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Gender differences

in CEOs' performance, CEOs' appointment, and CEOs' risk-taking behaviors

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PREFACE AND ACKNOWLEDGEMENTS

First and foremost, I would like to give special thanks to my thesis supervisor, Dr. Lemmen, for his expert advice and extraordinary support in my thesis research. And I am grateful for his academic advice and warm words for encouragement.

As I was pursuing a Master degree in Financial Economics, I recognized the importance of the characteristics of psychology and behavior for researching corporate governance. I have been attracted by courses with close contents in the past (e.g. Advanced Behavioral Finance, Advanced Corporate Finance and Governance). The effects of psychology and behavior on governance inspired and motivated me to do a relevant thesis on this research topic. After searching and reading plenty of literature, I came to wish to contribute to corporate governance in some ways, especially in gender differences. Through my research, I've gained new perspectives on gender differences in CEOs' performance based on CEO succession and in CEOs' risk-taking behaviors based on CEOs' compensation package. This paper might be helpful for people who are interested in the CEOs' governance mechanisms. This paper will provide empirical evidence through case studying to explain research questions and results.

Abstract

This paper aims to estimate gender differences in 1) Firm performance, according to the influences of gender changes (F2M & M2F) within CEOs' succession situations (Routine and Non-routine succession). In non-routine succession situations, this paper finds a significant positive influence of M2F (female replaces male CEO) succession on firm performance, especially on ROA, compared to a negative influence of F2M succession. Besides, the insignificant result of gender differences in non-routine successions indicates that the worse performance might be due to the former CEOs' sudden departures instead of female CEOs' low-capability. 2) CEOs' appointment decisions based on gender diversity of the boards, and it exhibits that a higher proportion of female directors will increase the likelihood of female CEOs; especially when more females are nominating members on the boards. 3) Risk-taking behaviors, according to CEOs' reactions to equity-based (restricted stocks & options) compensation, and It is reasonable to believe that female CEOs are prone to take M&A activities to pursue short-term benefits, and male CEOs have a higher risk-bearing in chasing long-term benefits.

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CHAPTER 1 Introduction

This paper will research gender differences in three aspects. First, I will estimate gender differences in firm performance, according to the influences of gender changes (F2M: male replaces female CEO & M2F: female replaces male CEO) in CEOs' succession situations. Then, this study will explore gender differences in CEOs' appointments on the basis of the influences of the boards' gender diversity, and in CEOs' risk-taking behaviors based on the CEOs' reactions to equity-based (restricted stocks & options) components of CEOs' compensation. Thus, the research question is, *What are gender differences in CEO performance, CEO appointment, and CEO risk-taking behaviors?*

The relationship between CEOs' succession and organizational performance has been an attractive topic in the literature due to the vital role played by top executives in firm performance. Scholars are interested in how the managerial organization functions in general, and particularly the causes and consequences of CEOs' succession (Huson, Malatesta, and Parrion, 2003). Ndofor (2009) considers leadership succession as a significant event in corporates' histories and should be considered as a strategy for improving firm performance. In existing studies, there are three main perspectives of the relationship between CEOs' succession and corporate performance. The first one is that there is a positive influence of CEO succession on firm performance studied by Shen and Cannella (2002), Virany, Tushman and Romanelli (1992), and Wiersema (1992). They document that top executives' turnover could optimize corporates' managerial structure to some extent. For example, it could lessen the loss from poor management by replacing the misgovernment.

Second, there is a negative relationship between CEO succession and firm's performance (e.g., Carroll, 1984; Hageman, 1993). Carroll (1984) proposes that the departure of senior executives is more likely to cause chaos in management, even making corporates lose critical routines and operating procedures. Third, Boeker (1997) and Pfeffer & Davis-Blake (1986) find that there is no apparent link between CEOs' succession and performance. The high diversity of senior executives' turnover is more associated with a greater level of strategic changes (Boeker, 1997). Also, Brown (1982) estimates the relationship between succession and performance from the point of view of scapegoating. He proposes that succession is over-ritualized by media and the public, and influences of the rite cause people readily believe the worse

performance is due to successors. The same as was concluded in Ndofor et al.'s report (2009), he thinks that there are equivocal results by scholarly studies considering the leadership succession and firm performance. These inconsistent findings indicate the analysis of this sort of relationship seems particularly important in separating succession situations, for example, routine succession and non-routine succession.

A large number of articles performs the holistic analysis of the CEO succession process by studying the relationship between CEOs' succession and firm performance, rather than categorizing situations within the succession. Therefore it is necessary to do in-depth research in this issue from a new angle; this is, is it possible that particular situations of succession affect firm performance regardless of the gender CEO? For example, if the former CEO resigned for no reason, it is more likely to hurt firm performance and cost a lot to recover during a new CEO's term. Pourciau (1991) proposes that "Although special circumstances surround every executive change, each change can be classified as one of two general types, routine and non-routine". This paper refers the way from Pourciau (1991) and Vancil (1987) to define both routine and non-routine successions, and to test the relationship between Routine/Non-routine CEOs' succession and firm performance.

Furthermore, this paper tests how gender change (a male CEO succeeded by a female or vice versa) influences firm performance. Many researchers only debate different views either on the relationship between the new female CEOs and firm performance, or the new male CEOs and firm performance separately. However, there are a few studies that examine the impacts of gender changes on both sides. A report by Zhang and Qu (2015) on senior Chinese executives proposes that gender changes in succession adversely affect post-succession firm performance, and they find that the positive organizational attitudes toward female executives might weaken the negative impact of male-to-female succession on firm performance. These findings inspire me to study the effects of gender changes together within CEOs' succession on firm performance. Meanwhile, this paper considers gender changes with routine and non-routine succession situations. In a word, this paper estimates gender differences by examining the influences of gender changes (F2M and M2F) within particular succession situations (Routine and Non-routine) on performance.

