xi (2018), further confirm the important roles of executive's legal training in reducing information asymmetry, which, in turn, contributes to lower liquidity costs.[67]

3.7. Conclusion

We show that corporate executives' styles and behavior developed through professional training have important implications for financial market quality. Focusing on legal education which can give CEOs an edge in facilitating transparency and risk management, we find that about 8.5% of firms in the sample of S&P 1500 firms are run by CEOs with a law degree.

[67] In a related study, Jiang et al. (2018) compare the profitability of insider trading between insiders with legal education and insiders without legal education. They find that insiders with legal training earn lower abnormal returns compared to insiders without legal education.

Firms headed by lawyer CEOs have higher stock market liquidity than non-lawyer CEO firms. We further show that the appointment of lawyer CEOs leads to an improvement in liquidity. Our result is also robust to several robustness checks to control for other CEO characteristics; model specifications; alternative liquidity measures and sub-samples.

We further examine the economic mechanisms underlying the relation between lawyer CEOs and stock liquidity. We find evidence that lawyer CEO have an impact on stock liquidity through their influences on firm risks and information transparency. In addition, firms led by CEOs with legal expertise are associated with less stock price delay, smaller market reactions to earnings announcements, and earn fewer insider trading profit. Overall, our findings highlight the importance of the executive's legal expertise in enhancing financial market quality. The findings of this chapter have implications for future research, which should consider managers' styles and behavior if it aims to study the liquidity costs of firms.

Appendix 3A: List of Variables

Variables	Descriptions	Sources
Stock Liquidity Measures		
INV_LN_AMIHUD	The natural logarithm of the annual Amihud ratio, measured over a firm's fiscal year. *INV_LN_AMIHUD* is the inverse of the natural logarithm of Amihud's ratio.	CRSP
INV_LN_CSPREAD	Annual bid-ask spreads for each stock estimated following the Corwin and Schultz (2002) method which uses daily high and low prices from CRSP to estimates a daily bid-ask spread. *INV_LN_CSPREAD* is the inverse of the natural logarithm of annual bid-ask spreads.	CRSP
INV_LN_ESPREAD	The effective spread for each trade is defined as the ratio of the absolute value of the difference between the trade price and the midpoint of the bid–ask quote over the trade price. *INV_LN_ESPREAD* is the inverse of the natural logarithm of the effective spread.	TAQ
INV_LN_QSPREAD	The quoted spread is the implicit trading cost for market orders when a trade occurs at the quoted price with no price improvement	CRSP
CEO characteristics		
LAWYER_CEO	A dummy that equals one if the CEO has a law degree ("LLB," "BCL," "LLM," "LLD," and "JD") or if the CEO has a Ph.D. in Jurisprudence, and zero otherwise.	Marquis Who's Who, BoardEx
MBA	A dummy that equals one if the CEO has an MBA degree and zero otherwise.	Marquis Who's Who
PHD	A dummy that equals one if the CEO has a Ph.D degree and zero otherwise.	Marquis Who's Who
IVY_EDUC	A dummy that equals one if the CEO attended one of the Ivy-League institutions and zero otherwise.	Marquis Who's Who
FOREIGN_CEO	A dummy that equals one if the CEO was born outside the U.S and zero otherwise.	Marquis Who's Who
FEMALE_CEO	A dummy that equals one if the CEO is female and zero otherwise.	Execucomp

GENERAL	General managerial skills over executive lifetime work experience.	Custódio et al. (2013)
DELTA	Natural logarithm of one plus the dollar change in wealth associated with a 1% change in the firm's stock price, following the approach of Core and Guay (2002).	Core and Guay (2002) Execucomp
VEGA	Natural logarithm of one plus the dollar change in wealth associated with a 0.01 change in the standard deviation of the firm's returns, following the approach of Core and Guay (2002).	Core and Guay (2002) Execucomp
TENURE	CEO's tenure, which is the number of years since the current CEO became CEO.	Execucomp
HOLDER_67	A dummy that equals to one if the CEO holds options that are more than 67% in the money at least twice during the sample period.	Execucomp
Firm Characteristics		
LOGASSET	The logarithm of firm size which is measured by total assets.	Compustat
TANGIBILITY	Tangibility, defined as property, plant, and equipment (PPENT)/total assets (AT).	Compustat
LEVERAGE	Leverage. Measured as the ratio of total debt to book assets.	Compustat
PRICE_INVERSE	Inverse of the mean daily stock's price over the fiscal year t. It is the difference between price and marginal cost divided by price	CRSP
INST_OWN	Institutional ownership computed as the fraction of its outstanding common shares owned by all 13F reporting institutions.	Thompson Reuters Institutional 13F
DOLVOL	Dollar trading volume (in millions)	CRSP
ANALYST	Analyst coverage. The natural logarithm of 1 plus the average number of analysts following the company during the year.	I/B/E/S
ADVERTISING	Advertising intensity measured as advertising expense divided by total asset.	Compustat
R&D	R&D expenditures computed by dividing R&D expenditures (XRD) by book assets (AT).	Compustat

BTM	Book-to-market measured as the ratio of the book equity value over market capitalization value	Compustat
FIRM_AGE	Log of a company's age, approximated by the number of years listed on Compustat	Compustat
Financial Report Quality Measures		
COMPARABILITY	A measure of financial statement compatibility in De Franco et al (2011). CompAcctInd is the median CompAcct for all firms j in the same industry as firm *i* during period *t*.	De Franco's webpage
OPAQUE	Financial reporting opacity, OPAQUE, measured as a three-year moving sum of absolute discretionary accruals, where discretionary accruals are estimated with the modified Jones (1991) model, following Dechow, Sloan, and Sweeney (1995).	Compustat
Volatility Measures		
IDIOVOL	The standard deviation of OLS regression residuals where excess daily return of firm i's stock is regressed on the Fama-French-Carhart four factors. The OLS regressions are estimated over one year.	CRSP, Kenneth French's Data Library
RETVOL	Annualized stock return volatility. Standard deviation of monthly stock return multiplied by the squared root of 12 over a fiscal year.	CRSP
EARNVOL	Earnings volatility, defined as the standard deviation of quarterly earnings ratio over the preceding five years. Earnings ratio is the ratio of income before extraordinary items (IBQ) over total assets (ATQ).	Compustat
Other variables		
EDF	A measure of expected default frequency estimated following Bharath and Shumway (2008)	Compustat
GINDEX	Corporate governance index.	Gompers et al. (2003)

PROFIT (t+180) *PROFIT (t+120)* *PROFIT (t+90)*	Profitability of insider trading defined as the average risk-adjusted return for each transaction calculated over the 180 (120 or 90) days following the transaction and relative to the Fama-French-Cahart 4 factor model.	2IQ Global Insider
PRICE_DELAY *IND_PRICE_DELAY*	A price delay measure proposed by Hou and Moskowitz (2005), defined as 1- (R-squared for restricted model / R-squared of non-restricted model). *IND_ADJ_PRICE_DELAY* is the industry-adjusted price delay, measured as the difference between firm-level price delay and the average price delay of the industry that a firm belong to.	CRSP
CAR (-2, +2) *ABS_CAR (-2, +2)*	Cumulative abnormal returns during the five-day period surround earnings announcement dates. *ABS_CAR (-2, +2)* is the absolute value of *CAR (-2, +2).*	Compustat, CRSP
SUE	Standardized unexpected earnings, measured as seasonally adjusted quarterly earnings per share divided by the share price at the end of the quarter, following Livnat and Mendenhall (2006).	I/B/E/S

Table 3.1. Summary statistics

Panel A: Descriptive statistics of whole sample

Variable	N	Mean	Std Dev	25th Pctl	50th Pctl	75th Pctl
CEO Characteristics						
LAWYER_CEO	19,480	0.085	0.279	0.000	0.000	0.000
MBA	19,480	0.106	0.308	0.000	0.000	0.000
PHD	19,480	0.022	0.146	0.000	0.000	0.000
FOREIGN_CEO	19,480	0.019	0.137	0.000	0.000	0.000
IVY_EDUC	19,480	0.073	0.260	0.000	0.000	0.000
LN_DELTA	18,243	5.486	1.466	4.535	5.428	6.376
LN_VEGA	17,475	3.930	2.460	3.101	4.052	5.024
TENURE	19,480	6.995	7.517	2.000	5.000	10.000
MALE_CEO	19,480	0.980	0.138	1.000	1.000	1.000
Liquidity Measures						
INV_LN_AMIHUD	19,480	8.409	2.111	7.046	8.446	9.854
INV_LN_CSPREAD	19,480	4.813	0.473	4.495	4.820	5.144
Firm Characteristics						
LOGASSET	19,480	7.198	1.386	6.172	7.083	8.189
TANGIBILITY	19,480	0.481	0.136	0.389	0.485	0.560
LEVERAGE	19,480	0.171	0.152	0.017	0.152	0.273
PRICE_INVERSE	19,480	0.048	0.038	0.024	0.036	0.057
INST_OWN	19,480	0.688	0.183	0.575	0.727	0.850
DOLVOL	19,480	16.002	1.561	14.952	16.139	17.397
ANALYST	19,480	1.792	0.683	1.386	1.922	2.428
IDIOVOL	19,480	0.208	0.120	0.102	0.169	0.309
R&D	19,480	0.033	0.052	0.000	0.006	0.046
ADVERTISING	19,480	0.010	0.018	0.000	0.000	0.010

Panel B: Lawyer CEOs vs. Non-Lawyer CEOs

	(1) Lawyer CEO			(2) Non-Lawyer CEO			Difference (1) – (2)
	Mean	Std Dev	Obs.	Mean	Std Dev	Obs.	
CEO Characteristics							
MBA	0.043	0.202	1,659	0.112	0.315	17,821	-0.069***
PHD	0.058	0.234	1,659	0.018	0.134	17,821	0.040***
FOREIGN_CEO	0.019	0.135	1,659	0.019	0.137	17,821	0.000
IVY_EDUC	0.086	0.281	1,659	0.072	0.258	17,821	0.014**
LN_DELTA	5.537	1.468	1,535	5.481	1.465	16,708	0.056
LN_VEGA	4.035	1.933	1,482	3.920	2.503	15,993	0.115*
TENURE	7.914	8.077	1,659	6.910	7.458	17,821	1.005***
MALE_CEO	0.973	0.161	1,659	0.981	0.136	17,821	-0.008**
Liquidity Measures							
INV_LN_AMIHUD	8.565	2.107	1,659	8.556	2.117	17,821	0.010**
INV_LN_CSPREAD	4.915	0.457	1,659	4.818	0.471	17,821	0.097***
Firm Characteristics							
LOGASSET	7.352	1.360	1,659	7.184	1.388	17,821	0.167***
TANGIBILITY	0.471	0.141	1,659	0.482	0.136	17,821	-0.010***
LEVERAGE	0.203	0.157	1,659	0.168	0.151	17,821	0.034***
PRICE_INVERSE	0.046	0.036	1,659	0.048	0.038	17,821	-0.002*
INST_OWN	0.675	0.175	1,659	0.689	0.183	17,821	-0.014***
DOLVOL	15.913	1.608	1,659	16.010	1.557	17,821	-0.097**
ANALYST	1.722	0.737	1,659	1.799	0.677	17,821	-0.077***
IDIOVOL	0.199	0.117	1,659	0.209	0.120	17,821	0.010***
R&D	0.024	0.046	1,659	0.034	0.053	17,821	-0.009***
ADVERTISING	0.009	0.016	1,659	0.010	0.018	17,821	-0.001**

Panel A of this table reports the descriptive statistics for the sample of 19,480 firm-year observations spanning 1992 to 2013. Panel B reports the statistics of the subsamples of firms with and without Lawyer CEOs. We hand-collect the executive education information from Marquis Who's Who and BoardEx databases, whereas liquidity measures are constructed from CRSP and accounting information is obtained from Compustat. Appendix 3A provides a detailed description of the variables.

Table 3.2: Lawyer CEOs and Stock Liquidity: Baseline results

	INV_LN_AMIHUD			**INV_LN_CSPREAD**		
	(1)	(2)	(3)	(4)	(5)	(6)
LAWYER_CEO	0.115***	0.056***	0.086***	0.054***	0.045***	0.046***
	(3.27)	(3.05)	(3.46)	(4.05)	(5.37)	(3.70)
$LOGASSET_{t-1}$		0.417***	0.311***		0.151***	0.125***
		(43.05)	(19.22)		(42.51)	(17.93)
$TANGIBILITY_{t-1}$		0.302***	0.586***		-0.175***	0.047
		(5.58)	(8.06)		(-8.02)	(1.60)
$LEVERAGE_{t-1}$		-0.771***	-0.682***		-0.121***	-0.107***
		(-16.62)	(-11.61)		(-5.87)	(-4.16)
$PRICE\_INVERSE_{t-1}$		-3.266***	-4.221***		-3.920***	-2.779***
		(-11.39)	(-10.64)		(-22.55)	(-13.84)
$INST\_OWN_{t-1}$		-0.183***	-0.016		0.200***	0.210***
		(-3.87)	(-0.23)		(10.61)	(7.49)
$DOLVOL_{t-1}$		0.912***	0.565***		-0.102***	-0.147***
		(83.95)	(45.23)		(-23.11)	(-26.60)
$ANALYST_{t-1}$		0.054***	-0.017		0.020***	0.045***
		(4.48)	(-1.14)		(3.68)	(7.05)
$IDIOVOL_{t-1}$		0.089	0.451		0.720***	1.953***
		(0.14)	(0.62)		(3.45)	(6.47)
$R\&D_{t-1}$		0.711***	-0.764**		-0.658***	-0.045
		(4.50)	(-2.28)		(-9.84)	(-0.38)
$ADVERTISING_{t-1}$		1.757***	-1.447**		0.462***	-0.262
		(4.96)	(-2.30)		(2.99)	(-0.92)
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Industry FEs	No	Yes	No	No	Yes	No
Firm FEs	Yes	No	Yes	Yes	No	Yes
Observations	19,480	19,480	19,480	19,480	19,480	19,480
R^2	0.868	0.882	0.928	0.675	0.533	0.710

This table presents regression results of stock liquidity on Lawyer CEOs and control variables. The dependent variables are stock liquidity measures, including Corwin and Schultz (2012) bid-ask spread and Amihud (2002) measure. The main independent variable of interest is *LAWYER_CEO,* a dummy that equals one if the CEO has a legal education and zero otherwise. Constant term, year-fixed effects, and firm-fixed effect (or industry fixed effects) are included. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 3A.

Table 3.3. Robustness Checks

	INV_LN_AMIHUD		INV_LN_CSPREAD		Alternative measures	
	Coeff.	R2	Coeff.	R2	Coeff.	R2
Panel A: Alternative model specifications						
(1) Two-way cluster standard errors by firm and year	0.076**	0.856	0.058***	0.307		
	(2.13)		(3.61)			
(2) Use Fama-Macbeth cross-sectional regression	0.123**	0.886	0.023**	0.505		
	(1.96)		(2.52)			
(3) Use median regression	0.053**	0.646	0.052***	0.191		
	(2.54)		(4.29)			
Panel B: Alternative measures of liquidity						
(4) Effective spread					0.030**	0.909
					(2.33)	
(5) Quoted spread					0.046**	0.914
					(2.37)	
(6) Bid-ask spread from daily close price					0.051***	0.753
					(4.95)	
Panel C: Additional control variables						
(7) Control for corporate governance	0.080***	0.925	0.036**	0.705		
	(2.87)		(2.56)			
(8) Control for the business cycle	0.087***	0.928	0.046***	0.710		
	(3.48)		(3.70)			
(9) Control for product market competition	0.093***	0.934	0.046***	0.708		
	(3.93)		(3.64)			
(10) Control for economic policy uncertainty	0.087***	0.928	0.046***	0.710		
	(3.48)		(3.71)			
(11) Control for CEO network centrality	0.074**	0.936	0.057***	0.760		
	(2.20)		(4.22)			
(12) All additional control variables	0.075**	0.941	0.060***	0.734		
	(2.39)		(4.51)			
Panel D: Subsamples analyses						
(13) Exclude financial crisis period (2007-2008)	0.069***	0.934	0.047***	0.697		

	(2.79)		(3.56)	
(14) S&P 500 stocks only	0.067***	0.934	0.038***	0.724
	(2.83)		(2.93)	
(15) NYSE stocks only	0.0890***	0.938	0.0298**	0.707
	(3.38)		(2.42)	
(16) Exclude firms having high litigation risk	0.0860***	0.928	0.0461***	0.699
	(3.09)		(3.25)	

This table reports the results of several robustness tests performed on the regressions of stock liquidity measures. For brevity, the table only reports the coefficients on the main independent variable of interest, *LAWYER_CEO*, a dummy that equals one if the CEO has a legal education and zero otherwise. Other firm-level characteristics variables are similar to those in the baseline regressions in Table 3.2. In Model (1), we use two-way clustering of standard errors by firm and year. Model (2) uses Fama-Macbeth cross-section regression. Model (3) uses the median regression with robust standard error. In Models (4), (5) and (6), we consider alternative measures of stock liquidity, including effective spreads, quoted spread, and bid-ask spread from daily close price. From Models (7) to (11), we augment the baseline model with each of additional control variables individually. In Model (12), we include all additional control variables (in Models 7 to 11) in our regression. In Models (13)-(15), we consider several subsamples. In Model (13), we rerun the baseline regression after by excluding observations in financial turmoil period (2007-2008). In Models (14) and (15), we consider the S&P 500 stocks and NYSE stock separately. In Model (16), we rerun the baseline equations after excluding firms with high litigation risk. We define firms having high litigation risk if these firms belong to the top quintile litigation risk measure estimated following Kim and Skinner (2012). Constant term, year-fixed effects, and firm-fixed effects in all models except models in Panel A. *t*-statistics are computed using standard errors robust to heteroscedasticity are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 3A.

Table 3.4. CEO Turnover Test

	Dependent Variable: Stock Liquidity			
	INV_LN_AMIHUD		INV_LN_CSPREAD	
	From non-Lawyer CEO to Lawyer CEO (99 Cases) (1)	From Lawyer CEO to non-Lawyer CEO (119 cases) (2)	From non-Lawyer CEO to Lawyer CEO (99 Cases) (3)	From Lawyer CEO to non-Lawyer CEO (119 cases) (4)
CEO_CHANGE × POST	0.106***	-0.043**	0.098*	-0.111**
	(3.92)	(-1.96)	(1.70)	(-2.00)
$LOGASSET_{t-1}$	0.068**	0.095***	0.189*	0.187**
	(2.11)	(3.04)	(1.85)	(2.32)
$TANG_{t-1}$	0.196	-0.083	0.790***	0.745***
	(1.57)	(-0.74)	(2.72)	(2.63)
$LEVERAGE_{t-1}$	0.095	0.230**	-0.423	-0.116
	(0.82)	(2.34)	(-1.43)	(-0.47)
$PRICE\_INVERSE_{t-1}$	-4.085***	-3.342***	-3.729**	-8.230***
	(-5.05)	(-5.12)	(-2.18)	(-4.75)
$INST\_OWN_{t-1}$	-0.021	0.185	-0.185	0.205
	(-0.15)	(1.65)	(-0.52)	(0.62)
$DOLVOL_{t-1}$	-0.126***	-0.066***	0.529***	0.418***
	(-4.99)	(-2.92)	(9.40)	(6.71)
$ANALYST_{-1}$	0.004	0.051**	-0.066	0.042
	(0.14)	(2.43)	(-1.30)	(0.83)
$IDIOVOL_{t-1}$	3.062***	2.900**	3.549	5.569**
	(2.79)	(2.40)	(1.09)	(2.04)
$R\&D_{t-1}$	-0.624	0.627	1.173	-2.790*
	(-1.12)	(1.39)	(0.81)	(-1.88)
$ADVERTISING_{t-1}$	0.227	1.506	0.231	-0.526
	(0.15)	(0.90)	(0.07)	(-0.14)
Year FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Observations	929	1,120	929	1,120
R^2	0.744	0.779	0.945	0.944

This table reports regression result for the difference-in-difference analysis. *CEO_CHANGE* is a dummy variable that equals one if the new CEO is from a non-lawyer CEO to lawyer CEO (Columns 1 and 3) and from a lawyer CEO to a non-lawyer CEO (Columns 2 and 4), and zero otherwise. Firm-year observations with *CEO_CHANGE* equals one are considered treated firms. Each firm-year observation in the treated group is matched with a firm-year observation in the control group (*CEO_CHANGE* equals zero) using the nearest-neighbor propensity score matching procedure. The matched pair is obtained in the year before the CEO turnover takes place and is based on firm size, book-to-market ratio, and industry. *POST* is a dummy variable that equals one if the year observation is in the three-year period after and zero in the three-year period before the turnover. Other firm characteristics variables are similar to those in the baseline regressions in Table 3.2. Constant term, year-fixed effects, and firm-fixed effects are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variables definitions and data sources are presented in Appendix 3A.

Table 3.5. Propensity score matching

Panel A: Characteristics of treatment and control firms

	Treatment	Control	Treatment - Control
LOGASSET	7.351***	7.377***	-0.026
TANG	0.471***	0.469***	0.003
LEVERAGE	0.202***	0.233***	-0.031
PRICE_INVERSE	0.046***	0.047***	-0.001
INST_OWN	0.676***	0.666***	0.011
DOLVOL	15.919***	15.845***	0.074
ANALYST	1.724***	1.734***	-0.010
IDIOVOL	0.199***	0.201***	-0.001
R&D	0.024	0.018	0.006
ADVERTISING	0.009	0.007	0.001
INV_LN_CSPREAD	4.914***	4.842***	0.072***
INV_LN_AMIHUD	8.571***	8.458***	0.113**
Observations	1,653	1,653	

Panel B: Regression results on the matched sample

	INV_LN_CSPREAD	INV_LN_AMIHUD
	(1)	(2)
LAWYER_CEO	0.098***	0.136**
	(2.94)	(2.20)
LOGASSET	-4.167***	-5.499***
	(-9.57)	(-5.26)
TANGIBILITY	0.165*	0.053
	(1.67)	(0.22)
LEVERAGE	-0.163***	0.583***
	(-9.82)	(15.35)
PRICE_INVERSE	0.044*	-0.007
	(1.94)	(-0.16)
INST_OWN	2.493**	5.912**
	(2.17)	(2.34)
DOLVOL	0.092***	0.218***
	(3.50)	(4.02)
ANALYST	0.045	0.480**
	(0.49)	(2.25)
IDIOVOL	-0.035	-0.785***
	(-0.46)	(-4.98)
R&D	-0.158	1.182
	(-0.39)	(1.07)
ADVERTISING	1.006	-0.880
	(1.09)	(-0.50)
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	3,306	3,306
R^2	0.715	0.936

The table reports the average treatment effects on liquidity measures obtained from the propensity score matching (Panel A), and the results of estimating the baseline regression (Table 3.2) on the matched sample (Panel B). For each year, we identify non-lawyer CEO firms (control) with similar firm characteristics to lawyer CEO firms (treatment) within a caliper of 0.001 without replacement using all firm-level control variables as in the baseline regression in Table 3.2. Constant term, year-fixed effects, and firm-fixed effects are included in all models. *t*-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variables definitions and data sources are presented in the Appendix 3A.

Table 3.6. Possible Channels

Panel A: Lawyer CEOs and Corporate Information Environment

	OPACITY		**FS_COMPATABILITY**	
	(1)	(2)	(3)	(4)
LAWYER_CEO	-0.011**	-0.010**	0.147***	0.129***
	(-2.44)	(-2.13)	(2.97)	(2.63)
$LOGASSET_{t-1}$		-0.011***		0.138***
		(-2.71)		(4.47)
$TANGIBILITY_{t-1}$		0.041**		-0.291***
		(2.11)		(-2.69)
$LEVERAGE_{t-1}$		0.033***		-0.677***
		(2.64)		(-6.27)
$INST\_OWN_{t-1}$		-0.008		0.279***
		(-0.57)		(2.73)
$ANALYST_{t-1}$		0.001		0.138***
		(0.37)		(6.70)
$R\&D_{t-1}$		0.116		-1.018**
		(1.21)		(-2.16)
Year FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Observations	14,219	14,219	11,527	11,527
R^2	0.434	0.437	0.553	0.565

Panel B: Lawyer CEOs, Return Volatility, and Earnings Volatility

	IDIOVOL		**RETVOL**		**EARNVOL**	
	(1)	(2)	(3)	(4)	(5)	(6)
LAWYER_CEO	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001*
	(-4.06)	(-3.29)	(-4.68)	(-4.15)	(-2.66)	(-1.91)
$LOGASSET_{t-1}$		-0.002***		-0.002***		-0.002***
		(-13.73)		(-9.21)		(-11.91)
$TANGIBILITY_{t-1}$		0.001		0.003***		0.007***
		(0.40)		(2.89)		(6.66)
$LEVERAGE_{t-1}$		0.005***		0.004***		0.004***
		(7.44)		(4.40)		(5.51)
$INST\_OWN_{t-1}$		-0.002***		-0.001		-0.001*
		(-3.82)		(-1.43)		(-1.72)
$ANALYST_{t-1}$		-0.001		-0.001**		-0.001**
		(-1.46)		(-2.02)		(-1.96)
$R\&D_{t-1}$		0.004		0.001		0.026***
		(1.22)		(0.18)		(6.33)
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16,599	16,599	16,808	16,808	16,738	16,738
R^2	0.692	0.700	0.646	0.651	0.618	0.632

Panel A reports the results of the effect of Lawyer CEOs on corporate information environment, measured by financial reporting opacity (*OPACITY*) and financial statement comparability

(*FS_COMPATABILITY*). *OPACITY* is measured as three-year moving sum of absolute discretionary accruals, where discretionary accruals are estimated with the modified Jones (1991) model, following Dechow, Sloan, and Sweeney (1995). *FS_COMPATABILITY* is the De Franco, Kothari, and Verdi (2011)'s comparability measure. Panel B reports the results of the effect of Lawyer CEOs on stock return volatility and earnings volatility. *RETVO*L is measured as the standard deviation of daily stock returns over the fiscal year. *IDIOVOL*, idiosyncratic volatility, is the standard deviation of OLS regression residuals where excess daily return of firm i's stock is regressed on Fama-French-Carhart four factors. *EARNVOL*, earning volatility, is the standard deviation of quarterly earnings in the previous four years. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. Constant term, year-fixed effects, and firm-fixed effects are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variables definitions and data sources are presented in Appendix 3A.

Table 3.7. Other CEO Characteristics

Panel A. Amihud measure

	Models										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
LAWYER_CEO	0.087***	0.080***	0.086***	0.087***	0.101***	0.071***	0.086***	0.086***	0.089***	0.088***	0.078***
	(3.50)	(3.18)	(3.46)	(3.51)	(4.09)	(2.70)	(3.45)	(3.47)	(3.62)	(3.52)	(3.03)
MBA	0.007										-0.042
	(0.26)										(-1.53)
PHD		0.137***									0.075
		(3.05)									(1.52)
IVY_EDUC			0.059**								0.081***
			(2.20)								(2.80)
FOREIGN_CEO				0.066							0.054
				(1.43)							(1.13)
DELTA					0.178***						0.249***
					(25.23)						(28.73)
VEGA						0.012**					-0.009**
						(2.08)					(-2.41)
TENURE							0.002*				-0.013***
							(1.84)				(-11.33)
MALE_CEO								0.035			-0.040
								(0.68)			(-0.74)
HOLDER_67									0.172***		0.052***
									(12.13)		(3.39)
GENERAL_SKILLS										-0.041***	-0.049**
										(-2.85)	(-3.22)
All firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,487	19,487	19,487	19,487	18,249	17,481	19,487	19,487	19,413	19,487	17,035
R^2	0.936	0.936	0.936	0.936	0.940	0.936	0.936	0.936	0.937	0.936	0.943

Panel B. Bid-ask measure

	Models										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
LAWYER_CEO	0.048***	0.047***	0.046***	0.047***	0.059***	0.045***	0.046***	0.046***	0.046***	0.046***	0.054***
	(3.76)	(3.73)	(3.67)	(3.73)	(4.62)	(3.65)	(3.71)	(3.71)	(3.71)	(3.71)	(4.34)
MBA	0.013										-0.008
	(0.99)										(-0.61)
PHD		-0.009									-0.006
		(-0.43)									(-0.27)
IVY_EDUC			0.054***								0.049***
			(3.69)								(3.06)
FOREIGN_CEO				0.026							0.014
				(0.98)							(0.46)
DELTA					0.009***						0.016***
					(2.96)						(4.13)
VEGA						0.005**					0.004*
						(2.14)					(1.66)
TENURE							-0.000				-0.001
							(-0.20)				(-1.54)
MALE_CEO								-0.000			-0.000
								(-0.01)			(-0.00)
HOLDER_67									0.003		-0.017**
									(0.39)		(-2.39)
GENERAL_SKILL										0.002	-0.004
										(0.22)	(-0.53)
All firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	19,487	19,487	19,487	19,487	18,249	17,481	19,487	19,487	19,413	19,487	17,035
R^2	0.741	0.741	0.742	0.741	0.750	0.751	0.741	0.741	0.741	0.741	0.755

This table reports regression results on the impact of Lawyer CEOs on stock liquidity after controlling for other CEO characteristics. In each model from 1 to 11, an additional variable is added into the baseline regression to control for different CEO characteristics, including *MBA*, *PHD*, *IVY_EDUC*, *FINTECH_EDUC*, *FOREIGN_CEO*, *DELTA*, *VEGA*, *TENURE*, MALE_CEO, *HOLDER_67*, *GENERAL_CEO*, and *MANAGERIAL_ABILITY* (see the Appendix for more details). In

Model 12, we include all additional CEO characteristics in the regression. Other firm characteristics variables are analogous to those specified in the baseline models in Table 3.2. The independent variables of interest are Amihud (2002) measure (Panel A) and Corwin and Schultz (2012) bid-ask spread (Panel B). All models include year-fixed effects and firm-fixed effects. *T*-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Definitions for all variables are presented in Appendix 3A.

Table 3.8. Alternative explanations

Panel A: CEO Ability

	$\overline{\text{Inv\_Ln\_Amihud}}$	$\overline{\text{Inv\_Ln\_CSpread}}$
	(1)	(2)
LAWYER_CEO	0.0784***	0.0447***
	(3.10)	(3.55)
All controls	Yes	Yes
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	19357	19357
R^2	0.3708	0.105

Panel B: CEO Network Centrality

	$\overline{\text{Inv\_Ln\_Amihud}}$	$\overline{\text{Inv\_Ln\_CSpread}}$
	(1)	(2)
LAWYER_CEO	0.0738**	0.0572***
	(2.21)	(4.22)
All controls	Yes	Yes
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	11768	11768
R^2	0.3736	0.0949

Panel C: Corporate Governance

	$\overline{\text{Inv\_Ln\_Amihud}}$	$\overline{\text{Inv\_Ln\_CSpread}}$
	(1)	(2)
LAWYER_CEO	0.0801***	0.0361**
	(2.85)	(2.55)
All controls	Yes	Yes
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	17328	17328
R^2	0.3511	0.1023

This table reports the results on the impact of CEO legal expertise on stock liquidity of the firms that they manage. We first regress stock liquidity on measures of CEO ability (Panel A), CEO network centrality (Panel B), or corporate governance (Panel C) and obtain the residuals from these regressions. We then use these residuals as proportions of stock liquidity not explained by CEO ability, network centrality, or corporate governance and regress them on the main independent variable of interest, *LAWYER_CEO*, and other control variables as in the baseline models in Table 3.2. *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. We provide detailed description of all other variables in the Appendix. We include year-fixed effects and firm-fixed effects in all models. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3.9: Lawyer CEOs, Stock Price Efficiency, Market Reactions to Earnings Announcements

Panel A: Lawyer CEOs and Stock Price Efficiency

	PRICE_DELAY		**IND _PRICE_DELAY**	
	(1)	(2)	(3)	(4)
LAWYER_CEO	-0.019*	-0.020**	-0.018*	-0.018*
	(-1.92)	(-2.04)	(-1.84)	(-1.87)
$LOGASSET_{t-1}$		0.010*		0.278***
		(1.75)		(3.29)
$TANGIBILITY_{t-1}$		0.013		-0.065***
		(0.54)		(-3.07)
$LEVERAGE_{t-1}$		0.056***		-0.014***
		(2.65)		(-3.97)
$PRICE\_INVERSE_{t-1}$		0.344***		0.019***
		(4.02)		(3.62)
$INST\_OWN_{t-1}$		-0.030		-0.349
		(-1.38)		(-1.57)
$DOLVOL_{t-1}$		-0.028***		0.002
		(-7.54)		(0.31)
$ANALYST_{t-1}$		0.029***		0.029
		(5.29)		(1.22)
$IDIOVOL_{t-1}$		-0.358		0.043**
		(-1.57)		(2.13)
$R\&D_{t-1}$		-0.135		-0.139
		(-1.35)		(-1.45)
$ADVERTISING_{t-1}$		0.253		0.329
		(1.00)		(1.33)
Year FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Observations	16,726	16,726	16,726	16,726
R^2	0.336	0.344	0.145	0.151

Panel B: Market Reactions to Earnings Announcements

	CAR (-2, +2)		**ABS_CAR (-2, +2)**	
	(1)	(2)	(3)	(4)
LAWYER_CEO	-0.003**	-0.003*	-0.004***	-0.004***
	(-2.05)	(-1.87)	(-4.86)	(-4.13)
$LOGASSET_{t-1}$		-0.024		0.155***
		(-1.52)		(18.09)
$TANGIBILITY_{t-1}$		-0.000		-0.004**
		(-0.02)		(-2.02)
$LEVERAGE_{t-1}$		0.002***		0.011***
		(3.91)		(30.21)
$PRICE\_INVERSE_{t-1}$		-0.006***		-0.001**
		(-6.54)		(-2.39)
$INST\_OWN_{t-1}$		0.063		0.039
		(1.48)		(1.64)
$DOLVOL_{t-1}$		-0.004***		-0.010***
		(-4.70)		(-18.74)
$ANALYST_{t-1}$		0.017***		0.000
		(4.06)		(0.09)
$IDIOVOL_{t-1}$		-0.003		0.012***
		(-0.82)		(6.48)
$R\&D_{t-1}$		-0.026		0.000
		(-1.41)		(0.01)
$ADVERTISING_{t-1}$		0.004		-0.003
		(0.11)		(-0.12)
SUE		0.065***		0.003
		(9.87)		(0.88)
Q4		-0.003***		0.001***
		(-5.15)		(4.10)
Year FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Observations	74,651	74,651	74,651	74,651
R^2	0.010	0.015	0.137	0.152

Panel A of this table reports the results on the impact of CEO legal expertise on the stock price efficiency. We use a price delay measure, PRICE_DELAY, proposed by Hou and Moskowitz (2005), which captures the average delay with the stock price movements in response to information. IND_PRICE_DELAY refers to the industry-adjusted price delay measure. Panel B of the table reports the results of the impact of CEO legal expertise on market reactions to corporate earnings announcements. Following Brown and Warner (1985), we use cumulative abnormal returns during the five-day period surround earnings announcement dates, CAR (-2, +2), to capture the market reactions to corporate earnings announcement. ABS_CAR (-2, +2) is the absolute value of CAR (-2, +2). We provide detailed description of all other variables in Appendix 3A. We include year-fixed effects, and firm-fixed effects in all models. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3.10: Lawyer CEOs and Profitability of Insider Trading

	Profit (t + 180)		Profit (t + 120)		Profit (t + 90)	
	(1)	(2)	(3)	(4)	(5)	(6)
LAWYER_CEO	-0.010**	-0.010**	-0.011**	-0.011**	-0.011*	-0.011*
	(-2.19)	(-2.23)	(-2.11)	(-2.03)	(-1.94)	(-1.90)
$LOGASSET_{t-1}$		-0.003**		-0.004**		-0.006***
		(-2.51)		(-2.32)		(-3.14)
BTM_{t-1}		-0.000		-0.000		-0.000
		(-0.92)		(-0.43)		(-1.12)
$INST\_OWN_{t-1}$		0.019*		0.024**		0.017
		(1.94)		(2.09)		(1.28)
$ANALYST_{t-1}$		0.004		0.002		0.002
		(1.60)		(0.71)		(0.54)
VOL_{t-1}		0.274		0.545***		0.252
		(1.56)		(2.62)		(1.04)
$FIRM\_AGE_{t-1}$		0.007***		0.007***		0.006**
		(3.25)		(2.71)		(2.02)
$R\&D_{t-1}$		-0.086**		-0.089**		-0.118**
		(-2.23)		(-2.03)		(-2.35)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,832	13,832	13,832	13,832	13,832	13,832
R^2	0.008	0.010	0.009	0.011	0.010	0.012

This table reports the results on the impact of CEO legal training on the profitability of insider trading. We follow Jagolinzer et al. (2011) and define profitability of insider trading as the average risk-adjusted return for each transaction calculated over the 180 days (120 days or 90 days) following the transaction and relative to the Fama-French-Cahart 4 factor model. Trade-specific profit is equal to alpha for purchases or minus alpha for sale transactions. We then compute the annual insider profit for each stock based on average daily profit over a year. *LAWYER_CEO,* is a dummy that equals one if the CEO has a legal education and zero otherwise. We provide detailed description of all other variables in Appendix 3A. We include year-fixed effects, and industry-fixed effects in all models. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively

Appendix A3.1: CEO long-term effect and Stock Liquidity

	INV_LN_AMIHUD	**INV_LN_CSPREAD**
	(1)	(2)
LAWYER_CEO	0.059**	0.026**
	(1.98)	(1.98)
$LOGASSET_{t-1}$	0.311***	0.128***
	(20.55)	(18.92)
$TANGIBILITY_{t-1}$	0.548***	0.029
	(7.85)	(0.92)
$LEVERAGE_{t-1}$	-0.707***	-0.127***
	(-12.61)	(-5.07)
$PRICE\_INVERSE_{t-1}$	-4.377***	-2.921***
	(-18.87)	(-28.21)
$INST\_OWN_{t-1}$	0.023	0.232***
	(0.39)	(8.81)
$DOLVOL_{t-1}$	0.567***	-0.153***
	(56.89)	(-34.38)
$ANALYS_{t-1}$	-0.019	0.046***
	(-1.29)	(7.10)
$IDIOVOL_{t-1}$	0.562	2.265***
	(0.80)	(7.26)
$R\&D_{t-1}$	-0.592**	0.056
	(-2.05)	(0.43)
$ADVERTISING_{t-1}$	-1.638**	-0.141
	(-2.51)	(-0.48)
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	15,748	15,748
R2	0.929	0.710

This table presents regression results of stock liquidity on Lawyer CEOs and control variables after excluding the first two year of tenure. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables are stock liquidity measures, including Amihud measure and Corwin and Schultz (2012) bid-ask spread. Constant term, year-fixed effects, and firm-fixed effects are included. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 3A.