The news from Fortune (Zillman, 2019) reports of a new record that 33 companies on the Fortune ranking

list are led by female CEOs in 2019. Also, the number of female CEOs in the S&P 500 shows the same as the Fortune ranking. The base number of female CEO is small and represents a small share of the group – just 6.6%. However, the sum in 2019 makes a great jump from last years' share (4.8%), and the trend of appointing female CEOs is increasing in slow-growth as can be seen from Figure 1, and the growth is apparent since the year 2010. From 2010 to 2019, the number of female CEOs on the Fortune 500 has raised from 14 to 33. Similar with the increase in female CEOs, the average ratio of women directors on the boards of S&P 1500 firms increased steadily from 7 percent in 1998 to 14 percent in 2013 (Kim & Starks, 2016). Additionally, it is important to consider the influences of the boards on the change in the status of female directors. There are a variety of responsibilities and powers related to the board, and the CEO's appointment dominates the directors' duty. Appointing CEOs is considered as a strategic approach to monitoring executives (Fama & Jensen, 1983) and indirectly controlling the core management. This paper will estimate gender differences in CEO appointment decisions, according to the influences of the board's gender diversity. More specifically, this paper will estimate gender differences by testing the relationship between the proportion of female directors on the boards and the probability of nominating females as CEOs.

Year	Number of CEOs who are women	Share of CEOs who are women
1998	1	0.2%
1999	2	0.4%
2000	2	0.4%
2001	3	0.6%
2002	7	1.4%
2003	7	1.4%
2004	8	1.6%
2005	9	1.8%
2006	10	2.0%
2007	13	2.6%
2008	12	2.4%
2009	15	3.0%
2010	14	2.8%
2011	12	2.4%
2012	18	3.6%
2013	20	4.0%
2014	24	4.8%
2015	24	4.8%
2016	21	4.2%
2017	32	6.4%

2018	24	4.8%
2019	33	6.6%

Figure 1 Number & Percentage of Female CEOs in the Fortune 500. Adapted from "The Fortune 500 Has More Female CEOs Than Ever Before" by C. Zillman, 2019. Retrieved July 20, 2019, Fortune Report, from: https://fortune.com/2019/05/16/fortune-500-female-ceos/

Generally, formulating the executives' compensation package is one of the important responsibilities of the board of directors. Meanwhile, executive compensation can not only be used to attract, retain, and motivate CEOs, but also can be used to align top managers with shareholders (Jensen & Meckling, 1976). There are five basic parts in the CEOs' compensation: salary, annual bonus, long-term incentive plans (LTIP), options, and restricted stocks (e.g., Frydman & Jenter, 2010), and an effective way to tie pay to performance is by increasing the proportion of managers' equity-based compensation, such as incentive stocks and options (Jensen & Murphy, 2010). Mehran (1995) concludes a positive relationship between firm performance and the percentage of executives' equity-based compensation. Other studies document that incentive parts of the compensation package motivate executives to take on more risk (e.g., Hirshleifer & Suh, 1992). These views indicate that executive compensation, measured by equity-based compensations, is closely related to firm performance. Furthermore, Bellucci et al. (2010), and Berger et al. (2014) believe that there is a gender difference in portfolio risk if firms are led by females on the boards, which motives me to explore gender differences in risk-bearing. This paper will estimate gender differences through testing CEOs' risk-taking behaviors based on equity-based compensation between firms led by female CEOs and firms led by male CEOs.

Overall, this paper extends the prior researches done on gender differences in managerial performance in two ways. First, it combines succession situations (Routine succession & Non-routine succession) with gender changes (F2M & M2F) as a factor to test gender differences in firm performance. In these cases, it exhibits a significant positive influence of M2F succession on firm performance in non-routine succession situations, especially on ROA, compared to a negative influence of F2M succession. Also, gender differences in CEOs' performance within routine succession are indistinctive. These findings indicate that the worse performance might be due to the former CEOs' sudden departures instead of new CEOs' low-capability for both males and females. Second, this study performs the analysis of gender differences in

risk-taking behaviors between firms run by female CEOs and firms run by male CEOs, according to equity-based compensation (restricted stocks & options). Results can be concluded that female CEOs are prone to take regular M&A activities to pursue short-term benefits, and male CEOs have a higher risk-bearing in chasing long-term benefits. More detailed information would be explained in the following sections.

The structure of this paper is as follows. Discussing the relevant literature and describing the hypotheses refer to chapter 2. In chapter 3, it provides data collection and basic ideas about research design. Then, this paper examines the relations and analyzes the results in chapter 4. Section 5 concludes.

CHAPTER 2 Theoretical Background

This chapter provides the theoretical bases for this paper. To further understand organizational management and gender differences, this paper describes four main theories: Resources dependence theory, Human capital theory, Agency theory and Social psychological theory.

2.1 Resources Dependence Theory

Resource dependence theory (RDT) is formalized by Pfeffer and Salancik (1978). They argue that the primary responsibility of the board is linking the organization to other external organizations. Resources dependence focuses on the effects of the external environment on organizations (e.g., Hannan & Carroll; 1992), and it connects the external situations to organizations' internal decisions, such as personnel changes and routine operations. Therefore, corporates try to make use of the external environment to build alliances to manage strategically. Casciaro and Piskorski (2005) propose that resources dependence provides a theoretical base on the power levels of the organization system. It posits that power is based on the control of resources (Pfeffer & Salancik, 1978), and the power is expressed in resource allocations (Mudambi & Navarra, 2004).

Under conditions of power imbalance, the dependent organization is likely to be more motivated (Casciaro & Piskorski, 2005). There are many empirical studies provide support for the power imbalance in application of resources dependence theory (e.g., Pfeffer & Leong, 1977; Casciaro & Piskorski, 2005; Provan, Beyer, and Kruytbosch, 1980). For example, certain types of organizational relations represent how firms deal with imbalanced power. Specifically, RDT supports that the boards enable firms to minimize dependence from gaining external resources (Pfeffer, 1972). Also, there is a bunch of prior literature conclude that RDT supports the importance of the board of directors on organizations' development (e.g., Dalton, Hitt, Certo, and Dalton, 2007; Zahra & Pearce, 1989), and they suggest that this theory is a more successful lens for understanding the boards (Hillman, Withers, and Collins, 2009).

A few studies cite resources dependence theory to examine boards' ability to provide critical resources for

the firm, and they consider the size and the compensation of the board. For example, Sanders and Carpenter (1998) find that board size is closely related to environmental dependence, such as a firm's level of internationalization, which is consistent with Pfeffer's (1972) view that "that board size and composition are not random or independent factors, but are rational organizational responses to the conditions of the external environment." Additionally, several studies consider the relationship between the board and firm performance as an indicator for a successful resource dependence strategy (e.g., Dalton, Daily, Johnson, and Ellstrand, 1999), and they state a complex connection between the board size and firm performance. Board composition not only dependents on the external environment but also on the firm's strategy and performance (Pearce & Zahra, 1992), which reflects a challenge of RDT that this theory overlooks the importance of external environment on organizations to some extent. This paper will estimate the influences of the composition of the boards, especially in gender diversity.