Appendix A3.2. Lawyer CEO and Industry-adjusted Stock Liquidity

	IND_ADJ_AMIHUD	**IND_ADJ_CSPREAD**
	(1)	(2)
LAWYER_CEO	0.113***	0.042***
	(4.32)	(3.44)
$LOGASSET_{t-1}$	-3.766***	-2.756***
	(-10.11)	(-14.54)
$TANGIBILITY_{t-1}$	0.155**	0.105***
	(2.25)	(3.94)
$LEVERAGE_{t-1}$	0.492***	-0.097***
	(39.98)	(-18.58)
$PRICE\_INVERSE_{t-1}$	0.006	0.024***
	(0.38)	(3.99)
$INST\_OWN_{t-1}$	-0.201	2.265***
	(-0.28)	(7.93)
$DOLVOL_{t-1}$	0.363***	0.093***
	(21.84)	(14.29)
$ANALYST_{t-1}$	0.411***	0.083***
	(5.61)	(2.99)
$IDIOVOL_{t-1}$	-0.640***	-0.098***
	(-10.64)	(-4.08)
$R\&D_{t-1}$	-1.071***	-0.080
	(-3.21)	(-0.77)
$ADVERTISING_{t-1}$	-2.116***	-0.244
	(-3.24)	(-0.88)
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	19,480	19,480
R^2	0.914	0.596

This table presents regression results of industry-adjusted stock liquidity on Lawyer CEOs and control variables. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables are stock liquidity measures, including Amihud (2002) measure and Corwin and Schultz (2012) bid-ask spread. For each liquidity measure, we construct the industry-adjusted liquidity measure as the difference between a firm liquidity and the average liquidity value of the industry that the firm belongs to. Constant term, year-fixed effects, and firm-fixed effects are included. T-statistics computed using standard errors robust to heteroscedasticity are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 3A.

Chapter 4.

Credit Risk Assessment and Executives' Legal Expertise

"*Our whole philosophy is one of transparency.*" -Valerie Jarrett, Former CEO of Habitat Company, a Juris Doctor from University of Michigan Law School (1981).

4.1. Introduction

For decades, credit ratings have been well considered by both academics and practitioners as one of the primary indicators when assessing a firm's credit risk (Kisgen, 2007; Kuang and Qin, 2013).[68] In a seminal work of Graham and Harvey (2001), survey-based evidence suggests that credit standing is ranked as the second most important concern after financial flexibility in financing decisions. Extant literature has focused intensively on the roles of firm characteristics and accounting information in the credit rating process.[69] However, other important factors such as the role of the firm's management have been largely under-investigated. A growing literature in economics and finance aims to understand the implications of managerial background, behavior, and experiences on corporate policies and

[68] A firm's credit rating reflects a rating agency's opinion of an entity's overall creditworthiness of its capacity to satisfy its financial obligation (Standard and Poor's, 2002).

[69] See, for example, Kaplan and Urwitz (1979), Ziebart and Reiter (1992), Blume, Lim, and MacKinlay (1998), Ashbaugh-Skaife, Collins, LaFond (2006), Cheng and Subramanyam (2008), Gopalan, Song, and Yerramilli (2014), Kedia, Rajgopal, and Zhou (2017).

outcomes[70], implying that corporate managers, who set the "tone at the top", should matter for firm's credit risks. As such, in this paper, we examine whether CEOs having legal expertise is associated with credit rating (default risk) and the cost of debt capital.

Our study focuses on whether credit rating agencies and debt market participants consider CEO legal training, which gives CEOs an edge in facilitating corporate transparency and risk management when assessing a firm's credit risk. The association between CEO legal education and a firm's default risk is intuitive for three important reasons. *First*, credit rating agencies are likely sensitive to any changes that potentially alter a firm's internal monitoring and gate-keeping functions (Ham and Koharki, 2016).[71] A considerable proportion of lawyers serve as executives of corporations and executive lawyers are often endowed with gatekeeping responsibilities Morse, Wang, Wu, 2016).[72] *Second*, firms headed by lawyer CEOs tend to pursue more conservative investment policies (Henderson, Hutton, Jiang, and Pierson, 2018), which can reduce the volatility of future cash flows, and hence reduce the likelihood that their companies miss principal and interest payments. Correspondingly, the reduction in a firm risk should affect the firm's overall creditworthiness. *Third*, executives with legal expertise are less likely to exploit private information for personal trades (Jiang, Wintoki, and Xi, 2018) and play significant roles in enhancing corporate disclosure transparency (See Chapter 3 of this thesis). Given enhanced information environment reduces default risks (Francis, Lafond, Olsson, and

[70] See, for example, Bertrand and Schoar (2003), Malmedier and Tate (2005), Bamber, Jiang, and Wang (2010), Malmedier, Tate, and Yan (2011), Dittmar and Duchin (2016), Schoar and Zou (2017), Bernile, Bhagwat, and Rau (2017), and Cronqvist and Yu (2017).

[71] For example, S&P downgraded General Electric's credit rating from A to BBB+ a day after the company announced the firing of its CEO (https://www.cnbc.com/2018/10/02/ge-credit-rating-under-review-for-possible-downgrade moodys.html). Accessed on July 01, 2019.

[72] A collective body of prior research shows significant effects of lawyers on the likelihood of compliance breaches of accounting and insider regulations (e.g., Jagolinzer, Larcker, and Taylor, 2011; Krishnan, Wen, and Zhao, 2011; Kwak, Ro, and Suk, 2012; Choudhary, Schloetzer, and Sturgess, 2013; Hopkins, Maydew, and Venkatachalam, 2015; Goh, Lee, and Ng, 2015).

Schipper, 2005; Mansi, Maxwell, and Miller, 2006; Cheng and Subramanyam, 2008; Brogaard, Li, and Xi, 2017), firms led by executives with legal expertise can be associated with lower default risk, and hence exhibit more favorable credit ratings.[73]

We find that around 9.7% of firms in our sample of S&P 1500 firms over the period of 1992-2015 are run by CEOs with a law degree and that firms headed by lawyer CEOs are associated with lower variability in future earnings and stock returns than their peers. Using both market-based and accounting-based measures of information asymmetry, we find that CEO legal expertise increases information transparency. Consistent with our expectation, we document that firms led by CEOs with legal expertise have more favorable credit ratings and lower default risk compared to their peers. These results are robust to different specifications, sampling methods, and controls such as firm characteristics, CEO characteristics as well as the year- and firm-fixed effects.

We acknowledge that the documented effect of CEO legal training and firm' credit risk could suffer from an omitted correlated variable bias. For example, firms could endogenously appoint lawyer CEOs based on certain firm characteristics, and at the same time, these characteristics could influence a firm's credit risk assessment. We discuss four identification strategies to rule out potential endogeneity concerns. *First*, to mitigate a concern that some omitted firm- or performance-characteristics can drive our results, we implement an identification strategy based on CEO turnovers. Specifically, we examine whether CEO turnovers are associated with changes in firm credit ratings by tracking cases of CEO turnovers where we can identify the legal education changes between old and new CEOs. Findings from

[73] Standard & Poor's corporate rating criteria also suggest the impact of information risk on corporate default risk: "*Qualms about data quality would translate into a lower rating and preclude a rating in the upper part of the rating spectrum*" (Standard & Poor's 2004, 120).

the difference-in-difference analysis suggest that an appointment of a CEO with legal training enhances a firm's credit rating, whereas, the opposite is true following an appointment of a CEO without legal background compared to the CEO's predecessors.

Second, we consider the possibility that CEO legal expertise matters more for certain types of firms in certain economic environments than for others. We test the relevance of lawyer CEOs for corporate credit ratings separately for (a) firms facing relatively high and low levels of financial distress, (b) investment-grade and speculative-grade firms, (c) firms facing relatively high and low levels of market competition, and (d) firm with higher and lower levels of past variability. *Third*, we provide additional analysis to rule out the concern that economic bonding could be a potential omitted variable in our model of the association between CEO legal expertise and credit ratings. This concern stems from the possibility that lawyer CEOs can influence issuer-pay rating agencies, which could lead to an increase in ratings. We find no significant evidence supporting this possibility.

Finally, we consider several alternative explanations and find that lawyer CEOs have an influence on credit risk assessment independent of CEO ability, risk-taking incentives, network centrality, corporate governance, or other top management with relevant oversight roles.

Next, we examine whether lawyer CEOs matter in the pricing of debt capital. While sophisticated market participants such as credit rating agencies can incorporate CEO legal expertise into their credit rating assessment, it is also important to understand whether, and to what extent, lawyer CEOs impact bond's investor required rates of return. We consider all new non-convertible fixed-rate corporate bonds issued and find that firms led by lawyer CEOs, on average, have about 7.35% (about 9.68 basis points, or bps) lower costs than firms headed by non-lawyer CEOs. Finally, we examine whether other firm stakeholders (i.e., auditors) value

CEO legal expertise in the pricing of their services. We find that firms led by lawyer CEOs, on average, pay about 5.82% lower audit fees than firms headed by non-lawyer CEOs.

This chapter contributes to the literature in two ways. First, it contributes to a strand of literature investigating determinants of credit rating assessment. To the best of our knowledge, we are the first to examine the effect of lawyer CEOs on credit risk assessments. We find that CEO legal expertise is an important credit risk factor incremental to firm fundamentals. To that extent, this chapter is aligned with Kuang and Qin (2013), Bonsall, Holzman, and Miller (2017), Cornaggia, Krishnan, and Wang (2017) and Bernile, Bhagwat, and Rau (2017) who show that CEOs' personal traits should be considered when assessing their firms' default risk. We also find that CEO legal training is important to pricing in the debt markets with firms headed by lawyer CEOs associated with narrower credit spread offerings. This effect is incremental to the inclusion of credit ratings, suggesting that CEO legal expertise is an independent factor in debt pricing decisions beyond the effect of credit ratings.

Second, this chapter contributes to a growing literature that aims to understand the implications of managerial background, behavior, and experiences on corporate policies and outcomes. We contribute to this line of research by showing that executives' legal expertise plays significant roles in their firms' default risk and cost of debt capital. We also find that CEO legal training is an important determinant that auditors impound into the pricing of their audit services.

The remainder of this chapter proceeds as follows. Section 4.2 describes the data collection and our sample. Section 4.3 discusses our baseline regression findings. In Section 4.4, we discuss identification strategies. Section 4.5 and Section 4.6 discuss further analyses. Section 4.7 concludes the chapter.

4.2. Data and variables

In this section, we present our data and sample selection. We first describe our sample. We then discuss the main measures for credit ratings, lawyer CEOs, and control variables. Finally, we provide the descriptive statistics of the variables.

4.2.1. Data and the sample

We obtain information on stock prices, stock returns, and trading volumes from CRSP. Compustat is our source for firm-specific accounting data and credit rating. We obtain data for the number of analysts following from the Institutional Brokers' Estimate System (I/B/E/S) database and Institutional ownership data from Thomson Reuters Institutional (13F) holdings. We obtain a full list of ExecuComp data on Standard & Poor's 1500 firms and their CEOs for the period of 1992–2015. We obtain additional data on managerial compensation, age, tenure from ExecuComp, and data on boards of directors from Institutional Shareholder Services database (ISS). We source corporate social rating data from Kinder, Lydenberg, and Domini Research & Analytics (KLD) database. We obtain corporate bond data from Mergent Fixed Income Securities Database. We source audit fee data and other standard control variables from Audit Analytics database. To avoid the effects of outliers, we winsorize all continuous variables at the first and 99th percentiles. Consistent with prior research (e.g., Cheng et al., 2008), we exclude from our sample financial and utility firms. Our final sample consists of 11,313 firm-year observations spanning 1992–2015. We provide a detailed description of the variables in Appendix 4A.

4.2.2. Measure of Credit Rating

We obtain Standard & Poor's Long-term Domestic Issuer Credit Rating from Compustat. Following prior literature on credit risk assessment (e.g., Ashbaugh-Skaife, Collins, LaFond, 2006; Kim, Kraft, and Ryan, 2013; Kuang and Qin, 2013; Bonsall, Holzman, and Miller, 2017; Cornaggia, Krishnan, and Wang, 2017), we construct numeric variables reflecting the ratings of the issuers in our sample. Specifically, we translate ratings numerically, increasing in credit quality as follows: D (or SD) = 1 to AAA = 22. We provide details for credit rating classifications in Appendix 4B.

4.2.3. Measure of Lawyer CEOs

We hand-collect information on the personal characteristics and educational background of the executives from Marquis "Who's Who" and BoardEx, which are two of the most comprehensive databases with CEOs' personal biographical details. Specifically, we identify CEOs by name using Execucomp classification (data item CEOANN = CEO). We classify a manager as a lawyer CEO, *LAWYER_CEO* = 1, if the CEO has a law degree ("LLB," "BCL," "LLM," "LLD," and "JD") or if the CEO has a Ph.D. in Jurisprudence.

To control for other known CEO characteristics, we hand-collect information on CEO's country of birth, educational qualifications, year of birth, and various other personal biographical details from Marquis Who's Who, BoardEx, and several other databases, including Notable Name Database (NNDB.com), Reference for Business, Bloomberg.com, Wikipedia, or Google searches in the last instance, to cross-check the information for each CEO characteristic obtained from Marquis Who's Who. This process allows us to compile a comprehensive and fine-grained data set of several CEO attributes. We also compute CEO risk incentives, measured as the natural logarithm of *DELTA* and *VEGA* from compensation contract data following the methodology in Core and Guay (2002).

4.2.4. Descriptive statistics

Panel A of Table 4.1 presents the descriptive statistics for the variables. For each variable, we provide information about the total number of observations, the mean and median values, the standard deviation, and the values at the 25th and 75th percentiles.

[Insert Table 4.1 about here]

Firms headed by CEOs with legal degrees account for 9.7% of the total number of companies in our sample. The average firm has the logarithm of firm size (*SIZE*) of 8.23 and 29.5 percent book debt financing. The average firm earns 4.20 percent of the return on assets (*ROA*), and covers its interest 18.33 times; 15.7 percent of firm-year observations are associated with negative earnings, have a book-to-market ratio of 1.18 and have the natural logarithm of the number of analysts issuing an annual forecast (*NUM_ANALYST*) of 2.43. In addition, the average firm has the logarithm of delta and vega (*LN_DELTA* and *LN_VEGA*) of 5.643 and 4.366, respectively. Regarding credit rating measure, the average rating (*RATING*) is 13.194 on average and 13 at the median, corresponding to the medium ratings (BBB-). Our credit rating and firm characteristics are in line with prior studies (Ashbaugh-Skaife et al., 2006; Cheng et al., 2008; Kuang and Qin, 2013; Bonsall et al., 2017; Cornaggia et al., 2017).

4.3. Main results

In this section, we examine the relation between lawyer CEOs and credit ratings. We start our analysis by examining the effect of CEO legal expertise on variability in future performance and information risk. We then present the baseline regression results of the relation between lawyer CEOs and credit risk assessment. We discuss these analyses in detail below.

4.3.1. Lawyer CEOs and future variability analyses

We begin by examining whether firms headed by lawyer CEOs are associated with lower variability in future performance. We follow Bonsall et al. (2017) and use earnings volatility (*STDROA_FUTURE*) and return volatility (*STDRET_FUTURE*) to capture the variability in future performance and examine this association by estimating the following OLS models:

$$STDRET\_FUTURE_{i,(t+1,\,t+4)} = \beta_0 + \beta_1 LAWYER\_CEO_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVERAGE_{i,t} + \beta_4 ROA_{i,t} + \beta_5 BTM_{i,t} + \beta_6 STDRET\_PAST_{i,t} + Year\ FEs + Firm\ FEs \quad \text{Eq.(1a)}$$

$$STDROA\_FUTURE_{i,(t+1,\,t+4)} = \beta_0 + \beta_1 LAWYER\_CEO_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVERAGE_{i,t} + \beta_4 ROA_{i,t} + \beta_5 BTM_{i,t} + \beta_6 STDROA\_PAST_{i,t} + Year\ FEs + Firms\ FEs \quad \text{Eq.(1b)}$$

where *STDRET_FUTURE* (*STDROA_FUTURE*) is a measure of future variability of earnings (stock returns). *STDROA_FUTURE* is measured as the standard deviation of ROA over the four years following the current year. Similarly, we measure the variability in future returns, *STDRET_FUTURE*, as the standard deviation of monthly returns over the four years following the current year.

Regarding control variables, following Demerjian et al. (2012) and Bonsall et al. (2017), we control for firm size (*SIZE*), expected growth prospects (*BTM*), and return on assets (*ROA*). We future control for book leverage (*LEVERAGE*) and the standard deviation of prior stock returns, *STDRET_PAST*, (or the standard deviation of prior *ROA*, *STDROA_PAST*) to correspond with the dependent variables.[74] Finally, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with the volatility of

[74] The variable *STDROA_PAST* is the standard deviation of return on assets (*ROA*) over the four-year period ending at the end of fiscal year t (i.e., [*t*-3, *t*]). The variable *STDRET_PAST* is the standard deviation of monthly stock returns over the 48-month period ending at the end of fiscal year t (i.e., [*t*-3, *t*]).

future returns or earnings; *t*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported. We report results for these tests in Table 4.2.

[Insert Table 4.2 about here]

Panel A of Table 4.2 provides results related to future stock return volatility. We present two regression specifications, one without any firm-specific control variables and one with firm-specific control variables. We document in both equations that *LAWYER_CEO* is significantly negatively associated with future stock return variability (*t*-statistics of -4.48 and of -3.83, without and with firm-specific control variables, respectively). The results suggest that firms led by CEOs with legal expertise are associated with lower variability in future stock returns.

Panel B of Table 4.2 provides results related to future ROA volatility. Consistent with Panel A, we present in Panel B two regression specifications, one without any firm-specific control variables and one with firm-specific control variables. We consistently find in both equations the significantly negative relation between CEOs' legal expertise and the variability in future ROA. These findings, combined with those from Panel A, suggest that firms led by CEOs with legal expertise are associated with lower variability in future earnings and stock returns. As rating agencies incorporate the variability of firm's future performance into their rating decisions (Kaplan and Urwitz, 1979; Blume, Lim, and MacKinlay, 1998), Table 4.2's results suggest the legal expertise of CEOs may impact the credit rating assessment by reducing the future variability. We will discuss this possibility in Section 4.3.3.

4.3.2. Lawyer CEOs and Information quality

We continue our analysis by examining whether CEO legal expertise helps negate information asymmetry problems. We consider both market-based and accounting-based proxies for information asymmetry, including (1) price delay measure (Hou and Moskowitz, 2005), (2) bid-ask spread (Diamond and Verrecchia, 1991; Lee, Mucklow, and Ready, 1993; Leuz and Verrecchia, 2000; Frankel and Li, 2004), (3) analysts' forecast error (Zhang 2006; Lang, Lins, and Maffett, 2012; Dai, Parwada, and Zhang 2015), and (4) financial statement comparability (De Franco, Kothari, and Verdi, 2011).

Our first measure of information asymmetry, price delay, captures how quickly stock price adjusts to new information. Information imperfections such as asymmetry hinder timely price discovery and are associated with a delayed stock price adjustment to information (Verrecchia, 1980; Callen, Govindaraj, and Xu, 2000; Callen, Khan, Lu, 2013). We follow Hou and Moskowitz (2005) and construct our price delay measure. Specifically, at the end of June of each calendar year, we run a regression of each stock's weekly returns on contemporaneous returns and four weeks of lagged returns on the market portfolio over the period of a year as follows:

$$r_{j,t} = \alpha_j + \beta_j R_{m,t} + \sum_{n=1}^{4} \delta_j^{(-n)} R_{m,t-n} + \varepsilon_{j,t} \qquad \text{Eq. (2)}$$

where $r_{j,t}$ is the return on stock j and $R_{m,t}$ is the return on the CRSP value-weighted market index in week *t.* If the stock price response to information with a lag, some of the $\delta_j^{(-n)}$will differ from zero (Hou and Moskowitz (2005). Equation (2) is estimated as above (unrestricted model) and with the restriction that all $\delta_j^{(-n)}$ are zero (restricted model). We then compute

price delay measure, *PRICE_DELAY*, as one minus the ratio of the restricted R^2 to the unrestricted R^2:

$$PRICE\_DELAY = 1 - \left[\frac{R^2_{restricted}}{R^2_{unrestricted}}\right] \quad \text{Eq. (3)}$$

The higher the price delay, the higher information asymmetry.

Bid-ask spread is our second measure of information asymmetry. The greater information asymmetry between informed and liquidity traders leads to wider spread (Glosten and Milgrom, 1985; Lee et al., 1993; Easly, Kiefer, O'Hara, and Paperman, 1996; Frankel and Li, 2004; Bushee, Core, Guay, and Hamm, 2010). We follow Corwin and Schultz (2012) and estimate daily bid-ask spreads for each stock using daily high and low prices from CRSP. We then compute the annual spread for each stock based on an average daily spread over a year (*BID-ASK SPREAD*). The higher the spread, the higher information asymmetry.

We use analysts' forecast error as the third measure of information asymmetry. Analysts play significant information processing roles (Lang, Lins, and Miller, 2004) and greater accuracy of analyst forecast reflects greater transparency of the firm's information environment (Zhang, 2006; Lang et al., 2012; Dai et al., 2015). Analyst forecast error (*FORECAST_ERROR*) is measured as the absolute difference between the mean annual analysts' earnings forecasts and the actual firm earnings scaled by the firm's stock price (Anderson, Duru, and Reeb, 2009; Bernile, Korniotis, Kumar, and Wang, 2015). We compute the analyst forecast error measure using data from the Institutional Brokers' Estimate System (I/B/E/S) database. The higher the forecast error, the higher information asymmetry.

Our final proxy for information asymmetry is financial report comparability (*FS_COMPARABILITY*).[75] Financial report comparability measures how closely a firm's financial reports mimic another firm's financial reports if both firms are exposed to the same economic condition. De Franco, Kothari, and Verdi (2011) find that higher financial report comparability is positively associated with analyst forecast accuracy, and hence negatively associated with the degree of information asymmetry.

We examine whether firms headed by lawyer CEOs are associated with lower information risk by estimating the following OLS models:

$$IA_{i,t+1} = \beta_0 + \beta_1 LAWYER\_CEO_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 LEVERAGE_{i,t} + \beta_4 BTM_{i,t} + \\ + \beta_5 NUM\_ANALYST_{i,t} + \beta_6 R\&D_{i,t} + \beta_7 STDRET_{i,t} + Year\ FEs + Firm\ FEs \qquad \text{Eq.(4)}$$

where *IA* refers to four measures of information asymmetry, including *PRICE_DELAY*, *BID-ASK SPREAD*, *FORECAST_ERROR*, and *FS_COMPARABILITY*.

Regarding control variables, following Anderson et al. (2009), Bharath, Pasquariello, Wu (2009) and De Franco et al. (2011), we control for firm size (*SIZE*), expected growth prospects (*BTM*), book leverage (*LEVERAGE*), and the standard deviations of stock return (*STDRET)*. We include a number of analysts following a firm (*NUM_ANALYST*) as analyst coverage is inversely related to information asymmetry (Zhang, 2006; Chang, Dasgupta, and Hilary, 2006; Lang et al., 2012). We further control R&D expenditure for as high R&D spending could increase asymmetric information problems (Aboody and Lev, 2000; Grullon, Kanatas, and Weston, 2004; Kale and Loon, 2011).[76] Finally, we control for year- and firm-fixed effects to

[75] We thank Rodrigo Verdi for making the financial report comparability data available through his website http://mitmgmtfaculty.mit.edu/rverdi.

[76] We use an indicator variable, *R&D*, that is equal to 1 if firm's R&D spending is positive in a given year and zero otherwise.

control for time- and firm-invariant factors that could be associated with the corporate information environment; *t*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported. We report results for these tests in Table 4.3.

[Insert Table 4.3 about here]

For each measure of information asymmetry, we present two regression specifications, one without any firm-specific control variables and one with firm-specific control variables. We document in both equations and across different measures of information asymmetry that *LAWYER_CEO* is significantly negatively associated with future information risk. The results suggest that CEO legal expertise enhances corporate information environment, which implies a reduction in default risk and corresponding favorable credit rating (Francis et al., 2005; Mansi et al., 2006; Cheng and Subramanyam, 2008; Brogaard et al., 2017). Taken together, the results of Table 4.2 and Table 4.3 suggest the legal expertise of CEOs matters for credit rating assessment. We examine this possibility in the next section.

4.3.3. Credit rating analyses

In this section, we examine whether, and to what extent, the legal expertise of CEOs affects assessed credit risk. We use the following regression:

$$RATING_{i,t} = f\,(LAWYER\_CEO_{i,t-1}, FIRMCTRL_{i,t-1}, FIRM\ FEs, YEAR\ FEs), \quad \text{Eq.(5)}$$

where *RATING* is the S&P issuer credit rating; *LAYWER_CEO* is an indicator that takes the value of 1 a CEO has a law degree; *FIRMCTRL* refers to firm-level control variables, and *FIRM FEs* (*YEAR FEs*) refer to firm-fixed effects (year-fixed effects).

We also control for various firm characteristics and performances that are documented to be associated with firm credit risk assessment. Specifically, we include firm size (*SIZE*) as

larger firms tend to face lower risk and thus have higher credit ratings (Ashbaugh-Skaife et al., 2006; Bonsall et al., 2017). Following prior studies (e.g., Kaplan and Urwitz, 1979; Lamy and Thompson, 1988; Ziebart and Reiter, 1992; Ashbaugh-Skaife et al., 2006; Bonsall et al, 2017; Cornaggia et al., 2017), we use debt-to-asset ratio (*LEVERAGE*), return-on-assets (*ROA*), interest coverage (*INT_COV*), and an indicator of whether the firms report negative earnings in a prior fiscal year (*LOSS*) to proxy for a firm's default risk. We control for differences in firms' asset structure (*CAP_INTEN*) as firms with greater capital intensity tend to be less risky to debt providers, and thus are expected to have more favorable credit ratings. We control for differences in firms' debt structure by including the indicator variable, *SUBORD*, which is equal to 1 if the firm has subordinated debt and zero otherwise (Kaplan and Urwitz, 1979; Ashbaugh-Skaife et al., 2006). We include the number of analysts following a firm (*NUM_ANALYST*) as Cheng and Subramanyam (2008) find that analyst following is negatively associated with default risk, and thus positively related to credit ratings. We further control for the book-to-market ratio (*BTM*), the standard deviations of stock return (*STDRET)* and the volatility of a firm's operating cash flow (*STDCFO*) to capture expected growth prospects and risk factors that are reflected in equity returns (Francis et al., 2005; Bhojraj and Segupta, 2003; Cheng and Subramanyam, 2008; Cornaggia et al., 2017). Finally, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with credit ratings. We also lag all independent variables by one year relative to the credit rating measures to avoid potential reverse causality issues. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported. We present the baseline regression results in Table 4.4.

[Insert Table 4.4 about here]

We present four regression specifications: (1) a model without any firm-specific control variables, (2) a model with firm-specific control variables that relate to credit risk assessment, (3) a model with additional controls for expected growth prospects and risk factors that are reflected in equity returns, and (4) a model with all control variables and fixed effects. We find that the coefficient estimates for the *LAWYER_CEO* variable are positive and significantly related to the measure of credit rating and the results hold for different model specifications. These findings suggest that firms headed by lawyer CEOs have more favorable credit ratings. Regarding control variables, we observe that credit risk assessment is more favorable for larger firms, firms with higher return-on-asset ratio, firms with higher capital intensity, firms with higher expected growth prospects and firms with higher number of analyst following while credit rating is lower for firms with higher leverage, firms that report negative earnings in the prior fiscal year, firms with subordinated debt, and firms with higher stock return volatility and higher cash flow volatility. These findings are consistent with prior studies on the determinants of credit risk assessment (see, among others, Kaplan and Urwitz, 1979; Bhojraj and Sengupta, 2003; Francis, LaFond, Olsson, and Schipper, 2005; Ashbaugh-Skaife et al., 2006; Cheng et al., 2008; Kuang and Qin, 2013; Bonsall et al, 2017; Cornaggia et al., 2017).

4.4. Identification Strategy

In this section, we discuss identification strategies to rule out potential endogeneity concerns. We first discuss the CEO turnover test. We then consider cross-sectional analyses. We further discuss alternative explanations for the documented effect of CEO legal expertise

on credit risk assessment. Finally, we discuss various robustness checks based on alternative model specifications and sampling methods.

4.4.1. CEO turnover test

While we find a robust positive relation between CEO legal training and firm' credit risk, our findings could suffer from an omitted correlated variable bias. Specifically, firms could endogenously appoint lawyer CEOs based on certain firm characteristics. At the same time, these characteristics could influence a firm's credit risk assessment. Even though we control for various firm characteristics in our baseline regression model, there could be other unobservable factors for which we fail to control. In the discussion that follows, we make several attempts to alleviate this concern.

First, we control for firm-fixed effects in all regressions to account for time-invariant firm-specific omitted variables. Second, to mitigate a concern that some omitted firm- or performance-characteristics can drive our results, we further implement an identification strategy based on CEO turnovers. We examine whether CEO turnovers are associated with changes in firm credit ratings by tracing cases of CEO turnovers where we can identify the legal education changes between old and new CEOs. Specifically, to identify cases of significant change in the educational background between CEOs, we use a dummy variable *CEO_CHANGE*, which takes a value of one if the new CEO is from a non-lawyer CEO to a lawyer CEO or from a lawyer CEO to a non-lawyer CEO and zero otherwise. Firm-year observations with *CEO_CHANGE* equaling one are considered treated firms. Each firm-year observation in the treated group is matched with a firm-year observation in the control group (*CEO_CHANGE* equals zero) using the nearest-neighbor propensity score matching procedure. The matched pair is obtained in the year before the CEO turnover and is based on all firm characteristics (as discussed in the baseline model) and the industry (based on two-digit

Standard Industrial Classification (SIC)). We use a dummy variable *POST*, which takes the value of one if year observation is in the three-year period after the turnover and zero otherwise.

To avoid potential noises from other corporate events, we only consider the period of three years before and three years after the turnover. We use the interaction term *CEO_CHANGE*×*POST* to capture the *difference-in-difference* effect of CEO legal background on credit rating. We rerun our baseline regression with the addition of the interaction term *CEO_CHANGE* ×*POST* and report results of this CEO turnover analysis in Table 4.5.

[Insert Table 4.5 about here]

In our sample, there are 73 cases where there are changes from non-lawyer CEOs to lawyer CEOs and 94 cases whether lawyer CEOs are replaced by non-lawyer CEOs. The coefficients on our variable of interest, *CEO_CHANGE*×*POST*, are significantly positive for cases where there are changes from non-lawyer CEOs to lawyer CEOs (Column 1) and significantly negative for cases where lawyer CEOs are replaced by non-lawyer CEOs (Column 2). Overall, the turnover results indicate that an appointment of a CEO with legal training enhances a firm's credit rating, whereas, the opposite is true following an appointment of a CEO without legal background compared to the CEO's predecessors.[77]

[77] We further examine the mechanism(s) through which the appointment of a CEO with legal training (or the appointment of a CEO without legal background) compared to the CEO's predecessor impacts a firm's credit risk assessment. We find in Appendix Table A4.1 that the appointment of a CEO with legal training reduces the future variability of corporate earnings and enhances the corporate information environment, whereas changes from lawyer CEOs to non-lawyer CEOs are associated with greater future variability and a higher degree of information asymmetry. These findings further confirm that CEO legal expertise reduces corporate default risk by increasing information transparency and reducing future earnings variability.

4.4.2. Cross-sectional analysis

We consider the possibility that CEO legal expertise matters more for certain types of firms in certain economic environments than for others. Specifically, we test the relevance of lawyer CEOs for corporate credit ratings separately for (1) firms facing relatively high and low levels of financial distress, (2) investment-grade and speculative-grade firms, (3) firms facing relatively high and low levels of market competition, and (4) firm with higher and lower levels of past variability.

First, we use Altman Z-score to proxy for financial distress and estimate our baseline regression (Equation (6)) separately for groups with above- and below-median levels of financial distress. Consistent with previous sections, in all regressions, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with credit risk assessment. We report results for this test in Columns (1) and (2) of Table 4.6.

Comparing the two subsamples, we observe that the coefficient on *LAWYER_CEO* is significantly positive in the group with above-median distress levels and not statistically significant in the low-distress group. A test for coefficient differences across the high- and low-distress subsamples indicates that the coefficient on *LAWYER_CEO* is statistically larger than for high-distress subsample compared with the low-distress subsample. These results suggest that CEO legal expertise is a significant credit-rating factor independent from its impact on prior firm performance and other observable characteristics (such as size, capital intensity, and capital structure) but only for firms with higher than the median probability of financial distress.

Second, we rerun our baseline model (Equation (6)) for subsamples of firms divided into investment grade (S&P rating better than or equal to BBB-) and speculative grade (S&P rating below BBB-). We argue that credit rating analysts spend more effort into analyzing soft

information to assess speculate-grade firms than investment-grade firms. We report results for this test in Columns (3) and (4) of Table 4.6.

[Insert Table 4.6 about here]

We find that the coefficient on *LAWYER_CEO* is significantly positive in the speculative-grade subsample and not statistically significant in the investment-grade subsample. Using seemingly unrelated estimation and Wald tests for the coefficient differences across the investment- and speculative-grade subsamples, we find the coefficient in the speculative-grade group is statistically larger than the coefficient in the investment-grade group. Taken together, results of Columns (1) to (4) in Table 4.6 suggest that CEO legal expertise is beneficial to creditors specifically among firms for which creditors face relatively high credit risks.

Third, we test the relevance of Lawyer CEOs for corporate credit ratings separately for firms facing above- and below-median levels of product market threats. Following Gaspar and Massa (2006), Peress (2010), and Kale and Loon (2011), we use the Lerner index (*LERNER*) to capture product market threats. Specifically, we measure *LERNER* as the ratio of operating profit to sales, where operating profit is sales less cost of goods sold, along with selling, general and administrative expenses. A low (high) Lerner index indicates a relatively low (high) market competition. We then rerun the baseline regression (Equation (6)) for two groups of firms based on their measure of market threats and observe that the coefficient on *LAWYER_CEO* is significant in both subsamples of firms. A test for coefficient differences across the high- and low-market competition subsamples suggests that the coefficient on *LAWYER_CEO* is statistically larger than for high-competition subsample compared with the low-competition subsample. Results of Columns (5) and (6) in Table 4.6 suggest that CEO legal training is a

more important credit rating factor (independent from its impact on firm characteristics) for firms facing higher levels of market competition.

Finally, we examine whether the impact of CEO legal expertise on credit risk assessment is more pronounced among firms that operate in a highly uncertain environment. We conjecture that legal training that gives CEOs an edge in facilitating risk management is likely to have a stronger impact on credit quality in higher risk circumstances. To test this possibility, we run the baseline regression (Equation (6)) separately for two subsamples of firms based the median of the standard deviation of daily returns during the previous fiscal year and report results for this test in Columns (7) and (8) of Table 4.6. We observe that the coefficient on *LAWYER_CEO* is significant in both subsamples of firms. We test the coefficient differences across the high- and low-variability subsamples, we find the coefficient in the high-variability subsample is statistically larger than the coefficient in the low-variability subsample. Collectively, results of Columns (7) and (8) support our prediction that CEO legal expertise impacts credit risk assessment to a greater extent when firms operate in a highly uncertain environment.

4.4.3. Testing for Economic Bonding

In this section, we attempt to mitigate the concern that economic bonding could be a potential omitted variable in our model of the association between CEO legal expertise and credit ratings. This concern stems from the possibility that lawyer CEOs can influence issuer-pay rating agencies, which could lead to an increase in ratings. Although these potential bonding relationships are unobservable and hence cannot be completely ruled out, we provide several additional tests to mitigate this concern.

First, we examine whether the economic bonding between firm managers and credit rating agencies increases over time, which potentially allows managers to influence credit

ratings. We run the baseline regressions separately for a subsample of firms with short-tenure CEOs (no more than 3 years) and long-tenure CEOs (more than 3 years). If the economic bonding is an omitted variable in our model of the association between CEO legal expertise and credit ratings, we should observe a more pronounced effect among the long-tenure subsample. Results of Columns (1) and (2) of Table 4.7 suggest that the effect of lawyer CEOs on credit ratings are statistically significant in both the long- and short-tenure CEOs groups. Using seemingly unrelated estimation and Wald test for the coefficient differences across the two subsamples, we find no significant difference in the magnitude of the association between CEO legal expertise and credit rating in two subsamples. These findings suggest that the economic bond is less likely a significant omitted variable in our model.

Second, we consider the possibility that firm managers can have greater incentives to build economic bonds with credit rating agencies if their firms' ratings are close to the investment grade cutoff. These incentives may arise because of restrictions on holding speculative grade assets for institutional investors (Bonsall et al., 2017). We test this possibility by examining the impact of lawyer CEOs for a subsample of firms with ratings just above and below the investment cutoff relative to firms in the other rating categories.[78] Results of Columns (3) and (4) of Table 4.6 suggest that the effect of lawyer CEOs on credit ratings are statistically significant in both the subsample close to investment grade cutoff and the subsample outside the cutoff. We also find no significant difference in the magnitude of the association between CEO legal expertise and credit rating in two subsamples. These findings further confirm that economic bonds are not significant omitted variables in our model.

Finally, one may also expect that personal social networks of CEOs may allow them to create economic bonds with credit rating agencies, and these personal connections can lead to

[78] This subsample consists of firms with ratings of BBB+, BBB, BBB-, BB+, BB, and BB-.

lower costs of debt contracting (Engelberg, Cao, and Parsons, 2012). To address this concern, we use a measure of CEO social ties constructed from the BoardEx database and run the baseline regression separately for a subsample of firms led by CEOs with above-median network centrality and for a subsample of firms headed by CEOs with below-median network centrality.[79] We find that the effect of lawyer CEOs on credit ratings persists in both subsamples. We also find no significant difference in the magnitude of the association between CEO legal expertise and credit rating in these two subsamples. Findings from Columns (5) and (6) of Table 4.7 suggest consistently support that an economic bond is less likely a concern in our model.

4.4.4. Alternative explanations

In this section, we consider alternative explanations. Specifically, we examine whether other CEO characteristics, other top managers, or corporate governance affect the relation between Lawyer CEOs and credit risk assessment. We discuss these analyses in detail below.

CEO ability

One possible concern about our *LAWYER_CEO* variable is that it simply captures CEO ability and firms led by CEOs with higher ability can exhibit more favorable credit ratings (Bonsall et al., 2017; Cornaggia et al., 2017). To ensure that CEO legal expertise have an influence on credit rating independent of CEO ability, we rerun baseline regression (Equation (6)) and further control for five proxies for CEO ability, including the managerial ability score as in Demerjian et al. (2012) and four education indicators (*MBA*, *PHD*, *IVY_EDUC*, and

[79] We thank William McCumber for providing the CEO network data.

FINANCIAL_EDUC).[80] We report results for this test in Model (1) in Table 4.8.[81] The results suggest that lawyer CEOs have an influence on credit rating independent of managerial ability.