Firms with more dependencies on the external environment have higher rates of senior executives' turnover (Harrison, Torres, and Kukalis, 1988; Friedman & Singh, 1989). Pfeffer and Salancik (1978) discuss that executive succession is a strategic response to the uncertain environment and dependencies, and they propose that "organizational structures are results of decisions affected by the distribution of power and control" (Hillman, Withers, and Collins, 2009), which means the distribution of power of organization affects senior executives' succession. Also, firm performance reflects how executive succession works. Therefore, executive succession is considered as a strategy for remedying poor performance. Furthermore, if a firm exhibits a signal of poor performance, the boards are more likely to replace the former CEO, and then the public market will respond more positively (Hillman, Withers, and Collins, 2009).

Since corporate behaviors could be explained by resources dependency theory, many studies cite RDT to research the characteristics of types of executives within executives' succession. There are two main types of CEO successors: outside & inside CEOs. Dalton and Kesner (1983) find that larger firms are more likely to replace the former CEO with an insider, and within larger firms, there isn't an apparent link between performance and successors' type. Besides, firms with a midrange of performance tend to select outside CEOs (Schwartz & Menon, 1985). However, there are some views that state the relationship between the types of new executives and firm performance is hard to be measured (e.g., Pearce & Zahra, 1992). And they believe that (external & internal) types of new executives can not be simply considered as the main

reason to explain firm (past and future) performance. Thus, these findings motive me to consider how firms' succession environment – routine & non-routine situations influence CEOs' performance, and this paper will estimate whether there are gender differences in CEOs' performance.

2.2 Human Capital Theory

The human capital theory (HCT) was announced in 1960 by Theodore Schultz, and this theory assumes that formal training or education is highly instrumental in improving the productivity and efficiency of workers. Olaniyan and Okemakinde (2008) argue that "HCT could increase cognitive stocks of economically productive human capability, which is a product of innate abilities and investment in humans. " Human capital theory has practical implication for determining the economic value of training and education, and it allows firms to calculate the expected returns of senior executives from their past educational experiences and future training investments.

The influences of HCT are referenced in many studies on the relationship between firm development and executives' capability. Robert (1991) proposes that the creation of human capital contributes to labour productivity and technology development in general. Even if we assume that there are no differences in the distribution of managers' innate talents between females and males, the external influences on executives are essential as well. And the fact is that many corporates have gender prejudice in cultivating and training executives, and they prefer males being their potential senior executives (e.g., Eagly, Makhijani, and Klonsky, 1992; Estes & Hosseini, 1988; Barber & Odean, 2001).

The human capital theory allows the public market to quantify the value of people's intangible assets, such as social status. Polachek and Mincer (1974) argue that HCT provides an explanation for occupational gender segregation. Polachek's (1979) segregation theory describes the fact that females rather males take responsibility for childcare and housework. To some extent, females are out of labour in some industries and countries, and their job capabilities are usually depreciating compared to males' appreciated circumstances (Polachek, 1975; Polachek, 1981). A commonly heard argument is females are easier to be regarded into a lower level of human capital (Burke & Mattis, 2013), and thus, organizations are less likely

to choose females as their senior executives and to fulfil females into the board positions as well, which indicates that women face societal, organizational, and familial obstacles that deter them from being top managers (Acker & Cockburn, 1994). However, there is a growing number of women who enroll in business schools and obtain higher degrees in recent years (Martelli & Abels, 2010). A report from the U.S. Department of Education (2008) states that the number of female graduate students increases by 65% compared to a 27% increase in male graduate students from 1995 to 2005. Besides, many scholars provide empirical evidence to prove that female executives are sufficiently qualified. Kalleberg and Leicht (1991) find that companies led by women are less likely to go into financial distress and more likely to generate higher earnings of small businesses. Caliper Corporation (2005) reports from personality assessments that female leaders are more assertive and persuasive.

Even if females are showing in executives' positions, it is still hard for them to promote and to proof their outstanding skills. Consistent with the view "glass ceiling", it describes the barriers to female's promotion at the top levels of firms (Bryant, 1984). The internal training is one of the sources of human capital and associated with some set of skills particular technologies. However, investing in human capital is a costly endeavour for firms (e.g., Tushman & Nadler, 1978), and firms need to afford a significant fraction of the costs of these training investments. Some corporations and the public markets underestimate females' potential economic value; thus, they are not willing to invest in human capital for female executives compared to males. Furthermore, from executive successions' perspective, companies are willing to pick insiders as their senior executives to reduce their investment expenditures and decrease their potential losses due to personnel changes.

2.3 Agency Theory

The agency theory has wide applications. A bunch of literature cites the theory in their empirical work (e.g., Caves & Murphy, 1976; Hill & Jones, 1992; Jensen & Meckling, 1976). Hill and Jones (1992), Jensen and Meckling (1976), and Ross (1973) conclude that "An agency relationship is defined that one party/person engages another party/person to perform some service on their behalf, which involves delegating some decision-making authority." The agency theory posits that there is an inconsistent interest between

principals and agents (Hill & Jones, 1992). Therefore, the main challenge of agency theory is to limit the divergence of interests. To build a relative harmonious agency-relationship, principals usually generate an incentive mechanism to maximize their benefits (e.g., Hill & Jones, 1992; Wilson, 1968; Heckerman, 1975).

Examples of the agency theory are universal, especially in the relationship between the employer and employee (Ross, 1973). The most broadly applicated topics on corporate governance are agency relationships within organizations and problems of moral hazard. This paper confines attention to a general problem - the analysis of agency relationship between the board and top management of the corporation. The agency relationship reflects the issue associated with "separation of ownership and control" (Jensen & Meckling, 1976; Alchian & Demsetz, 1972). Executives directly control the operating business, whereas the board con only indirectly interpose the routine operations by monitoring and allying with top managers in general (Hillman & Dalziel, 2003; Fama & Jensen, 1983). Jensen and Meckling (1976) argue that senior executives might avoid ventures simply because it requires too much effort on management or on learning new technologies. In that case, the agency conflict between the boards and managers is deriving from the managers' tendency to chasing less risky projects for their interests; and it can result in firms' market value substantially lower in the long-term.