[Insert Table 4.8 about here]

CEO risk-taking incentives

Kuang and Qin (2013) find a positive relation between managerial risk-taking incentives and the firm's default rate. This finding raises the possibility that CEO legal expertise can capture certain aspects of the CEO's risk-taking incentives and hence can affect credit risk assessment. To rule out this possibility, we augment our baseline model with two proxies for managerial risk-taking incentives, namely *LN_DELTA* and *LN_VEGA*. Following prior literature (e.g., Core and Guay, 2002; Coles, Daniel, and Naveen, 2006; Anantharaman and Lee, 2014), we measure *LN_DELTA* (*LN_VEGA)* as the natural logarithm of one plus the change in wealth in dollars associated with a 1% change in the firm's stock price (the standard deviation of the firm's returns). Results for this test, reported in Model (2) of Table 4.8, suggest that lawyer CEOs have an influence on credit rating independent of managerial risk-taking incentives.

CEO network centrality

[80] We thank Peter Demerjian, Sarah McVay, and Baruch Lev for making the managerial ability data available at their websites: http://faculty.washington.edu/pdemerj/data.html

[81] Although, in Table 4.8, we control for a comprehensive set of proxies of CEO ability and document a statistically and economically effect of CEO legal expertise and credit ratings, it is possible that *LAWYER_CEO* can still capture certain aspects of a CEO's ability that are not manifested in the educational record or work experience. To rule out the possibility that the effect of lawyer CEOs on credit risk assessment operates only through the effect of executive ability on credit ratings, we conduct a further test and report the results in Appendix Table A4.2. Taken together, the results of Tables 4.8 and A4.2 suggest that lawyer CEOs have an influence on credit ratings independent of the effect of CEO ability, risk-taking incentives, overconfidence, networks, or corporate governance.

Prior studies suggest that social networks of executives affect firm outcomes (Hwang and Kim, 2009; Engelberg, Gao, and Parsons, 2012; Fracassi and Tate, 2012; El-Khatib, Fogel, and Jandik, 2015; Karolyi, 2018). Regarding credit risk assessment, Skousen, Song, and Sun (2018) find a positive relation between CEO network centrality and bond ratings, suggesting that firms with better-connected CEOs are more likely to receive high bond ratings. Iyer, Kemper, and Zhao (2018) document that larger board networks are associated with higher credit ratings. To rule out the possibility that the effect of lawyer CEO on credit risk assessment operates only through the effect of the executive network on credit rating, we augment our baseline model with a measure of CEO network centrality constructed from BoardEx database. Model (3) reports the results for this test. The results suggest that lawyer CEOs have an influence on credit rating independent of the CEO network.

CEO overconfidence

CEO behavioral traits such as overconfidence matter for various corporate behavior and decisions.[82] Managerial overconfidence also impacts credit risk (Hribar, Kim, Wilson, and Yang, 2013). We, therefore, control for CEO overconfidence to ensure that CEO legal expertise has an influence on credit rating independent of overconfidence. Following Campbell et al. (2011), Hirshleifer et al. (2012), and Kim, Wang, and Zhang (2016), we construct the modified Malmendier and Tate (2005) option-based measure of CEO overconfidence and define a CEO as overconfident if the CEO holds options that are more than 67% in the money at least twice during the sample period. The variable *HOLDER_67* is a dummy variable that takes the value of one for such a CEO (i.e., the CEO holds options that are more than 67% in the money at

[82] See, for example, Malmendier and Tate (2005, 2008), Goel and Thakor (2008), Malmendier, Tate, and Yan (2011), Galasso and Simcoe (2011), Hirshleifer, Low, and Teoh (2012), Kaplan, Klebanov, and Sorensen (2012), and Ho, Huang, Lin, and Yen (2016).

least twice during the sample period) and zero otherwise. Model (4) of Table 4.8 shows the results for this test.

We further control for other relevant CEO characteristics documented in the literature, including CEO age, gender, tenure, a measure of CEO general skills (*GENERAL_CEO*) as in Custódio, Ferreira, and Matos (2013), and an indicator of whether a CEO is foreign-born (*FOREIGN CEO*). We report the result for these analyses in Model (5) of Table 4.8. In addition, we augment our baseline model with all CEO characteristics from Models (1) to (5) and report results for this test in Model (6). Our sample size ranges from 759 to 10,987 firm-year observations, due to the availability of CEO characteristics. We find that there is no material change in the size of the coefficient for *LAYWER_CEO* across different model specifications. Taken together, Panel A's findings suggest that the effect of CEO legal expertise on credit risk is not confounded by any of the above CEO characteristics.

General Counsels

We continue our analysis by examining whether the effect of CEO legal training on credit risk assessment is driven by other corporate top managers with relevant oversight roles. A growing literature examines the role of general counsels (GC) on the corporate information environment and provides mixed findings.[83] Ham and Koharki (2016) empirically examine the association between corporate GC and firm credit risk and find that credit risk increases following GC promotion to senior management. We control for corporate GC to ensure that CEO legal expertise has a direct influence on credit rating independent of GC. Following Kwak

[83] On the one hand, general counsels play significant roles in facilitating corporate transparency by issuing more accurate and less optimistic forecasts (Bamber et al., 2010; Kwak, Ro, and Suk, 2012) or reducing the usage of executives' private information via insider trading (Jagonlinzer et al., 2011). On the other hands, highly paid general counsels tend to facilitate rather than inhibit aggressive financial reporting practices, resulting in lower financial reporting quality (Hopkin, Maydew, and Venkatachalam, 2015).

et al. (2012), Hopkin et al. (2015) and Ham and Koharki (2016), we use the annual title from the Execucomp database to construct our GC measure. Specifically, to identify executives who are general counsels, we search the annual titles of the executive-firm-years for words containing "*counsel*", "*law*", "*legal*", and similar variants.[84] We manually search the executives' titles and exclude the titles that do not refer to legal experts such as tax counsel and investment counsel. Our measure of corporate counsel, *GC*, is a dummy variable that takes the value of one if a firm has a corporate counsel among top five highest-paid executives and zero otherwise. We augment our baseline model with the *GC* variable and report results for this test in Model (7) of Table 4.8.

Lawyer CFOs

In the final set of sensitivity analyses, we examine whether the legal training of chief financial officers (CFOs) affects the effect of CEO legal expertise on a firm's credit risk. One could argue that CEOs make strategic decisions while CFO makes the financing decisions and that the CFO's legal training should be more important than that of the CEO. On the other hand, Malmendier, Tate, and Yan (2011) posit that, although CFOs design the financing decision, the CEO has the final say. Nevertheless, we hand-collect CFO educational background and conduct further tests to ensure our results are not explained by CFO legal education. Specifically, first, we follow Jiang, Petroni, and Wang (2010) and Ge, Matsumoto, and Zhang (2011) and identify CFOs based on managers' titles in Execucomp data that include any of the following phrases: *CFO, chief financial officer, treasurer, controller, vice president-finance, VP finance*. We then manually collect each CFO's educational background from

[84] We follow Kwak et al. (2012) and consider the following titles on Execucomp to be a general counsel: "general counsel", "chief legal officer", "chief legal executive", "chief legal counsel", "chief counsel", "VP counsel", "vice president for law and public affairs'", "vice president for law and government affairs", "vice president for law and corporate affairs", "vice president for legal affairs", and "vice president of corporate affairs".

BoardEx and Marquis Who's Who. Consistent with lawyer CEOs, we classify a CFO as a lawyer CFO, *LAWYER_CFO* = 1, if the CFO has a law degree. We rerun our baseline model after controlling for *LAWYER_CFO*. Results of Model (8) in Table 4.8 suggest that lawyer CEOs have a significant influence on credit rating, even after controlling for CFO legal training.

Corporate Governance

Next, we consider whether corporate governance can explain the effect of CEO legal expertise on a firm's credit risk. The importance of corporate governance for corporate information environment and risk-taking has been intensively documented in the literature.[85] In the context of credit risk assessment, Klock, Mansi, and Maxwell (2005) find firms with strong antitakeover provisions are associated with a lower cost of debt financing while Ashbaugh-Skaife et al. (2006) show that firms with better corporate governance have more favorable credit ratings. A potential concern is that the documented effect of lawyer CEO on credit ratings could be driven by the strength of the firm's corporate governance. We examine this possibility by augmenting our baseline model with a comprehensive set of governance proxies, including (a) Gompers et al. (2003)'s corporate governance index (*GINDEX*) constructed based on 24 governance provisions, (b) institutional ownership (Bhojraj and Segupta, 2003), (c) takeover index constructed from the laws (Cain, McKeon, and Solomon, 2017), and (d) three measures of board quality: board size, the fraction of independent directors on the board (Weisbach 1988; Coles, Daniel, and Naveen 2008; Dahya, Dimitrov, and McConnell 2008; Hazarika, Karpoff, and Nahata 2012), and co-opted boards (Coles, Daniel,

[85] See, for example, Diamond and Verrecchia (1991), Schleifer and Vishny (1997), Hefline and Shaw (2000), Perotti, and Thadden (2003), O'Neill and Swisher (2003), John et al. (2008); Laeven and Levine (2009), Acharya et al. (2011), and Armstrong et al. (2012).

and Naveeen 2014).[86] We construct these governance measures using the RiskMetrics database. In each model (Models 9 to 12), we augment our baseline model with each of the above governance proxies individually. In Model (13), we include all governance measures in our regression. The coefficient of *LAWEYER_CEO* remains positive and statistically significant across different model specifications. These findings consistently indicate that CEO legal training has a significant impact on credit risk assessment, beyond the effect of corporate governance.

Collectively, findings from Table 4.8 suggest that CEO legal expertise has a direct effect on firms' credit risk, independent of other CEO personal traits, other top managers or corporate governance.

4.4.5. Sensitivity Analysis

We supplement the baseline regression results from Table 4.4 with various robustness tests to ensure that our results are not sensitive to specific model specifications, sample selection, or alternative measure of corporate default risk. Specifically, in Models (1) and (2) of Table 4.9, we run the baseline model (Equation (6)) after controlling for earnings quality as accrual quality is associated with a firm's cost of capital and credit rating (Francis, LaFond, Olsson, and Schipper, 2005; Francis, Nanda, and Olsson, 2008; Armstrong, Guay, and Weber, 2010; Alissa, Bonsall, Koharki, and Penn, 2013). We use two measures of earnings quality. First, following Hutton, Marcus, and Tehranian (2009), Kim, Li, and Zhang (2011), and Kim and Zhang (2016), we measure *ACCM* as a three-year moving sum of absolute discretionary accruals, where discretionary accruals are estimated with the modified Jones (1991) model, following Dechow, Sloan, and Sweeney (1995). Second, we follow Barth, Konchitchki, and

[86] We thank Lalitha Naveen for making the co-opted board data available through the website https://sites.temple.edu/lnaveen/data.

Landsman (2013) and construct earnings transparency measure (*EARN_TRANS*). Specifically, we measure *EARN_TRANS* using a two-step estimation procedure to allow intertemporal and cross-sectional variations in our measure. For each firm-year, *EARN_TRANS* is the sum of two R^2 with the first R^2 constructed from annual returns-earnings relations estimated by industry and the second R^2 constructed from the annual returns-earnings relation estimated by portfolio.[87]

In Model (3) of Table 4.9, we control for rollover risk as Gopalan et al. (2014) suggest that firms with greater exposure to rollover risk exhibit lower credit quality. We follow Gopalan et al. (2014) and measure a firm's exposure to rollover risk using the variable LT_{t-1}, which is defined as the amount of the firm's long-term debt outstanding at the end of year *t-1* due for repayment in year *t* scaled by its book value of total asset at the end of year *t-1*. We focus on ΔLT_{t-1}, which equals LT_{t-1} minus LT_{t-2}, as a larger value of ΔLT_{t-1} denotes a larger increase in the firm's exposure to rollover risk. In Model (4), we further control for financial distress measured by the Altman Z-score.

In Model (5) of Table 4.9, we further control for corporate social responsibility as a firm's corporate social responsibility performance impacts the pricing of corporate debt and the assessment of credit quality (Oikonomou, Brooks, and Pavelin, 2014; Ge and Liu, 2015; Hoepner, Oikonomou, Scholtens, and Schröder, 2016). We, therefore, control for corporate social responsibility to ensure that the effect of CEO legal training on credit risk assessment is not driven by corporate social responsibility performance. We source corporate social rating data from Kinder, Lydenberg, and Domini Research & Analytics (KLD) database and follow Cronqvist and Yu (2017) to construct a CSR score. Specifically, KLD rates companies using six CSR categories (i.e., community, diversity, employee relations, environment, human rights,

[87] See Equation (1) in Barth et al. (2013) for more detail.

and product) and provides a number of strengths and concerns for each category. For each firm-year, each strength adds +1 to the score while each concern adds -1. We aggregate the scores for each category and then aggregate across all six categories. CSR score equals the number of strengths minus the number of concerns. We follow Cronqvist and Yu (2017) and normalize these scores so that the minimum is zero for a straightforward interpretation. Higher CSR indicates a more socially responsible corporate rating. We control for CSR and report results for this test in Model (5) of Table 4.9.

We further control for all additional firm characteristics from Models (1) to (5) and the results reported in Model (6) of Table 4.9 suggest that the effect of CEO legal expertise on credit risk is not confounded by any (or all) of the above firm characteristics.

So far we focus on credit rating to measure corporate default risk as it reflects a firm's overall creditworthiness (Standard and Poor's, 2002). In model (7), we consider an alternative measure of corporate default risk. We use Bharath and Shumway (2008) measure of expected default frequency (EDF) which is a simplified version of Merton (1974) distance-to-default model and provides cross-sectional and the time-varying probability of default. We follow Bharath and Shumway (2008) and Brogaard et al. (2017) to compute EDF as follows:

$$DD_{i,t} = \frac{\log\left(\frac{Equity_{i,t}+Debt_{i,t}}{Debt_{i,t}}\right)+\left(r_{i,t-1}-\frac{\sigma_{Vi,t}^2}{2}\right)\times T_{i,t}}{\sigma_{Vi,t}\times\sqrt{T_{i,t}}} \quad \text{Eq.(7a)}$$

$$\sigma_{Vi,t} = \frac{Equity_{i,t}+Debt_{i,t}}{Debt_{i,t}} \times \sigma_{Ei,t} + \frac{Debt_{i,t}}{Equity_{i,t}+Debt_{i,t}} \times (0.05 + 0.25 \times \sigma_{Ei,t}) \quad \text{Eq.(7b)}$$

$$EDF_{i,t} = N(-DD_{i,t}) \quad \text{Eq.(7c)}$$

where $Equity_{i,t}$ is the market value of equity measured as the product of the number of shares outstanding and the stock price at the end of the year; $Debt_{i,t}$ is the face value of debt measured

as the sum of debt in current liabilities and one-half of long-term debt at the end of the year; $r_{i,t-1}$ is firm i's past annual return; $\sigma_{Ei,t}$ is the stock return volatility for firm i during year t estimated using the monthly stock return from the previous year; $\sigma_{Vi,t}$ is an approximation of the volatility of firm assets; $T_{i,t}$is set to one year; and *N(.)* is the cumulative standard normal distribution function. Low (high) *EDF* indicates relatively low (high) distress. To avoid confusion when interpreting the dependent variables, we multiple *EDF* by -1 (denoted as *INV_EDF*), such as the higher values of *INV_EDF* are associated with lower default risk.

In Model (8) of Table 4.9, we examine the relation between CEO legal expertise and credit risk assessment using the ordered probit models. A suggested by Bernile et al. (2017), the OLS estimation is less sensitive to a large number of fixed effects in the model but requires that the distance between two adjacent rating categories is constant across the full range of ratings. The ordered probit estimation, on the other hand, can accommodate the varying distance between adjacent rating categories but is more sensitive to a large number of fixed effects. We, therefore, report results from the order probit model in Model (8) to complement the OLS results.

In Model (9) of Table 4.9, we test the robustness of our baseline results to alternative standard errors two-way clustered by year and CEO as in Kuang and Qin (2013) and Cornaggia et al. (2017).[88]

In Models (10) and (11) of Table 4.9, we consider alternative sampling methods. Specifically, to rule out the possibility that the documented effect of CEO legal expertise on credit risk can be driven by the financial turmoil period (2007-2009), we rerun our baseline

[88] We also consider alternative standard errors clustering by CEO, by CEO and industry, by year and industry, and by firm following Petersen et al. (2009) and Gow et al. (2010) and find our results (untabulated for brevity) are robust.

models after excluding this financial crisis and report results in Model (10). Dimitrov, Palia, and Tang (2015) investigate the impact of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) on corporate bond ratings by credit rating agencies (CRAs) and document that, following the implementation of the Dodd-Frank Act, CRAs issue lower ratings and issue downgrades that are less information. We, therefore, rerun our baseline models after excluding the post-Dodd-Frank Act period to ensure the Act cannot explain our documented effect. We report results for this test in Model (11) of Table 4.9.

Overall, the results from various robustness tests in Table 4.9 suggest that the effect of CEO legal expertise on corporate credit rating is robust across various model specifications, sampling methods, or alternative measures of default risk.

[Insert Table 4.9 about here]

4.5. Lawyer CEOs and cost of debt capital

Our analyses so far suggest that sophisticated market participants such as credit rating agencies incorporate CEO legal expertise into their credit rating assessment. It is also important to understand whether, and to what extent, lawyer CEOs impact required rates of return by bond investors. Our analysis of the effect of CEO legal expertise on the cost of debt capital serves two purposes. First, we examine whether managers with legal expertise, who can reduce the variability in corporate future performance, can reduce their firms' cost of debt capital. Second and more interestingly, we study whether CEO legal expertise explains variations in credit spreads incremental to issuance-specific characteristics such as credit ratings. This

evidence provides more insights on the mechanism (both direct and indirect) through which bond prices impound executives' legal expertise.

To address these questions, we consider all new non-convertible issue fixed-rate corporate bonds issued between 1992 and 2015 as reported by the Mergent Fixed Income Security Database (FISD). We then match the FISD data with Compustat, CRSP, Execucomp, BoardEx, and Thomson Reuters data, yielding a final sample of 2,149 firm bond issuances during our sample period. We measure offering credit spreads as the offering yields to maturity in excess of similar duration treasuries and use the following regression:

$$LN\_SPREAD = f\,(LAWYER\_CEO, ISSUECRTL, FIRMCTRL, FIRM\ FEs, YEAR\ FEs) \quad \text{Eq.(9)}$$

where *SPREAD is* offering credit spread, *LAYWER_CEO* is an indicator that takes the value of 1 a CEO has a law degree, *ISSUECRTL* refers to issue issuance-specific characteristics, *FIRMCTRL* refers to firm-level control variables, and *FIRM FEs* (*YEAR FEs*) refer to firm-fixed effects (year-fixed effects).

Regarding control variables, we follow previous literature (see, for example, Bonsall et al. (2017)) and control for issuance-specific characteristics, including bond issuance-specific S&P rating (*BOND_RATING*), the natural logarithm of the offering amount of new bond (*ISSUE*), the number of years until maturity on the new bond (*MATURITY*), an indicator of whether the new bond-related debt is senior for issuance (*SENIOR*), and an indicator of whether the new bond issuance has credit enhancements (*ENHANCE*). We further control for various firm characteristics associated with credit quality as in the baseline regression (Table 4.4's Column 4). Finally, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with credit spreads. We present results for this test in Table 4.10.

We present three regression specifications: (1) a model without any issuance-specific and firm-specific control variables, (2) a model with issuance-specific control variables, and (3) a model with all issuance-specific and firm-specific control variables. According to Model (1) in Table 4.10, the coefficient estimates for the *LAWYER_CEO* variable are negative and significantly related to the measure of credit spread, suggesting that CEO legal expertise is associated with a lower credit spread. Results reported in Models (2) and (3) suggest that there could be several channels through which CEO legal training affect bond prices. Specifically, the estimated coefficients on *LAWYER_CEO* are negative and statistically significant across different model specifications, which is consistent with CEO legal training affecting credit spreads directly. Moreover, the coefficients on *BOND_RATING* are also negative and statistically significant, suggesting that CEO legal expertise affect credit spreads indirectly through its impact on credit ratings. The magnitude of the effect of CEO legal expertise on credit spreads is also economically significant, with firms led by lawyer CEOs, on average, having about 7.35% (about 9.68 bps) lower costs than firms headed by non-lawyer CEOs.[89] Taken together, the results of Table 4.10 suggest that CEO legal expertise impacts bond pricing through direct and indirect channels.

[Insert Table 4.10 about here]

4.6. Lawyer CEOs and the pricing of audit services

These analyses so far suggest that debt market participants consider CEO legal expertise which gives CEOs an edge in facilitating corporate transparency and risk management when assessing a firm's credit risk. In this section, we further examine whether other firm

[89] We estimate this difference as the coefficient on *LAWYER_CEO* (in Model 2 of Table 4.10) multiplied by the median of the sample loan spread (e.g., -0.0735 ×129 bps = -9.68 bps).

stakeholders value CEO legal expertise. We focus on auditors for two reasons. First, auditors are important participants in financial markets and particularly sensitive to the credibility of corporate financial misreporting. If CEO legal expertise plays roles in enhancing corporate financial reporting quality, it is likely that it will affect audit risks and audit fees. Second, prior auditing literature suggests that client business risk is among the primary risks assessed by auditors (Morgan and Stocken, 1998; Bell, Landsman, and Shackelford, 2001). Given lawyer CEOs reduce corporate default risks, auditors could take this information into account in the pricing of their audit services.

To examine this question, we source audit fee data and other standard control variables from the Audit Analytics database. We measure audit fees, *LN(AUDIT_FEE*), as the logarithm of audit fees (in dollars) the firm pays to their auditors over the fiscal year. Follow prior auditing literature (e.g., Simunic, 1980; Gul and Goodwin, 2010; Hanlon, Krishnan, and Mills, 2012; Bentley, Omer, and Sharp, 2013; Chen, Gul, Veeraraghavan, and Zolotoy, 2015), we include control variables for firm characteristics and auditor characteristics, including firm size (*SIZE*), book-to-market ratio (*BTM*), leverage (*LEVERAGE*), asset tangibility (*TANG*), firm profitability (*ROA*), special items (*SI*), the logarithm of non-audit fees (*LN_NONFEE*), operating loss (*LOSS*), auditor tenure (*AUDITOR_TENURE*), audit opinion (*OPINION*), a dummy variable (*BIG4*) that takes the value of one if the firm is audited by one of the Big 4 auditors, and zero otherwise, and a dummy variable (*YE*) that is equal to one if the firm's fiscal year-end is December, and zero otherwise. We further include the standard deviation of cash flow (*STDCFO*) and earnings volatility (*EVOL*) to control for profitability and operating risks, respectively (Billings, Gao, and Jia, 2014; Chen et al., 2015). To account for the effect of client business risk on audit fee, we follow Coles, Daniel, and Naveen (2006) and Chen et al. (2015) and include research and development intensity (*RD_INTENSITY*) and capital expenditure (*CAPEX*). Finally, we control for CEOs' risk-taking incentive, measured by *LN_DELTA* and

LN_VEGA, as Billings et al. (2014) and Chen et al. (2015) find these characteristics matter in the pricing of audit service. We control for year-fixed effects to control for time-invariant factors that could be associated with audit pricing. To avoid industry-specific effects from confounding variations in audit fees, we follow the audit pricing literature and control for industry fixed effects. We also lag all independent variables by one year relative to the credit rating measures to avoid potential reverse causality issues. Table 4.11 presents results for the association between lawyer CEOs and audit fees.

[Insert Table 4.11 about here]

We present three regression specifications: (1) a model with firm-specific and auditor-specific control variables, (2) a model with fixed effects, and (3) a model with additional controls for clients' business. We find the coefficient estimates for the *LAWYER_CEO* variable are negative and significantly related to audit pricing, suggesting that CEO legal expertise reduce the audit pricing. The magnitude of the effect of CEO legal expertise on audit pricing is economically significant, with firms led by lawyer CEOs, on average, pay about 5.82% lower fees than firms headed by non-lawyer CEOs. For control variables, we find that audit fees are positive and significantly related to firm size, leverage, non-audit fees, Big4 auditors, audit opinion, fiscal year-end, earnings volatility, and executives' risk-taking incentive while negatively and significantly related to capital expenditure and research and development intensity. Overall, these findings are largely consistent with the prior literature (e.g., Johnstone and Bedard, 2003; Gul and Goodwin, 2010; Bentley et al., 2013; Billings et al., 2014; Chen et al., 2015).

4.7. Concluding Remarks

We find that debt market participants incorporate the reduction in future outcome risk and the enhancement in corporate information environment associated with executive's legal expertise into their assessments of a firm's credit risk. We further document that executives' legal expertise has implications for debt market investors and auditors. Firms led by lawyer CEOs, on average, have about 7.35% (about 9.68 bps) lower debt costs than firms headed by non-lawyer CEOs. Auditors also value CEO legal expertise in the pricing of their audit services.

Overall, our empirical results contribute to a growing literature documenting the economic effects of executives' legal expertise. We extend this line of research to credit analysis and cost of debt capital. Specifically, we employ executives' legal training as a proxy for the soft information analyzed by credit rating agencies and find that firms headed by lawyer CEOs enjoy more favorable ratings than firms headed by non-lawyer executives. Our results suggest that the executive's legal expertise is an independent factor that debt market participants impound into their credit assessment.

Appendix 4A: List of Variables

Variables	Descriptions	Sources
Credit rating measures		
RATING	Standard & Poor's Long-term Domestic Issuer Credit Rating from Compustat.	Compustat
CEO characteristics		
LAWYER_CEO	A dummy that equals one if the CEO 1 if the CEO has a law degree ("LLB," "BCL," "LLM," "LLD," and "JD") or if the CEO has a Ph.D. in Jurisprudence, and zero otherwise.	Marquis Who's Who, BoardEx
MA_SCORE	Managerial ability measure of Demerjian et al. (2012)	Demerjian et al. (2012)
DELTA	Natural logarithm of one plus the dollar change in wealth associated with a 1% change in the firm's stock price.	Core and Guay (2002), Execucomp
VEGA	Natural logarithm of one plus the dollar change in wealth associated with a 0.01 change in the standard deviation of the firm's returns.	Core and Guay (2002), Execucomp
MBA	A dummy that equals one if the CEO has an MBA degree and zero otherwise.	Marquis Who's Who
PHD	A dummy that equals one if the CEO has a Ph.D degree and zero otherwise.	Marquis Who's Who
IVY_EDUC	A dummy that equals one if the CEO attended one of the Ivy-League institutions and zero otherwise.	Marquis Who's Who
FINANCIAL_EDUC	A dummy that equals one if the CEO obtained an MBA or has a degree in accounting or economics and zero otherwise.	Marquis Who's Who
HOLDER_67	A dummy that equals to one if the CEO holds options that are more than 67% in the money at least twice during the sample period.	Execucomp
FOREIGN_CEO	A dummy that equals one if the CEO was born outside the U.S and zero otherwise.	Marquis Who's Who
GENERAL_CEO	General managerial skills over executive lifetime work experience.	Custódio et al. (2013)
Firm Characteristics		
SIZE	The logarithm of firm size which is measured by total assets.	Compustat
LEVERAGE	Leverage. Measured as the ratio of total debt to the book value of assets.	Compustat
ROA	Net income before extraordinary items divided by total assets.	Compustat

LOSS	An indicator that takes the value of 1 if the net income before extraordinary items is negative in the current and prior fiscal year, zero otherwise	Compustat
SUBORD	An indicator that is equal to 1 if a firm has subordinated debt and zero otherwise	Compustat
CAP_INTEN	Gross PPE divided by total assets.	Compustat
INT_COV	Operating income before depreciation divided by interest expense	Compustat
NUM_ANALYST	Natural log of the number of analysts issuing an annual forecast for a firm during the year.	I/B/E/S
BTM	Book-to-market measured as the ratio of the book equity value over market capitalization value	Compustat
Volatility Measures		
STDRET	Annualized stock return volatility, measured as the standard deviation of monthly stock return multiplied by the square root of 12 over a fiscal year.	CRSP
STDCFO	Standard deviation of operating cash flows scaled by total assets from year *t*-4 to year *t*.	Compustat
STDRET_FUTURE	The standard deviation of monthly returns over the four years following the current year (i.e., [*t*+1, *t+4*]).	CRSP
STDRET_PAST	The standard deviation of monthly stock returns over the 48-month period ending at the end of fiscal year t (i.e., [*t*-3, *t*]).	CRSP
STDROA_FUTURE	The standard deviation of ROA over the four years following the current year (i.e., [*t*+1, *t+4*]).	CRSP
STDROA_PAST	The standard deviation of return on assets (i.e., ROA) over the four-year period ending at the end of fiscal year t (i.e., [*t*-3, *t*]).	CRSP
Other variables		
INV_EDF	A measure of expected default frequency estimated following Bharath and Shumway (2008)	Compustat
PRICE_DELAY	Hou and Moskowitz (2005)'s price delay measure	CRSP, Compustat
BID-ASK SPREAD	Corwin and Schultz (2012)'s bid-ask spread measure	Corwin and Schultz (2012), CRSP
FORECAST_ERROR	Analysts' forecast error, measured as the absolute difference between the mean annual analysts' earnings forecasts and the actual firm earnings scaled by the firm's stock price	I/B/E/S

FS_COMPARABILITY	financial report comparability	De Franco et al. (2011)
R&D	An indicator that is equal to 1 if firm's R&D spending is positive in a given year and zero otherwise.	Compustat
LERNER_INDEX	The ratio of operating profit to sales, where operating profit is sales less cost of goods sold, along with selling, general and administrative expenses.	Compustat
GC	GC, is a dummy variable that takes the value of one if a firm has a corporate counsel among top five highest-paid executives and zero otherwise	Execucomp
G-INDEX	Corporate governance index.	Gompers et al. (2003)
ACCM	Accrual quality measured as a three-year moving sum of absolute discretionary accruals, where discretionary accruals are estimated with the modified Jones (1991) model, following Dechow, Sloan, and Sweeney (1995).	Compustat
EARN_TRANS	earnings transparency measure	Barth et al. (2013) CRSP, Compustat
ΔLT	A measure of rollover risk as Gopalan et al. (2014)	Gopalan et al. (2014), Compustat
CSR	Corporate social responsibility rating measured using six CSR categories as in Cronqvist and Yu (2017)	KLD database
Bond data		
LN_SPREAD	Offering credit spreads measured as the offering yields to maturity in excess of similar duration treasuries	FISD database
BOND_RATING	Bond issuance-specific S&P rating	FISD database
ISSUE_SIZE	The natural logarithm of the offering amount of new bond	FISD database
MATURITY	Number of years until maturity on the new bond	FISD database
SENIOR	An indicator of whether the new bond related debt is senior for issuance	FISD database
ENHANCE	An indicator of whether the new bond issuance has credit enhancements	FISD database
Audit data		
LN(AUDIT_FEE)	The logarithm of audit fees (dollar amount) the firm pays to their auditors over the fiscal year	Audit Analytics database

LN_NONFEE	The logarithm of non-audit fees	Audit Analytics database
BIG4	A dummy variable that takes the value of one if the firm is audited by one of the Big 4 auditors, and zero otherwise	Audit Analytics database
YE	A dummy variable that is equal to one if the firm's fiscal year-end is December, and zero otherwise	Audit Analytics database
SI	Special items, defined as a dummy variable equal to 1 if the firm has non-zero, non-missing special items, and 0 otherwise	Compustat
AUDITOR_TENURE	Log auditor tenure. Auditor tenure is the number of years the firm has retained its current auditor.	Compustat
OPINION	Audit opinion, defined as a dummy variable equal to 1 if the audit opinion is not a standard, unqualified opinion, and 0 otherwise	Compustat
EVOL	Earnings volatility, defined as the standard deviation of quarterly earnings ratio over the preceding five years. Earnings ratio is the ratio of income before extraordinary items over total assets.	Compustat
RD_INTENSITY	R&D intensity, defined as R&D expenses scaled by total sales.	Compustat
CAPEX	Capital expenditure scaled by total asset	Compustat

Appendix 4B: Credit Rating Summary

Credit Risk	Standard & Poor's	Numerical Rating
Highest quality	AAA	22
High quality	AA+, AA, AA-	21, 20, 19
Upper medium	A+, A, A-	18, 17, 16
Medium	BBB+, BBB, BBB-	15, 14, 13
No investment grade	BB+, BB, BB-	12, 11, 10
Speculative lower grade	B+, B, B-	9, 8, 7
Speculative risky	CCC+, CCC, CCC-	6, 5, 4
Speculative poor standing	CCC+, CCC, CCC-	3
Highly vulnerable	C	2
In default	D, SD	1

Table 4.1. Summary and Statistics

Variable	Observations	Mean	SD	P25	P50	P75
LAWYER_CEO	11,313	0.097	0.296	0.000	0.000	0.000
RATING	11,313	13.194	3.450	11.000	13.000	16.000
Firm-level characteristics						
SIZE	11,313	8.226	1.249	7.333	8.111	9.052
LEVERAGE	11,313	0.295	0.155	0.186	0.277	0.384
ROA	11,313	0.042	0.083	0.019	0.049	0.081
LOSS	11,313	0.157	0.364	0.000	0.000	0.000
SUBORD	11,313	0.162	0.368	0.000	0.000	0.000
CAP_INTEN	11,313	0.584	0.380	0.284	0.514	0.827
INT_COV	11,313	18.326	84.942	4.282	7.898	14.317
BTM	11,313	1.175	1.032	0.542	0.899	1.467
NUM_ANALYST	11,313	2.427	0.695	2.079	2.485	2.944
Volatility measures						
STDRET	11,313	0.105	0.065	0.064	0.089	0.128
STD_CFO	11,313	0.037	0.028	0.018	0.029	0.049
STDRET_FUTURE	24,604	0.111	0.067	0.071	0.095	0.132
STDRET_PAST	24,604	0.111	0.054	0.074	0.098	0.133
STDROA_FUTURE	22,858	0.048	0.102	0.012	0.024	0.048
STDROA_PAST	22,858	0.042	0.081	0.012	0.023	0.045
Other variables						
INV_EDF	8,536	0.136	0.225	0.000	0.010	0.194
SPREAD (bps)	2,149	195.345	169.299	82.000	140.000	250.000
LN_SPREAD	2,149	5.005	0.778	4.443	4.963	5.561
LN_DELTA	10,783	5.643	1.498	4.750	5.626	6.523
LN_VEGA	10,369	4.366	1.871	3.565	4.536	5.426
LN(AUDIT_FEE)	5,121	7.865	1.073	7.199	7.886	8.542

The table reports the descriptive statistics for the sample of 11,313 firm-year observations spanning 1992 to 2015. We hand-collect the executive education information from Marquis Who's Who and BoardEx databases, whereas credit rating measures are constructed from Compustat's S&P ratings and accounting information is obtained from Compustat. We source stock returns from CRSP, corporate bond data from Mergent Fixed Income Securities Database, and audit fee data from the Audit Analytics database. Appendix 4A provides a detailed description of the variables and Appendix 4B provides credit rating classifications.

Table 4.2. Lawyer CEOs and Future Earnings and Return Volatility

Panel A: Lawyer CEOs and future return volatility

	STDRET_FUTURE (1)	STDRET_FUTURE (2)
LAWYER_CEO	-0.0078***	-0.0058***
	(-4.48)	(-3.83)
SIZE		-0.0059**
		(-2.10)
LEVERAGE		0.0225***
		(3.06)
ROA		-0.1082***
		(-9.70)
BTM		0.0007
		(1.61)
STDRET_PAST		0.0919*
		(1.76)
Year fixed effects	Yes	Yes
Firm fixed effect	Yes	Yes
R^2	0.642	0.670
Observations	24,604	24,604

Panel B: Lawyer CEOs and future ROA volatility

	STDROA_FUTURE (1)	STDROA_FUTURE (2)
LAWYER_CEO	-0.0053**	-0.0070***
	(-3.38)	(-3.94)
SIZE		0.0106***
		(4.16)
LEVERAGE		0.0151**
		(3.22)
BTM		0.0004
		(0.70)
STDROA_PAST		-0.1348***
		(-4.01)
Year fixed effects	Yes	Yes
Firm fixed effect	Yes	Yes
R^2	0.528	0.542
Observations	22,858	22,858

This table presents regression results of the effect of Lawyer CEO on future return volatility (Panel A) and future earnings volatility (Panel B). The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables are future variability of stock returns (*STDRET_FUTURE*) and future variability of earnings (*STDROA_FUTURE)*. *STDRET_FUTURE* is the standard deviation of monthly returns over the four years following the current year (i.e., [*t+1, t+4*]). *STDROA_FUTURE* is the standard deviation of return on assets over the four years following the current year (i.e., [*t+1, t+4*]). Constant term, year-fixed effects, and firm-fixed effect are included in all models. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.3. Lawyer CEO and Information Risk

	PRICE_DELAY		BID-ASK SPREAD		FORECAST_ERROR		FS_COMPARABILITY	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LAWYER_CEO	-0.0259***	-0.0254***	-0.0558***	-0.0347**	-0.0250*	-0.0116**	0.1580***	0.1231***
	(-4.29)	(-4.30)	(-3.48)	(-2.31)	(-1.94)	(-2.06)	(3.44)	(2.82)
SIZE		-0.0320***		-0.0614***		0.0245		0.1686***
		(-6.11)		(-5.28)		(1.07)		(5.47)
LEVERAGE		0.0709***		0.1352***		0.1890*		-0.6704***
		(4.83)		(5.41)		(1.95)		(-6.75)
BTM		-0.0279***		0.0027		-0.0171*		0.0473***
		(-5.85)		(0.36)		(-1.75)		(6.55)
NUM_ANALYST		0.0039		-0.0317***		-0.0474		0.1357***
		(0.88)		(-5.62)		(-1.16)		(7.19)
R&D		-0.0127		-0.0346		-0.0198		-0.0852
		(-0.98)		(-1.71)		(-1.12)		(-0.35)
STDRET		-0.1055**		1.5873***		-0.0358		-3.0481***
		(-2.41)		(12.03)		(-0.27)		(-7.63)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.311	0.324	0.686	0.723	0.895	0.898	0.462	0.496
Observations	22,059	22,059	20,966	20,966	17,846	17,846	13,816	13,816

This table presents regression results of the effect of Lawyer CEO on future information risks. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables are Hou and Moskowitz (2005)'s price delay measure (Columns 1 and 2), bid-ask spread measure (Columns 3 and 4), analysts' forecast error (Columns 5 and 6), and the financial statement comparability of De Franco et al. (2011) (Columns 7 and 8). Constant term, year-fixed effects, and firm-fixed effect are included in all models. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.4: Lawyer CEOs and Credit Risk Assessment: Baseline results

	Dependent Variable: Credit Rating			
	(1)	(2)	(3)	(4)
LAWYER_CEO	0.3528***	0.2989***	0.4190***	0.2683***
	(3.71)	(3.63)	(6.38)	(3.10)
SIZE		0.8759***	0.1939***	0.9300***
		(20.00)	(7.33)	(17.58)
LEVERAGE		-3.6865***	-3.3243***	-3.1849***
		(-16.54)	(-22.62)	(-15.52)
ROA		4.0746***	2.6315***	2.7724***
		(11.30)	(9.72)	(8.69)
LOSS		-0.4157***	-0.4825***	-0.3808***
		(-4.59)	(-8.93)	(-4.82)
SUBORD		-0.2486***	-0.0387	-0.2466***
		(-4.44)	(-0.70)	(-4.74)
CAP_INTEN		0.5940***	0.3352***	0.5788***
		(4.00)	(3.65)	(4.09)
INT_COV		0.0002	-0.0004**	-0.0000
		(1.10)	(-2.14)	(-0.00)
NUM_ANALYST		0.6143***	0.9999***	0.4756***
		(9.55)	(27.53)	(8.00)
BTM			0.2783***	0.2768***
			(13.19)	(5.52)
STDRET			-3.8864***	-5.2925***
			(-14.31)	(-5.81)
STDCFO			-2.8229***	-2.3917**
			(-4.39)	(-2.46)
Year fixed effects	Yes	Yes	No	Yes
Firm fixed effect	Yes	Yes	No	Yes
R^2	0.825	0.873	0.505	0.879
Observations	11,313	11,313	11,313	11,313

This table presents regression results of the effect of lawyer CEOs on credit risk assessment. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables of interest are S&P credit rating measures from Compustat. Constant term, year-fixed effects, and firm-fixed effect are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.5: CEO Turnover Test

	Dependent variable: Credit Rating	
	From non-Lawyer CEO to Lawyer CEO (73 Cases) (1)	From Lawyer CEO to non-Lawyer CEO (94 cases) (2)
CEO_CHANGE × POST	0.2283**	-0.3556***
	(1.98)	(-4.31)
All Controls	Yes	Yes
Year FEs	Yes	Yes
Firm FEs	Yes	Yes
Observations	874	1,085
R^2	0.931	0.929

This table reports regression result for the difference-in-difference analysis. *CEO_CHANGE* is a dummy variable that equals one if the new CEO is from a non-Lawyer CEO to Lawyer CEO (Columns 1) and from a Lawyer CEO to a non-Lawyer CEO (Columns 2), and zero otherwise. Firm-year observations with *CEO_CHANGE* equals one are considered treated firms. Each firm-year observation in the treated group is matched with a firm-year observation in the control group (*CEO_CHANGE* equals zero) using the nearest-neighbor propensity score matching procedure. The matched pair is obtained in the year before the CEO turnover and is based on all firm characteristics as per Table 4.4 and the industry (by two-digit SIC). *POST* is a dummy variable that equals one if the year observation is in the three-year period after and zero in the three-year period before the turnover. The dependent variable in all models is S&P credit ratings. Other firm characteristics variables are similar to those in the baseline regressions in Table 4.4. Constant term, year-fixed effects, and firm-fixed effects are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variables definitions and data sources are presented in the Appendix 4A.