Furthermore, Hill and Jones (1992) explain the evolution of shaping a better relationship between managers and stakeholders through building an incentive mechanism. This study describes that the boards exert their responsivities strategically to build an alliance with CEOs. Specifically, nominating CEOs is a way for the board of directors to monitor managers and control critical operating business. CEOs are considered as a bridge for directors to connect closely with internal operations. Besides, optimizing top executives' compensation package could weaken interest conflict (Boyd, 1994; Walsh & Seward, 1990), and this study will focus on the influences of the equity-based compensation on CEOs' performance.

2.4 Social Psychological Theory

Social psychological theory (SPT) provides an integrative conceptual framework for group phenomena and a dynamic linkage of social cognitive and group behaviors (Michael, 2001; Hogg & Abrams, 1999;

Moreland et al., 1994). In the socio-psychological tradition, this theory focuses on individual cognition and behavioural characteristics in a communicative context (Turkstra, Coelho, and Ylvisaker, 2005). SPT can be divided into three main branches (all explore what results in behaviors): Behavioural analysis based on variables in communication situations (e.g., individual's personality, situational differences); Cognitive analysis based on influences of patterns of thoughts; Biological analysis based on the influences of inborn neurobiological.

Application of the social psychological theory is broad, and there are a lot of extended theories of SPT (e.g., Attribution theory; Cognitive dissonance; Observational learning; Self-perception theory). An important extension of social psychology on leadership and management is called leader categorization theory (e.g., Rush & Russell, 1988; Hais, Hogg, and Duck, 1997; Judith & Donelson, 1991). This theory indicates that people or the public market have preconceived ideas about what types of leaders should be and how leaders should behave in general situations (Michael, 2001). That is, excellent leaders and senior executives are considers as a group of people who fit situational requirements have symbolic categories (Michael, 2001), which reflects the stereotype of leaders.

More specifically, this paper estimates gender differences in CEO appointment decisions and in CEO performance. Many empirical studies propose that there is gender stereotype on manager types. For example, Schein (1973) find that outstanding managers perceived to possess symbolic characteristics, attitudes, and temperaments are more commonly attributed to males than to females. Like Sczesny et al. (2004) reported that managers are perceived as possessing traits that are part of the male-type stereotype. Moreover, Ashmore and Del-Boca (1979) construct a general social psychological framework to study how sex stereotypes function in social cognition and behavior. They find that people are more likely to category "sex-roles" by "implicit personality theory". In other words, there are consensual beliefs of gender differences in typical characteristics between men and women (Broverman, 1968), and it exhibits that females rather males take more responsibilities for childcare and housework (Polachek, 1979). There isn't an apparent resemblance between women and managers (Ashmore & Del-Boca, 1979; Judith & Donelson,1991).

Sex stereotypes cause females less competitive in the market. Hefferman (2002) notes that women are held

back from coming into corporates due to sex stereotype. Even if females take charge of executives' positions, it is hard for them to break the barriers of promotion (Bryant, 1984). Until the year 2010, the proportion of female CEOs in the Fortune 500 companies is only about 3 % (Zillman, 2019). Moreover, Marshall (2001) proposes that efforts to absorb females or minorities on the boards are often hampered by debates on qualifications. Therefore female senior executives and female directors exhibit a phenomenon of "tip of the iceberg", that is, a tiny part of the whole employment market.

Westphal and Milton (2000) investigate how minorities on the boards influence corporates' focal decisions, and their conclusions indicate that minority directors have limited power on other directors, especially if the prior experience of minority directors in a majority role could weaken their power. A negative relationship between minorities on the boards and their control power brings with an indication. The public markets do not have sufficient loyalty to follow female CEOs' (A minority of the CEO scale) decisions, and in this case, females will receive less weight in firms' status.

CHAPTER 3 Literature Review and Hypotheses Development

In this chapter, the previous articles on CEOs' succession, CEO gender & firm performance, the power of directors are reviewed. The broad review consists of four parts. The first and second part is about Routine and Non-routine succession, the third one illustrates the CEOs' gender preferences & firm performance, the final part states the relationship between the power of the boards and the CEOs' performance. After that, this paper provides a clear statement of the research hypotheses.

3.1 Literature Review

3.1.1 Routine Succession

To understand the general relationship between executive succession and organizational performance, I need to identify possible reasons for changes in leadership. Brown (1982) notes that the nature of leadership succession remains uncertain. Also, executive changes are complicated, there are lots of unique situations and uncertainties around the turnover of power. The question is, how do I classify succession conditions to avoid biased results? Pourciau (1991) proposes that "Although special circumstances surround executives' changes, each change can be classified as one of two general types, routine and non-routine". This paper mainly refers to the way Pourciau (1991) and Vancil (1987) define routine and non-routine successions.

Vancil (1987) regards the routine succession periods as the "relay process". Through illustrating with characteristics of routine succession, he proposes that the routine succession, as a fairly orderly and well-orchestrated process, is planned corporate governance. Generally, there are two ways of proceeding routine succession. First, the designated person is chosen and then trained for a period before term expiring of the incumbent CEO, which process is considered as preparations for the succession planning. The incoming CEO must learn his/her responsibilities in the position and familiarize with organizational resources and routines (Karaevli, 2007); this is to ensure fewer problems related to disruption of firm routines arise (Vancil, 1987). Second, there are more than one candidates who are chasing for the only one position, and then the

boards have to assess these cultivated candidates to determine who is the most qualified for the position. Moreover, consider CEOs' succession with the intrinsic principle of the planned corporate governance, insider candidates are representatives who reflect the rule of routine succession. Ocasio (1999) takes "insider" and "outside" measurements as a way to differentiate routine and non-routine succession. Pourciau (1991) also supports the way by "Succession events that are not retirement-related are likely to introduce newcomers into the top management team who differ in cognitive perspective from their predecessors".

Also, many studies mention that how insider and outsider succession influence firm performance (e.g., Parrino, 1997; Agrawal, Knoeber, and Tsoulouhas, 2006; Beatty & Zajac, 1987). The application of rules of insider and outsider is more inclined to the idea of "planned governance", which reflects board members' controlling strategy. Milliken and Theresa's view (1991) describes that it is firm's inertia to persist considering insider or outsider on the succession issue, and therefore, the rules of insider and outsider dominate most organizations on deciding the CEO's position. Similarly, the authors tend to focus on insider and outsider specifically as objects of studies on estimating how senior executives' succession proceeds. Like Ocasio (1999) reported, "results provide little evidence the rules of insider and outsider can be better explained by alternative explanations, such as bounded rationality, founder power, or the structure of the board of directors." This paper will differentiate routine and non-routine succession from a new perspective - "reasons for leaving".