Table 4.6. Cross-sectional Analysis

	Financial distress		Grade		Competition		Past Variability	
	High	Low	Investment	Speculative	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LAWYER_CEO	0.2400***	0.112	0.1195	0.2353***	0.3280***	0.2932***	0.343**	0.234***
	(2.90)	(1.16)	(1.60)	(2.68)	(3.30)	(3.28)	(2.52)	(2.66)
SIZE	0.6826***	1.453***	0.7564***	0.5016***	0.8850***	0.9019***	0.746***	0.976***
	(10.44)	(23.00)	(12.38)	(6.14)	(15.30)	(13.77)	(11.71)	(22.92)
LEVERAGE	-2.9490***	-2.599***	-2.6943***	-2.7929***	-3.1750***	-3.6051***	-3.019***	-3.206***
	(-9.40)	(-11.49)	(-12.42)	(-11.16)	(-13.15)	(-11.26)	(-10.17)	(-18.60)
ROA	1.5334***	7.343***	5.3209***	1.8957***	2.9506***	2.5410***	2.209***	4.717***
	(4.73)	(10.10)	(7.29)	(6.06)	(5.13)	(9.32)	(7.18)	(5.01)
LOSS	-0.3503***	-0.121	0.1205	-0.4504***	-0.1460	-0.4456***	-0.497***	0.076
	(-3.45)	(-0.84)	(0.97)	(-5.99)	(-1.29)	(-4.67)	(-5.07)	(0.55)
SUBORD	-0.2360***	-0.196**	-0.3105***	-0.1230*	-0.0249	-0.4310***	-0.180**	-0.394***
	(-3.02)	(-2.96)	(-3.51)	(-1.76)	(-0.32)	(-4.65)	(-2.28)	(-6.25)
CAP_INTEN	0.2970	0.790***	0.8353***	-0.4540**	1.2490***	0.3692*	0.063	0.836***
	(1.55)	(3.95)	(6.13)	(-2.08)	(8.41)	(1.93)	(0.30)	(6.00)
INT_COV	-0.0002	0.000	0.0000	-0.0002	-0.0003**	0.0002	0.000	-0.000
	(-0.90)	(0.08)	(0.08)	(-1.28)	(-2.08)	(0.64)	(0.38)	(-0.16)
NUM_ANALYST	0.4906***	0.361***	0.2572***	0.4952***	0.4550***	0.3977***	0.449***	0.530***
	(5.52)	(6.12)	(5.04)	(7.33)	(6.73)	(5.81)	(4.96)	(11.11)
BTM	0.3178***	0.179***	0.1653***	0.2903***	0.1461***	0.4250***	0.241***	0.289***
	(5.00)	(4.89)	(3.96)	(4.32)	(4.62)	(4.61)	(4.28)	(6.60)
STDRET	-4.1597***	-6.108***	-4.5957***	-3.7302***	-6.0826***	-4.7088***	-4.088***	-7.170***
	(-5.51)	(-6.01)	(-8.33)	(-5.45)	(-5.76)	(-4.96)	(-6.62)	(-6.17)
STDCFO	-0.5789	-3.086*	-3.7673***	-1.3214**	-2.1015**	-2.1350*	-2.506**	-2.543***
	(-0.52)	(-2.68)	(-4.17)	(-1.96)	(-2.14)	(-1.68)	(-2.49)	(-3.05)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes		
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes		
R^2	0.859	0.898	0.801	0.699	0.801	0.699	0.834	0.891
Observations	5,320	5,360	5,418	5,841	5,609	5,557	5,545	5,554
SUR & Wald Test for differences in coefficients:								
χ^2 Test	2.57*		2.59*		3.93**		3.59**	
p-value	(0.07)		(0.07)		(0.05)		(0.05)	

This table reports results from regressions of the effect of lawyer CEOs on S&P credit ratings for subsamples of firms. Columns (1) and (2) report results for above- and below-median levels of financial distress measured using Altman z-score. Columns (3) and (4) report results separately for investment-grade (rated BBB- or above) and speculative-grade firms (below BBB-). Columns (5) and (6) report results for above- and below-median level of market competition measured by *LERNER* index. We measure *LERNER* as the ratio of operating profit to sales, where operating profit is sales less cost of goods sold, along with selling, general and administrative expenses (Gaspar and Massa, 2006; Peress, 2010; Kale and Loon, 2011). Columns (7) and (8) report results for above- and below-median standard deviation of daily returns. The dependent variable in all models is S&P credit ratings. Firm-level characteristics variables similar to those in the baseline regression in Table 4.4 are included in all models. Constant term, year-fixed effects, and firm-fixed effects in all models except models in Panel A. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.7: Testing for Economic Bonding

	CEO Tenure		Rating		CEO Network	
	High	Low	Around Cutoff	Others	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
LAWYER_CEO	0.2312**	0.2516**	0.3330***	0.3360**	0.2242*	0.2653*
	(2.12)	(2.16)	(5.49)	(2.33)	(1.74)	(1.71)
SIZE	0.8979***	1.0715***	0.7067***	1.0357***	0.9568***	0.9166***
	(15.20)	(10.42)	(14.16)	(10.76)	(12.00)	(15.96)
LEVERAGE	-3.0476***	-3.4454***	-2.3737***	-2.3257***	-2.9159***	-2.3754***
	(-13.26)	(-9.06)	(-15.32)	(-4.14)	(-6.45)	(-6.94)
ROA	2.9920***	2.8228***	2.6326***	2.3579***	2.0910*	2.0812***
	(6.99)	(4.15)	(4.87)	(7.45)	(1.81)	(5.03)
LOSS	-0.3398***	-0.2962***	-0.2056***	-0.4668***	-0.6421**	-0.3044***
	(-3.77)	(-2.75)	(-2.97)	(-4.26)	(-3.48)	(-2.96)
SUBORD	-0.1760**	-0.4404***	-0.1616***	-0.2267	-0.4781***	-0.4064***
	(-2.47)	(-3.52)	(-3.67)	(-1.59)	(-4.24)	(-4.47)
CAP_INTEN	0.8784***	-0.3295	0.5563***	0.2577	0.7637***	0.7972***
	(5.43)	(-1.10)	(4.48)	(1.02)	(2.84)	(3.74)
INT_COV	-0.0001	0.0005*	-0.0004***	0.0003	-0.0001	0.0007
	(-0.88)	(1.81)	(-2.92)	(1.65)	(-1.47)	(1.37)
NUM_ANALYST	0.5224***	0.3318***	0.2876***	0.4410***	0.5085***	0.3120***
	(7.40)	(5.31)	(6.49)	(4.52)	(4.38)	(3.24)
BTM	0.2325***	0.4045***	0.3210***	0.2437***	0.1611**	0.4119***
	(4.91)	(5.97)	(6.14)	(6.26)	(2.54)	(5.00)
STDRET	-5.6922***	-3.6625***	-3.7282***	-4.1353**	-3.9726***	-3.6226***
	(-5.80)	(-4.63)	(-5.95)	(-3.17)	(-3.86)	(-5.36)
STDCFO	-2.7264**	-2.7787*	-1.5866*	-2.8823*	-0.7252	-3.0672**
	(-2.51)	(-1.86)	(-1.69)	(-1.99)	(-0.41)	(-2.46)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.881	0.897	0.720	0.939	0.901	0.886
Observations	7,773	3,361	6,866	4,346	3,389	3,375
SUR & Wald Test for differences in coefficients:						
χ^2 Test	0.02		0.02		1.49	
p-value	(0.88)		(0.90)		(0.22)	

This table reports results from regressions of the effect of lawyer CEOs on S&P credit ratings for subsamples of firms. Columns (1) and (2) report results for long- and short-CEO tenure. Columns (3) and (4) report results separately for a subsample of firms with ratings just above and below the investment cutoff and a subsample

of firms in the other rating categories. Columns (5) and (6) report results for above- and below-median level of CEO network centrality. The dependent variable in all models is S&P credit ratings. Firm-level characteristics variables similar to those in the baseline regression in Table 4.4 are included in all models. Constant term, year-fixed effects, and firm-fixed effects in all models except models in Panel A. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.8. Alternative Explanations

	LAWYER_CEO			
	coef.	t-stat.	R^2	Obs.
Panel A: Other CEO characteristics				
(1) Controlling for CEO ability	0.3787***	(5.22)	0.850	2,034
(2) Controlling for CEO risk-taking incentives	0.2754***	(2.88)	0.885	9,874
(3) Control for CEO network	0.3195***	(2.84)	0.897	6,836
(4) Control for CEO overconfidence	0.2626***	(2.95)	0.881	10,897
(5) Control for other CEO characteristics	0.4214***	(2.65)	0.862	1,043
(6) Control for all CEO characteristics from Models (1) to (5)	1.2396***	(4.04)	0.854	759
Panel B: Other Executives				
(7) Control for General Counsels	0.2788***	(3.51)	0.897	6,620
(8) Control for Lawyer CFOs	0.2492***	(3.10)	0.912	4,267
Panel C: Control for corporate governance				
(9) Control for corporate governance (*GINDEX*)	0.2414***	(2.72)	0.897	5,623
(10) Control for takeover index	0.2834***	(3.10)	0.882	10,903
(11) Control for institutional ownership	0.2690***	(3.12)	0.879	11,313
(12) Control for board quality	0.2894***	(3.07)	0.883	7,856
(13) Control for all governance measures	0.3731***	(3.79)	0.910	4,608

This table reports regression results of investigating alternative explanations for our baseline results. The dependent variable in all models is S&P credit ratings. We report the coefficient and the t-stat of LAYWER_CEO, as well as the R-squared and number of observations of the regression. In all models, we include all control variables and fixed effects as in Table 4.4. In Model 1, we further control for proxies for CEO ability, including managerial ability score as in Demerjian et al. (2012) and four educations indicators (MBA, PHD, IVY_EDUC, and FINANCIAL_EDUC). In Model 2, we control for CEO risk-taking incentives measured by LN_DELTA and LN_VEGA. In Model 3, we control for CEO networks as per El-Khatib et al. (2015. In Model 4, we control for CEO overconfidence using the modified Malmendier and Tate (2005) option-based measure of CEO overconfidence (Campbell et al., 2011; Hirshleifer et al., 2012). In Model 5, we control for other CEO characteristics, including AGE, GENDER, TENURE, GENERAL_CEO, and FOREIGN CEO. In Model 6, we control for all CEO characteristics from Models 1 to 5. In Model 7, we control for corporate general counsels as per Kwan et al. (2012) and Hopkin et al. (2015). In Model 8, we control for Lawyer CFOs. In Models 9 to 12, we augment our baseline model with each of governance proxies individually. In Model 13, we include all governance measures in our regression. The appendix 4A provides a full description of these variables. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 4.9. Lawyer CEOs and Credit Risk Assessment: Sensitivity Analysis

	LAWYER_CEO coeff.	t-stat/ z-stat	R^2/ Pseudo R^2	Observations
(1) Control for accrual quality (*ACCM*)	0.2542***	(2.72)	0.882	9,359
(2) Control for earnings transparency (*EARN_TRANS*)	0.2663***	(3.07)	0.879	11,313
(3) Control for rollover risk	0.2805***	(3.01)	0.883	9,707
(4) Control for financial distress	0.2661***	(3.38)	0.880	10,843
(5) Control for corporate social responsibility rating	0.2888**	(2.40)	0.905	6,737
(6) All additional controls (Models 1 to 5)	0.3937***	(3.24)	0.909	5,405
(7) Use Merton's distance-to-default to measure default risk	0.0225**	(2.37)	0.475	8,536
(8) Use ordered probit regression	0.0881**	(2.17)	0.173	11,313
(9) Standard errors are two-way clustered by CEO and year	0.2683**	(2.21)	0.879	11,313
(10) Exclude financial turmoil period (2007-2009)	0.2731***	(2.70)	0.879	9,677
(11) Exclude post-Dodd-Frank Act period	0.2283**	(2.25)	0.883	9,576

This table reports results of several robustness tests performed on the regressions of credit rating measures. In Models (1) and (2), we rerun the baseline model after controlling for earnings quality measured by three-year moving sum of absolute discretionary accruals (ACCM) as in Hutton et al. (2009), and earnings transparency (EARN_TRANS) as per Barth et al. (2013). Model (3) controls for rollover risk as in Gopalan et al. (2014). Model (5) controls for corporate social responsibility ratings measured as in Cronqvist and Yu (2017). In Model (6), we control for all additional control variables from Models (1) to (5). In model (7), we use Bharath and Shumway (2008) measure of expected default frequency as an alternative measure of corporate default risk. In Model (8), we examine the relation between CEO legal expertise and credit risk assessment using the ordered probit models as in Ashbaugh-Skaife et al. (2006), Cheng et al. (2008). In Model (9), we use alternative standard errors two-way clustered by year and CEO as in Kuang and Qin (2013) and Cornaggia et al. (2017). In Models (10) and (11), we consider alternative sampling methods. Constant term, year-fixed effects, and firm-fixed effects are included in all models except models in Panel A. Except Model (8) where ordered probit model is employed and z-statistics are report and Model (9) where standard errors are two-way clustered by CEO and year, *t*-statistics computed using standard errors robust to

heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses in all models. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.10: Lawyer CEOs and bond costs

	Dependent variable: LN_SPREAD	
	(1)	(2)
LAWYER_CEO	-0.1158***	-0.0735**
	(-3.35)	(-1.96)
BOND_RATING	-0.0366***	-0.0199***
	(-7.13)	(-4.85)
MATURITY	0.0086***	0.0092***
	(6.52)	(6.78)
ISSUE	-0.0000***	-0.0000***
	(-13.25)	(-11.05)
SENIOR	0.6085***	0.2842**
	(4.47)	(2.45)
ENHANCE	0.0252	0.0035
	(0.38)	(0.06)
SIZE		-0.1496***
		(-5.02)
LEVERAGE		0.6296***
		(3.38)
ROA		-0.7247
		(-1.49)
LOSS		0.0576
		(0.97)
SUBORD		-0.0132
		(-0.36)
CAP_INTEN		-0.0048
		(-0.04)
INT_COV		-0.0006***
		(-3.74)
NUM_ANALYST		-0.0324
		(-0.58)
BTM		-0.0882***
		(-3.15)
STDRET		1.3155**
		(2.59)
STDCFO		1.0136**
		(2.25)
Year fixed effects	Yes	Yes
Firm fixed effect	Yes	Yes
R^2	0.741	0.767
Observations	2,149	2,149

This table presents regression results of the effect of lawyer CEOs on new bonds' offering credit spreads. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variables of interest are offering credit spreads measured as the logarithm of offering yields to maturity in excess of similar duration treasuries. Constant term, year-fixed effects, and firm-fixed effect are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009). *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table 4.11: Lawyer CEOs and audit fees

	Dependent variable: LN(AUDIT_FEE)		
	(1)	(2)	(3)
LAWYER_CEO	-0.0907***	-0.0394**	-0.0582**
	(-2.77)	(-2.15)	(-2.53)
SIZE	0.4972***	0.4766***	0.5088***
	(42.23)	(38.23)	(36.92)
LEVERAGE	0.4548***	0.0340	0.2043***
	(6.91)	(0.70)	(4.70)
ROA	0.4494**	0.2456**	-0.1224
	(2.58)	(2.22)	(-1.54)
MTB	-0.0466***	-0.0468***	-0.0107
	(-3.72)	(-4.90)	(-0.97)
LOSS	0.0082	0.0589**	0.0171
	(0.22)	(2.09)	(0.49)
TANG	0.0000	0.0000**	-0.0000
	(0.67)	(2.26)	(-1.63)
LN_NONFEE	0.1124***	0.1406***	0.1136***
	(15.09)	(13.32)	(9.44)
YE	0.0608***	0.0732	0.0725
	(2.93)	(1.50)	(1.36)
BIG4	0.1100	0.1166**	0.1798**
	(1.25)	(2.54)	(2.46)
OPINION	0.0784***	0.0524*	0.0474*
	(4.09)	(1.77)	(1.86)
LTNR	-0.0125	-0.0384***	-0.0418***
	(-1.03)	(-4.17)	(-5.41)
SI	-0.0500*	-0.0107	-0.0094
	(-1.89)	(-0.59)	(-0.58)
EVOL	2.7968***	0.8272	1.8320***
	(5.68)	(1.74)	(3.58)
STDCFO	-3.3234***	-0.8137***	-1.1357***
	(-9.67)	(-3.19)	(-3.90)
LN_DELTA	-0.0454***	-0.0086	-0.0028
	(-4.10)	(-0.90)	(-0.23)
LN_VEGA	0.0151**	0.0088**	-0.0038
	(2.54)	(2.21)	(-0.79)
CAPEX			-1.2128***
			(-2.68)
RD_INTENSITY			-0.9691***
			(-5.28)
Year fixed effects	No	Yes	Yes
Firm fixed effect	No	Yes	Yes
R^2	0.554	0.752	0.779
Observations	5,121	5,121	3,433

This table presents regression results of the effect of lawyer CEOs on audit pricing. The independent variable of interest, *LAWYER_CEO*, is a dummy that equals one if the CEO has a legal education and zero otherwise. The dependent variable of interest is audit fees, *LN(AUDIT_FEE*), measured as the logarithm of audit fees (in dollars) the firm pays to their auditors over the fiscal year. Constant term, year-fixed effects, and industry-fixed effect are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009). *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Internet Appendices for Chapter 4

"Executives' Legal Expertise and Credit Risk Assessment"

4A. CEO Replacements, Future Return Volatility, and Information Asymmetry

In Section 4.4.1, we analyze the CEO turnover and document that an appointment of a CEO with legal training enhances a firm's credit rating, whereas, cases, when lawyer CEOs are replaced by non-lawyer CEOs, are associated with a downgrade in firms' credit rating. In this section, we further examine whether CEO replacements are associated with changes in variability in future performance and information environment. Our additional analyses serve two purposes. First, while it is important to study the changes in a firm's credit rating following CEO replacements to rule out potential endogeneity concerns, it is also of great interest to examine the mechanism(s) through which CEO replacements are associated with changes in credit risk assessment. Second, these analyses in this section will provide additional evidence to either confirm or cast doubt on our argument that CEO legal expertise reduces a firm's default risk by increasing information transparency and reducing firm risk.