To conduct the investigation, I identify CEOs who departed the CEO positions of S&P 1500 corporates during 1992-2018 in this paper. How to classify the reason for CEOs' departure is based on the information acquisition from Execucomp. There are four classifications representing reasons for leaving in data collection: Deceased, Resigned, Retired and Unknown. A study by Liu, McConnell, and Xu (2017) treads retirement as the most important reason to identify departed CEOs into their dataset. They believe retirement could view results with less bias because unnormal situations usually bring with uncertainty and uncontrollability. Employing the executives' routine succession is best for corporate governance, and retirement and tenure expiration are dominant situations of the normal CEO succession (Ocasio, 1999), particularly retirement situations (Fredrickson, Hambrick, and Baumrin, 1988). Thus, to make better use of the collected data, this study includes retirement as a representative variable for routine succession.

3.1.2 Non-Routine Succession

Compared with routine succession, non-routine succession situation is more likely as a result of an unexpected or unplanned event. Non-routine executive succession occurs when the existing executive departs the firm prematurely before his/her retirement age (Vancil, 1987), and it means that the company does not have the opportunity of enhancing orderly succession: plenty of time to select and groom a successor (Pourciau, 1991). The most common example of non-routine succession is "Resignation." Notably, forced resignation situation is a reflection if non-routine succession (Pourciau, 1991) as well.

Generally, there are two specific situations in resignation: forced resignation and voluntary resignation. The former occurs because they are forced to resign after the unsuccessful challenging to status quo (Brown & Maloney, 1999). Firms may wish to meet or exceed the previous performance by replacing former executives (Pourciau, 1991). Thus, the boards of directors ask them to leave because they are incompetent to change poor status. Besides, forced resignation occurs when incumbent CEO causes scandal and affects the firm's reputation. The latter one (voluntary resignation) is a result of the combination of work-related and personal characteristics (Pizam & Thornburg, 2000). It generally happens when the incumbent CEO has the incentive to jump in a position with higher pay or they pursue a position with a greater chance for promotion (Pourciau, 1991). Moreover, voluntary resignation is more likely to happen when executives are powerless to change the status quo, or they have no incentives to change the status quo (Brown & Maloney, 1999).

It is complicated to process the forced resignation of a senior manager. First, the effects of public reactions to the announcement (e.g., stock price) are vast and significant. For example, the announcement of a forced CEO resignation brings with a small but significant positive abnormal return of 0.5% (Renneboog & Ferere, 2000). Firms are serious and cautious about the information shown in public. For example, a report of what causes firms to change senior executives? Companies will hide the information on worse firm performance and executives' scandal. Thus, the deliberately concealing contents of the announcement are hard to be perceived. Second, since the incumbent CEOs are reluctant to give up their positions even when the firm performance is poor (Boeker, 1992), it is not easy to ask the incumbent CEO to leave, and they would like

to persuade the boards to give them more time to prove their ability (Vancil, 1987). Third, if the incumbent CEOs are serving as the board chairs simultaneously, it is complicated to remove their positions. Entrenchment is more likely to be incumbent CEOs' weapon to influence other board members to retain their positions (Horner & Valenti, 2012).

Information acquisition about forced resignation and voluntary resignation is only from public reports generally, which is unreliable and unverifiable, and especially for the voluntary resignation. Voluntary resignation is more relevant to non-measurable personal subjective reasons (e.g., personal willingness to stay/ leave, relationship with the board of directors). As Beatty and Zajac said, uncertainties and idiosyncrasies issues are surrounding executives' succession. There is no clear and convincing boundary between forced resignation and voluntary resignation. Therefore, this paper combines forced resignation with voluntary resignation as non-routine succession.

CEO resignations could be predicted by the firm prior performance. There is a stronger association between prior performance and the probability of resignation for companies (Weisbach, 1988) no matter if it is the forced resignation or the voluntary resignation. A study by Warner, Watts, and Wruck (1988) argue in this respect, and they propose that the effect of CEO turnover on performance (as measured by stock returns) is significantly negative. There are other econometric evidences indicate that firm performance gradually becomes worse before CEO succession (Coughlan & Schmidt, 1985; Jensen & Murphy, 1990; Warner, Watts, and Wruck, 1988; Weisbach, 1988).

Routine succession is less likely to execute strategic changes (Nakauchi & Wiersema, 2015), but, it shows a greater likelihood of strategic change after non-routine executive succession. The poor performance and pressure for shareholder wealth maximization drive non-routine executive succession change (e.g., Coughlan & Schmidt, 1985; Denis & Kruse, 2000; Denis & Serano, 1996; Goodstein & Boeker, 1991; Wiersema & Zhang, 2011). These findings indicate that management changes are followed by changes in operating performance. This paper will estimate how "reasons for CEOs' departure" affects firm performance.

3.1.3 Gender preferences & Firm performance

Female leadership has drawn increasing attention from scholars. There are three streams of existing literature addressing female executives and firm performance. First, the majority of studies have negative attitudes on females' overall capacity compared to males. A corporate prefers male management more than female because they believe males perform better usually. Heilman et al. (1989) and Oakley (2000) present their views in this respect that "women often are stereotyped as being less competent managers than men". In this case, leadership positions are defined to be mainly occupied by males, such as the position of CEO (e.g., Eagly, Makhijani, and Klonsky, 1992; Eagly, Karau, and Makhijani, 1995). Therefore, there is a mandatory method to enhance the representation of females in firms. For example, the Norwegian government implements the mandatory gender quota (40%) on Norwegian boards to improve the influences of female directors on organizational control (Wang & Kelan, 2013).

In terms of financial ability, on the one hand, Powell and Ansic (1997) believe that females are less competitive than males because the strategies in financial-decision making adopted by males are readily observable. On the other hand, females are less confident in their financial ability, which makes it difficult for them to overcome gender stereotype (Estes & Hosseini, 1988; Barber & Odean, 2001). Investors' reactions to the announcements of female CEOs are significantly more negative than male counterparts (Lee & James, 2007). Further, the negative reactions are turned into an adverse influence on the stock price. These findings indicate that investors are more skeptical about the appointment of female executives than males (Martin et al., 2009).

Second, the view that top female managers bring higher profitability to firms was proved by many articles. McKinsey & Company (2007) reports that companies with three or more woman directors and officers in Europe and the United States perform better in corporate governance and financial performance. Kalleberg and Leicht (1991) find that businesses led by women are less likely to go into financial distress and more likely to generate higher earnings' growth of small businesses. Third, there is no strong significant evidence to prove the relationship between gender and firm performance. Because the clear attitudes (positive or negative attitude on female executives) can not rule out the possibility of discrimination via gender segregation or unequal promotion, they believe that the results from two perspectives mentioned above are

influenced by gender bias (Lee & James, 2007).

This study argues that the inconsistent views surrounding the relationship between succession and performance are due primarily to problems from existing studies. The majority of papers separately and solely analyze the influence of gender of senior executives (either male or female) on firm performance, instead of considering the gender changes together within the same firm. The experiments of Powell and Ansic (1997) take into account both genders to analyze gender differences, and they find no significant differences in their financial decision-making ability. Not too many studies describe how gender changes affect firm performance, particularly in the context of CEO succession with gender change (a male CEO succeeded by a female or vice versa). A report measuring top Chinese executives by Zhang and Qu (2015) proposes "the gender changes in succession may amplify the disruption of the CEO succession process and thus adversely affect post-succession firm performance and increase the likelihood of successor early departure" no matter if it is female-to-male or male-to-female. These findings inspire me to explore how gender changes in CEOs' succession affect firm performance in the S&P 1500 companies. And this paper will test whether firm performance is significantly different between female-to-male and male-to-female CEO successions.

3.1.4 Power of the board of directors

From the organizational power's perspective, the power of the board of directors could be measured by the ability to control the decision-making processes (Roy, 1997; Horner, 2013), including the routine operational decisions and executive appointments decisions. Senior executives directly operate the business. For example, CEOs play an important role in determining significant decisions on financial activities and routine business operations (Charitou, Patis, and Vlittis, 2010). The boards only indirectly control operating businesses in general, e.g. through appointing and monitoring top managers (Hillman & Dalziel, 2003). Fama and Jensen (1983) prove that the strategy of using the directors' power to monitor executives' management influence firm performance. A variety of functions and powers are related to the board, and apparently, appointing CEO is more likely to be considered as a strategic approach and a primary source of management control (e.g., Kosnik, 1987). Besides, the top executive appointments are indications of the

firm's future in shareholders' view. Davidson et al. (2002), Friedman and Singh (1989) propose that the succession of CEOs is a signal for future success or failure.

The average ratio of women directors on the boards of S&P 1500 firms increases steadily, nearly doubling from 7 percent in 1998 to 14 percent in 2013 (Kim & Starks, 2016). The positive growth of female CEOs in similar trend with the increase in female directors' percentage reflects the pronounced historical change, which inspires me to explore whether a significant causality exists between these two increases. In the context of the boards appointing CEO position, this paper will consider whether the proportion of female directors on the boards affects CEOs' appointment decision. If there are more females on the board, will more females be put into the CEO positions?

There are a few papers studying the relationship between gender diversity of the boards and the choice of a male or female CEO, and the general view is greater female on the board increases the likelihood of firms having female executives, including a female CEO (e.g., Bilimoria, 2006; Gupta & Raman, 2014; Matsa & Miller, 2011). Gupta and Raman (2014) prove that the significantly positive relationship between the proportion of female directors and the likelihood of a female being appointed CEO, and the result is robust in a firm or an industry with female-friendly culture. This article refines the responsibilities (e.g., nominating members) of the boards to analyze their effects on appointment decisions in S&P 1500 firms.

Picking CEO is a way for the board of directors to monitor management and control critical operating business. Meanwhile, determining and setting top executives' compensation packages are important strategies to weaken interest conflict between shareholders and top executives (Boyd, 1994; Walsh & Seward, 1990). The agency problem is particularly pronounced when ownership and executives are separate (Dyl, 1988). CEOs are willing to maximize their wealth in the short term. Boards of directors, as the representatives of shareholders (Fama & Jensen, 1983), focus more on the firm wealth in the long term. Executive compensation can be used to alleviate the agency problem by aligning managers with shareholders (Jensen & Meckling, 1976).

A compensation package consists of different components and varies with firms. The most common components are salary, bonus, restricted stocks and stock options (Murphy, 1999). The latter two (restricted

stocks & options) are equity-based compensation, and they have gained incredible popularity since the 1990s (e.g., Murphy, 1999; Perry & Zenner, 2000). Restricted stocks and options are encouraged by the boards' compensation committees because it could reduce interest conflicts between shareholders and managers (Bryan, Hwang, and Lilien, 2000). This article focuses on the impacts of equity-based compensation on CEOs' risk-taking performance. Khan and Vieito (2013) find that when the boards design the compensation packages, especially equity-based compensation, they are not attending to the risk aversion differences between male and female CEOs. This finding motivates me to explore whether there are significant gender differences in CEOs' performance between firms led by female CEOs and firms led by male CEOs.

3.2 Hypotheses Development

This study provides theoretical extensions to the existing literature in three ways. First, this paper estimates gender changes (F2M & M2F) with particular succession situations (Routine and Non-routine succession). Second, this study takes consideration of the influences of the boards' gender diversity on CEOs' appointment decisions, particularly in the effects of female directors and female nominating members. Third, it makes profound research on gender differences in CEOs' risk-taking behaviors, according to the CEOs' reaction to the equity-based compensation. Detailed development of all hypotheses is described below.

In the context of CEOs' routine succession, firms prefer grooming and selecting CEO candidates systematically and orderly before incumbent CEO retires. Since successors have been trained for a period, It is reasonable to believe that incoming CEOs are qualified and familiar with their positions for males and females, and Therefore, in routine succession situations, this paper hypothesizes that the influences of gender changes within CEOs' succession are insignificant on performance.

Hypothesis 1a: In Routine CEOs' succession situations, the differences in firm performance between F2M successions and M2F successions are insignificant.

Under non-routine succession circumstances, CEOs' turnover process varies in particular situations. In this

complicated case, the goal of this study is to estimate the importance of gender changes within CEOs' succession to performance. Hence, this paper hypothesizes that gender differences in CEOs' performance are pronounced in non-routine succession situations.