Consistent with the previous section, we trace cases of CEO turnovers where we can identify the legal education changes between old and new CEOs and use a dummy variable *CEO_CHANGE*, which takes a value of one if the new CEO is from a non-Lawyer CEO to a Lawyer CEO or from a Lawyer CEO to a non-Lawyer CEO, and zero otherwise. We use a dummy variable *POST*, which takes the value of one if year observation is in the three-year

period after the turnover and zero otherwise. We use the interaction term *CEO_CHANGE×POST* to capture the difference-in-difference effect of CEO legal background on credit rating. We use return volatility (*STDRET_FUTURE*) to capture the variability in future performance and a price delay measure of Hou and Moskowitz (2005) to proxy for information quality. We report results of these analyses in Appendix Table A4.1.

Regarding the variability in future performance, the coefficient on our variable of interest, *CEO_CHANGE×POST*, is significantly negative for cases where there are changes from non-lawyer CEOs to lawyer CEOs (Column 1) and significantly positive for cases where lawyer CEOs are replaced by non-lawyer CEOs (Column 2). Regarding future information quality, the coefficient on *CEO_CHANGE×POST* is significantly negative for cases where there are changes from non-lawyer CEOs to lawyer CEOs (Column 3) and significantly positive for cases where lawyer CEOs are replaced by non-lawyer CEOs (Column 4). Collectively, the additional turnover results indicate that an appointment of a CEO with legal training reduces firm risk and enhances corporate information environment, whereas, the opposite is true following an appointment of a CEO without legal background compared to the CEO's predecessors. These findings provide further support to our prediction that CEO legal expertise reduces a firm's default risk by increasing information transparency and reducing firm risk.

4B. The Effect of Lawyer CEOs on Credit Rating after Controlling for Alternative Explanations

We discuss several alternative explanations in Section 4.4.4. This section complements Section 4.4.4 by further examining whether other CEO characteristics, other top managers, or corporate governance affect the association between Lawyer CEOs and credit risk assessment.

4B.1. Other CEO characteristics

While we, in Table 4.8, control for CEO ability and still document a statistically and economically effect of CEO legal expertise and credit rating, it is possible that the *LAWYER_CEO* can still pick up certain aspects of a CEO's ability that are not manifested in the educational record or work experience. To rule out the possibility that the effect of lawyer CEOs on credit risk assessment operates only through the effect of executive ability on credit rating, we conduct the following test. First, we regress credit rating on five measure of CEO ability, including managerial ability score as in Demerjian et al. (2012) and four education indicators (*MBA*, *PHD*, *IVY_EDUC*, and *FINANCIAL_EDUC*), and obtain the residuals from the regression. The residuals from this regression reflect the proportion of credit rating not explained by managerial ability. We then regress these residuals on the main independent variable of interest, *LAWYER_CEO*, and other control variables as in the baseline models in Table 4.4. Consistent with prior analyses, we use year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with credit ratings. We report the findings of this test in Panel A of Table A4.2. We find that the effect of *LAWYER_CEO* on the proportion of credit rating not explained by CEO ability still positive and statistically significant. This finding, combined with findings of Table 4.8, suggest that lawyer CEOs have an influence on credit rating independent of CEO ability.

We apply the same procedure to address the possibility that the lawyer CEOs can capture certain aspects of CEOs' risk-taking incentives, personal social networks, or overconfidence, which then affect credit risk assessment. We use *LN_DELTA* and *LN_VEGA* as proxies managerial risk-taking incentives, a measure of CEO network centrality constructed from BoardEx database to measure interpersonal ties, an option-based measure of CEO overconfidence to proxy for managerial overconfidence. We report results of these tests in

Panels B, C, and D of Table A4.2. We find that the effect of *LAWYER_CEO* on the proportion of credit rating not explained by any of the above CEO characteristics still positive and statistically significant. These findings consistently support that lawyer CEOs have an influence on credit rating independent of managerial risk-taking incentives, network, or overconfidence.

4B.2. Other Top Managers

We continue our analysis by examining whether the effect of CEO legal training on credit risk assessment is driven by other corporate top managers with relevant oversight roles, such as corporate general counsels (GC) or lawyer CFOs. Consistent with previous sections, we first regress credit ratings on a measure of GC (or a measure of lawyer CFOs) and obtain the residuals from these regressions.[90] The residuals from these regressions reflect the proportion of credit ratings not explained by other top managers. We then regress these residuals on *LAWYER_CEO* in the baseline model and report results of these tests in Panels E and F of Table A4.2. We find that the effect of *LAWYER_CEO* on the proportion of credit ratings not explained by other top management with relevant oversight roles remains positive and statistically significant. These findings consistently support that lawyer CEOs have an influence on credit risk assessment independent of other top managers.

4B.3. Corporate Governance

We address a possibility that the documented effect of lawyer CEO on credit ratings could be driven by the strength of the firm's corporate governance. While we control for corporate governance in the sensitivity analyses (Models 12 to 16 in Table 4.9), it does not completely rule out the possibility that lawyer CEOs affect credit rating only through their

[90] See Section 4.4.4 for more detail on a measure of GC or lawyer CFOs.

effect on corporate governance. To mitigate this concern, we first regress credit ratings on a comprehensive set of governance proxies, including (1) Gompers et al. (2003)'s corporate governance index (*GINDEX*) constructed based on 24 governance provisions; (2) institutional ownership; (3) takeover index constructed from the laws (Cain, McKeon, and Solomon, 2017); and (4) three measures of board quality: board size, the fraction of independent directors on the board, and co-opted boards (Coles, Daniel, and Naveeen 2014), and obtain the residuals. The residuals from these regressions reflect the proportion of credit ratings not explained by governance. We then regress these residuals on *LAWYER_CEO* in the baseline model and report results of these tests in Panel G of Table A4.2. We find that the effect of *LAWYER_CEO* on the proportion of credit ratings not explained by governance remains positive and significant. These findings further confirm that lawyer CEOs have an influence on credit risk assessment independent of corporate governance.

4C. Lawyer CEOs, Litigation risk, and Credit rating

So as to conduct a comprehensive study on the effect of lawyer CEOs on a firm's credit risk assessment, in this section, we consider whether litigation risk affects the association between CEO legal expertise and credit risk. Given corporate managers with legal expertise tend to be sensitive to litigation risk arising from misreporting (Krishnan, Wen, and Zhao, 2011; Ham and Koharki, 2016) and financial reporting quality can affect credit risk, one may expect that the effect of lawyer CEOs on a firm's credit risk assessment can be more pronounced among firms facing high litigation risks. To test this possibility, we follow the Kim and Skinner (2012) and construct a firm-level litigation risk measure. Specifically, we collect

data on filings of securities class action lawsuits from the *Stanford Law School Securities Class Action Clearinghouse* and construct a firm-level litigation risk measure as follows:[91]

$$SUED = \beta_0 + \beta_1 (FPS_t) + \beta_2 (LNASSET_{t-1}) + \beta_3 (SALE\_GROWTH_{t-1}) + \beta_4 (RETURN_{t-1}) + \beta_5 (RETURN\ SKEWNESS_{t-1}) + \beta_6 (RETURN\ STD_{t-1}) + \beta_7 (TURNOVER_{t-1}) + \varepsilon \quad \text{(Eq. 9)}$$

where *SUED* is a dummy that equals 1 if a class lawsuit filling occurs during the year and 0 otherwise; *FPS* is a dummy that equals 1 if the firm is in the biotech (SIC codes 2833–2836 and 8731–8734), computer (SIC codes 3570–3577 and 7370–7344), electronics (SIC codes 3600–3674), or retail (SIC codes 5200–5960) industry, and 0 otherwise; *LNASSET* is the natural logarithm of total assets at the end of year *t-1; SALE_GROWTH* is year *t-1* sales less year *t-2* sales scaled by beginning of year *t-1* total assets; *RETURN*, *RETURN SKEWNESS*, and *RETURN STD* are market-adjusted 12 month stock return, skewness, and standard deviation of the firm's 12-month returns, respectively; and *TURNOVER* is trading volume accumulated over the past 12 months.

Given firms in some industries are more sensitive to litigation risks (Francis, Philbrick, and Schipper, 1994a, b), we construct an industry-adjusted firm-level measure of litigation risk as the differences between a firm litigation risk and average litigation risk of the industry that this firm belongs to. We then estimate our baseline regression (Equation (6)) separately for groups with above- and below-median levels of firm litigation risk. Consistent with previous sections, in all regressions, we control for year- and firm-fixed effects to control for time- and firm-invariant factors that could be associated with credit risk assessment. We report results for this test in Appendix Table A4.3.

Comparing the two subsamples, we observe that the coefficient on *LAWYER_CEO* is significantly positive in both subsamples. We then conduct a test for coefficient differences

[91] Stanford Law School Securities Class Action Clearinghouse data available at: http://securities.stanford.edu/

across the high- and low-distress subsamples and find that the coefficient on *LAWYER_CEO* is statistically larger for the high litigation risk subsample compared with the low litigation risk subsample. These results suggest that CEO legal expertise is a significant credit-rating factor that is independent from its impact on prior firm performance and other observable characteristics (such as size, capital intensity, and capital structure) and more pronounced for firms with relatively high litigation risk.

Table A4.1: CEO Turnover Test, Future Return Volatility and Financial Report Comparability

	Dependent Variable: Future Return Volatility and Financial Report Comparability			
	STDRET_FUTURE		PRICE_DELAY	
	From non-Lawyer CEO to Lawyer CEO (73 Cases)	From Lawyer CEO to non-Lawyer CEO (94 cases)	From non-Lawyer CEO to Lawyer CEO (73 Cases)	From Lawyer CEO to non-Lawyer CEO (94 cases)
	(1)	(2)	(3)	(4)
CEO_CHANGE × POST	-0.0047 *	0.0060**	-0.048**	0.0379*
	(-1.74)	(2.01)	(2.24)	(1.70)
All Controls	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes
Observations	874	1,083	709	935
R^2	0.811	0.845	0.358	0.389

This table reports regression result for the difference-in-difference analysis. *CEO_CHANGE* is a dummy variable that equals one if the new CEO is from a non-Lawyer CEO to Lawyer CEO (Columns 1 and 3) and from a Lawyer CEO to a non-Lawyer CEO (Columns 2 and 4), and zero otherwise. Firm-year observations with *CEO_CHANGE* equals one are considered treated firms. Each firm-year observation in the treated group is matched with a firm-year observation in the control group (*CEO_CHANGE* equals zero) using the nearest-neighbor propensity score matching procedure. The matched pair is obtained in the year before the CEO turnover and is based on all firm characteristics as per Table 4.4 and the industry (by two-digit SIC codes). *POST* is a dummy variable that equals one if the year observation is in the three-year period after and zero in the three-year period before the turnover. Dependent variables are future variability of stock returns (*STDRET_FUTURE*) and future price delay measure (*PRICE_DELAY*). *STDRET_FUTURE* is the standard deviation of monthly returns over the four years following the current year (i.e., [*t+1*, *t+4*]). *PRICE_DELAY* is the Hou and Moskowitz (2005)'s price delay measure. Other firm characteristics variables are similar to those in the baseline regressions in Table 4.3. Constant term, year-fixed effects, and firm-fixed effects are included in all models. *T*-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variables definitions and data sources are presented in Appendix 4A.

Table A4.2: The Effect of Lawyer CEOs on Credit Rating after Controlling for Alternative Explanations

Panel A: CEO Ability

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.2792***
	(2.85)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	2,034
R^2	0.249

Panel B: CEO risk-taking incentive

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.2126**
	(2.36)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	9,874
R^2	0.114

Panel C: CEO Network Centrality

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.3234***
	(2.86)
All controls	
Year FEs	
Firm FEs	0.2361
Observations	6,836
R^2	0.209

Panel D: CEO Overconfidence

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.2625***
	(3.04)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	10,897
R^2	0.217

Panel E: General Counsels

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.2761***
	(3.50)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	6620
R^2	0.317

Panel F: Lawyer CFOs

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.1832**
	(2.01)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	4,267
R^2	0.228

Panel G: Corporate Governance

	Dependent Variable = Ɛ (*CREDIT RATING*)
LAWYER_CEO	0.3819***
	(3.77)
All controls	Yes
Year FEs	Yes
Firm FEs	Yes
Observations	4,608
R^2	0.169

This table reports the results on the impact of CEO legal expertise on credit rating of the firms that they manage. We first regress credit ratings on measures of managerial ability (Panel A), CEO risk-taking incentives (Panel B), CEO network centrality (Panel C), CEO overconfidence (Panel D), General Counsels (Panel E), Lawyer CFO (Panel F) or corporate governance (Panel F) separately and obtain the residuals from these regressions. These residuals reflect the proportion of credit ratings not that are explained by other CEO characteristics, other top management, or corporate governance. We then regress these residuals on the main independent variable of interest, *LAWYER_CEO*, and other control variables as in the baseline models in Table 4.4. *LAWYER_CEO* is a dummy that equals one if the CEO has a legal education and zero otherwise. We include year-fixed effects and firm-fixed effects in all models. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Table A4.3. Lawyer CEOs, Litigation risk, and Credit rating

	Litigation Risk	
	High	Low
	(1)	(2)
LAWYER_CEO	0.315***	0.267***
	(2.93)	(4.01)
SIZE	0.955***	1.011***
	(13.05)	(13.98)
LEVERAGE	-3.102***	-2.742***
	(-8.53)	(-14.76)
ROA	2.713***	3.334***
	(8.84)	(7.67)
LOSS	-0.487***	-0.202***
	(-5.02)	(-3.44)
SUBORD	-0.305***	-0.179**
	(-2.70)	(-3.48)
CAP_INTEN	0.352	0.797***
	(1.35)	(4.67)
INT_COV	0.000	-0.000
	(0.57)	(-0.64)
NUM_ANALYST	0.618***	0.366***
	(5.70)	(5.78)
BTM	0.203***	0.316***
	(3.54)	(7.62)
STDRET	-3.797***	-5.560***
	(-3.91)	(-5.49)
STDCFO	-2.857*	-2.498***
	(-1.85)	(-2.86)
Year fixed effects	Yes	Yes
Firm fixed effect	Yes	Yes
R^2	0.874	0.896
Observations	4,865	4,843
SUR & Wald Test for differences in coefficients:		
χ^2 Test	5.49**	
p-value	(0.02)	

This table reports results from regressions of the effect of lawyer CEOs on S&P credit ratings for subsamples of firms based on litigation risk. Columns (1) and (2) report results for above- and below-median firm-level litigation risk measured following Kim and Skinner (2012). Firm-level characteristics variables similar to those in the baseline regression in Table 4.4 are included in all models. Constant term, year-fixed effects, and firm-fixed effects are included in all models except models in Panel A. T-statistics computed using standard errors robust to heteroscedasticity and clustered by year (Pedersen, 2009) are reported in parentheses. *, ** and *** denote significance at the 10%, 5%, and 1% levels, respectively. Variable definitions and data sources are presented in Appendix 4A.

Chapter 5.

Conclusion

5.1. Summary of Empirical Findings

This thesis examines whether, and to what extent, executives' attributes affect corporate outcomes. The thesis consists of three empirical chapters with the first essay focusing on how the changes in CEO status affect corporate innovation outcomes and the remaining two essays focusing on how the legal expertise of executives impacts financial market quality and credit risk assessment.

The first essay finds that firms headed by winners of non-media awards generate more patents and more citations per patent in the second and the third year following the award year, whereas, the difference in corporate innovation outputs between media award-winning CEOs and a matched sample of non-winners is either insignificant or weak. In addition, firms headed by winners of non-media award are associated with better employee treatment and less analyst-induced pressure following the award, both of which spur innovative activities. Furthermore, non-media award winners are less likely to be the center of media attention; hence they do not suffer from the burden of celebrity.

The second essay suggests that that firms led by lawyer CEOs have higher stock market liquidity than firms led by non-lawyer CEOs. The magnitude of this effect is economically significant, with firms headed by lawyer CEOs, on average, having about 4.6% lower average

annual bid-ask spreads compared to firms headed by non-lawyer CEOs. In addition, firms led by CEOs with legal expertise are associated with less stock price delay, smaller market reactions to earnings announcements, and earn fewer insider trading profit.

The third essay shows that debt market participants incorporate the reduction in future outcome risk and the enhancement in corporate information environment associated with executives' legal expertise into their assessments of a firm's credit risk. Specifically, firms head by lawyer CEOs enjoy more favorable ratings and have, on average, 7.35% (about 9.68 bps) lower debt costs than firms of non-lawyer CEOs. Other firm stakeholders such as auditors also value CEO legal expertise in the pricing of their services.

Taken together, this thesis provides more insights on how CEOs' personal traits (i.e., CEO status and legal education) are associated with corporate innovative activities, liquidity costs, and credit risk assessments. The thesis has several implications for investors, credit rating agencies, and other firm stakeholders. Specifically, investors should take into account CEOs' personal traits when making investment decisions as these attributes are strongly related to corporate disclosure quality and information asymmetry between corporate insiders and outsiders. In addition, incorporating executives' education background and experience should allow credit rating analysts and other firm stakeholders to better understand a firm's overall risk profile and performance.

5.2. Avenues for Future Research

This thesis suggests several interesting avenues for future research. First, the thesis has several implications for future studies that aim to examine the effect of executives' personal traits on corporate outcomes. Specifically, the first essay utilizes a unique set of CEOs' non-media awards in examining firm innovative activities. Given the change in status following non-media award competitions could affect various corporate decisions and stakeholder

behaviors, the robust findings of the first essay provide a potentially fruitful avenue for future research that investigates stakeholders and corporate outcomes in a non-media setting. For example, future studies can revisit the association between award-winning managers and corporate earnings management practice in a non-media setting. Such study will complement Malmedier and Tate (2009) and provide a comprehensive investigation on how shocks to CEO status affect subsequent firm performance. From the stakeholders' point of view, future research can consider how debt market participants value the changes in CEO status, in both media and non-media setting, when designing debt contracts.

Second, the findings of the second empirical essay have a strong implication for future research on financial market quality. This essay highlights the importance of executives' characteristics, which are largely under-investigated up to this point, in enhancing financial market quality. Given executives' styles, experience, and behavior play important roles in corporate outcomes, future studies should take these attributes into consideration if they aim to study a firm's liquidity costs.

Finally, given the third essay provides strong evidence that executives' legal expertise has implications for debt market investors and auditors, future research could examine whether, and to what extent, other firm key stakeholders (e.g., employees, customers, suppliers, and investors) value executives' legal education. Such studies will offer timely empirical evidence to a relatively new but growing literature documenting the economics effects of top management's legal expertise.

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