Hypothesis 1b: In Non-Routine CEOs' succession situations, F2M succession has a positive influence on firm performance, M2F succession has a negative impact.

This paper tests how gender diversity of the boards affects CEO appointment decisions. In line with the widespread findings, a strong positive relationship between the percentage of female directors and the likelihood of female CEOs (e.g., Borokhovich, Parrino, and Trapani, 1996). Based on the number of female CEOs synchronously increases with the proportion of female directors, this paper hypothesizes that if there are more female directors on the boards, the likelihood of female CEOs is greater.

Hypothesis 2: The higher proportion of female directors on boards increases a greater probability of nominating females as CEOs.

The boards have power on constructing CEOs' compensation package. To explore gender differences in CEOs' risk-taking behaviors, this study focuses on equity-based compensation: restricted stocks and options. Many studies document that the equity-based compensation is closely related to risky investment, and incentive parts of the compensation package motivate some executives to take on more risk (e.g., Hirshleifer & Suh, 1992; DeFusco, Johnson, and Zorn, 1990). CEOs have different attitudes toward risk measurements. For example, views on risky aversion between female and male CEOs are different, which motivates me to develop a hypothesis. There are gender differences in CEOs' risk-taking behaviors between firms run by female CEOs and firms run by male CEOs.

Hypothesis 3: Equity-based components of the CEOs' compensation package (Restricted stocks & Options) impact firms led by female CEOs on evolving more risk-taking activities than firms led by male CEOs.

CHAPTER 4 Research Design, Sample Description, and Models

This chapter includes two parts, the first one gives some necessary information about the research design, and it mainly explains how to identify routine and non-routine succession situations based on "reasons of CEOs' departure". Also, this part describes variables that used to conduct three hypotheses in empirical research. The second part is about data collection and three primary models.

4.1 Research Design

Due to many personal factors and public reaction on executive succession events (Pourciau, 1991), many outgoing CEOs are reluctant to describe the real reasons honestly, which causes a fuzzy boundary to distinguish the routine and non-routine reasons for succession, especially in identifying voluntary and forced resignations. Besides, the circumstances of the succession process are difficult to interpret precisely based on external public information. Puffer and Weintrop (1991) make comments on the difficulty of acquiring the exact properties of executive departures. They believe that the high level of public reactions on senior executives' turnovers makes information acquisition less authentic, based on public reports from the business press or company release statements. In this respect, a few researchers have proposed to use the retired age of departed CEOs as the split point to distinguish routine succession (i.e., normal retirements) and non-routine succession events (e.g., Puffer & Weintrop, 1991; Wiersema & Bantel, 1993; Vancil, 1987).

This paper employs the "retirement" to distinguish routine succession and non-routine succession. The "retirement" situation represents the routine CEOs' succession, otherwise belongs to non-routine succession. In the model, I generate a dummy variable to split succession situations: Routine succession equals to one if the predecessor leaves the CEO position because of retirement, otherwise pertains to non-routine succession. "Reasons for leaving" is included in this paper's sample collected from ExecuComp, and "Unknown" accounts for about 13% of reasons on the list. If the "Unknown" variables are simply removed from the sample, there is a great possibility of obtaining biased results. I decide to use "retired age" to divide this group into routine and non-routine succession situations. Therefore, the leading step in this article is how to identify the retirement succession by "retired age".

In America, there is not a generally agreed or mandatory retirement age, and the average retirement age from public reports is changing every year. Academic papers from Wiersema (1995) and Weisbach (1995) consider "65" as retirement age because the normal and the most frequent average retirement age is 65 in U.S. firms, which is consistent with the summary "Probability of CEO departure with CEO age" (see Figure 2) made by Jenter and Lewellen (2015). They present two reasons for explaining why employ 65 as the retirement age. First, CEOs seem to be slacking off work around 65 years old, and then they are more likely to prefer leisure. Second, the boards are easy to treat CEOs who are older than 65 with suspicion of their capacity because firms believe CEOs' skills are deteriorating with the increased age (Jenter & Lewellen, 2015). Besides, the turnover of CEOs around age 65 is more likely due to normal retirements than to forced departures (e.g., Murphy & Zimmerman, 1993; Goyal & Park, 2002; Weisbach, 1988).

A report by Munnell (2015) inspires me to consider gender differences in retirement age. He reports that there is a gradual stability retirement age difference between female and male since 1996 - around 2.5 years (see Figure 3). Also, Weisbach (1995) finds that the proportion of departures at ages 64, 65 or 66 make up over 40% of all generated departures. Considering the gender difference in average retirement age, I employ CEOs' retirement age ranges for males is 62-66 and for females is 59-63.

Figure 2 Probability of CEO departure with CEO age. Adapted from "Probability of CEO departure as a function of CEO age" from "*CEO Preferences and Acquisitions*" by D. Jenter & K. Lewellen, 2015.

Retrieved July 21, 2019[1].
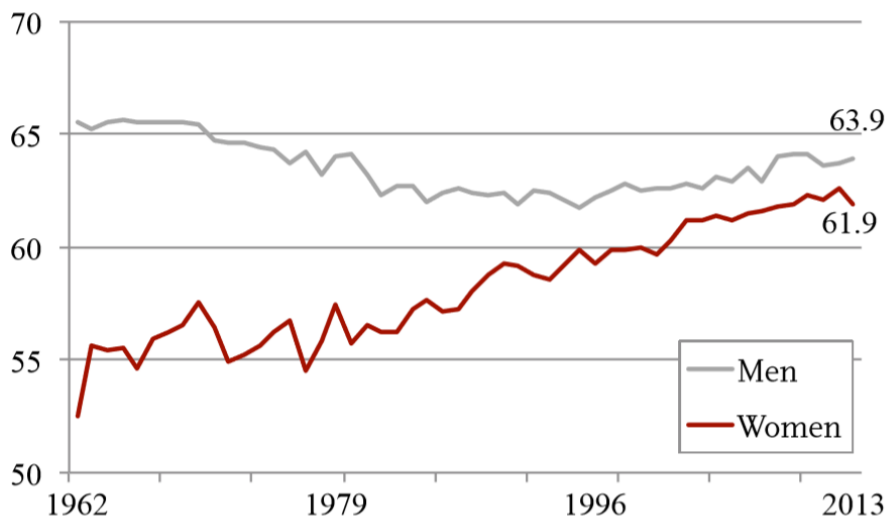
Figure 3 Average Retirement Age. Adapted from "THE AVERAGE RETIREMNT AGE – AN UPDATE[2]" by Alicia H. Munnell, 2015. Retrieved July 21, 2019 from Center for Retirement Research, Boston College.

Another goal of this paper is to estimate gender differences in CEOs' appointment and in risk-taking behaviors (see hypothesis 2 & hypothesis 3). This paper will discuss two important responsibilities of the boards of directors- nominating CEOs and constructing CEOs' compensation package. Hypothesis 2 tests whether more female directors on the boards cause a higher possibility of choosing females as CEOs. In the model, there are two groups of variables generated. The first group is related to "female directors" factor (e.g., "the proportion of female directors", "Number of female directors", "Only one female director" and "Maximum number of female directors"). The second group is related to "Female Nominating Committee Members" factor (e.g., "Number of female nominating members", "Whether has female nominating members" and "Maximum number of female nominating members").

Wiseman and Gomez-Mejia (1998) propose that executives' performance is a function of risk-bearing, which supports this study on CEOs' risk-taking performance according to equity-based payment (restricted stocks & options). The phenomenon that the compensation forms of restricted stocks and options rapidly

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[1] The probability is computed as the number of firm-years in which a CEO of a given age leaves office divided by the number of firm-years with CEOs of that age at the start of the year. The sample consists of 56,183 firm-years from 1989 to 2007 from "*CEO Preferences and Acquisitions*" by Dirk Jenter & Katharina Lewellen, December 2015.

[2] Munnell uses the data on labor force participation to construct an average retirement age from 1962-2013.

increase indicates an increase in the sensitivity of CEOs' payment related to stock (Jensen & Murphy, 1990). The payment model could be used for building the alignment of the incentives of top executives with the interests of shareholders (Coles & Daniel, 2006), and could inspire CEOs to work harder and effectively maximize their common gains. The increased proportion of executives' equity-based compensation might move into more or less risk-taking activities of the firm management. Thus, this paper will consider CEOs' risk-taking reactions to their equity-based compensation.

Besides, the incentive effects of CEOs' compensation are more complicated than customarily assumed (Lamber, Larcker, and Verrecchia, 1991). Borghans et al. (2009) put forward that the evaluation of reaction to risk is related to cognitive and personality traits. Personal characteristics are important but hard measured factors for considering the risk-taking behaviors. Moreover, there are several risk-aversion models (e.g., Ross, 2004; Lamber, Larcker, and Verrecchia, 1991; DeFusco, Johnson, and Zorn, 1990; Holmstrom, 1979) describe the relationship between the risk aversion and the view of compensation. However, little is known about gender differences in CEOs' risk-taking behaviors and performance in the context of executive compensation.

In the mathematical model of hypothesis 3, there are two assumptions made: 1) CEO personal risk-taking positively associate with overall corporate risk-taking management; 2) CEOs with less risk-aversion are more likely to engage in elevated levels of acquisition activity and more likely to spend for R&D activity. This study measures three variables to represent CEOs' risk-taking behaviors: Cash Holdings, Intensity of Research and Development expenditures (R&D Intensity), and spending on merger and acquisition (M&A) activity. First, cash holdings represent firms' assets that hold in cash, and there is a significant positive relation between CEO risk-taking incentives and cash holdings (Liu & Mauer, 2011). Second, M&A activity represents short-term financial activities (Sanders, 2001). CEOs dominate M&A decisions compared to other aspects of operating businesses (Graham, Harvey, and Puri, 2015), and analyzing CEOs' M&A activity is a right window into estimating the degree of CEOs' risk-taking behaviors (Cain & McKeon, 2016). Third, R&D expenditure is a typical long-term strategy to invest. As Sanders (2001) pointed out, the impacts of the CEO compensation package on risky long-term strategy need to be taken more attention, such as R&D intensity (e.g., Wu & Tu, 2007).

4.2 Sample Description

The data are constructed by four data groups from the Standard and Poor's: CEO Characteristic (CEO personal information & CEO succession information); Firm Performance Characteristic; Board Characteristic and Executives' compensation Characteristic.

First, the variables of CEO Characteristic and Executives' compensation Characteristic are collected from the ExecuComp[3] (Compustat), spanning the year 1992-2018. The number of female CEOs in a short period is insufficient. To avoid biased results due to insufficient data, I decide to collect variables from a large span (26 years) as the sample in this research. The CEO Characteristic dataset contains necessary CEO personal variables, such as gender, age, and includes variables represent CEO turnover, such as "The date of becoming CEO", "The date of leaving office", and "Reasons for leaving". And variables from Executives' compensation Characteristic describe the basic components of the compensation package (Salary, Bonus, Restricted Stock, Option and Long-term incentive plans), and includes explicit calculations of particular proportions of the executive compensation, such as "Fraction of Restricted stock and Option to Total Compensation" and "Fraction of Salary and Bonus to total Compensation".

Second, variables related to Firm Performance Characteristic are from the CRSP database (North American) annually during 1992-2018, representing firm performance. Besides, this paper collects the Institutional Shareholder Services (ISS[4]) databases for obtaining variables of characteristics of directors on the boards, such as gender (dummy variables), age, various types of committee members (e.g., Compensation, Nomination) spanning the year 2007 (the minimum year allowed) to 2018. To weaken the adverse effects of limited number of female CEOs and female directors in S&P 500, this paper contains the firms that are spread over the Standard and Poor's (S&P) 500, the S&P Midcap Index, and the S&P Small Cap Index.

Overall, one distinction between this paper and other searches at the sample is this paper's data span a more extended period and include a more significant number of CEO turnovers. This study covers some smaller

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[3] ExecuComp contains data about the top executives and their compensation for small, mid-cap, and large North America firms.

[4] Institutional Shareholder Services (ISS) database provides unique data related to the individual board members of S&P 1500 companies.

firms to counter the limit in the number of female CEOs. Besides, CEOs' role dominates decisions of critical operations and financial activities. Another distinction is that this study focuses on CEO turnover for estimating firm performance without taking into consideration the roles of other top executives (like CFO, COO, CTO). The goal of this study is to evaluate whether gender differences exist in two relationships: the influences of CEOs' succession on firm performance and influences of CEOs' equity-based compensation on associated financial behaviors.

4.3 Models

The statistical regression models are applied in this research to assess the gender differences in CEO performance, in CEO appointment decision, and in CEOs' risk-taking behaviors. The widely used regression model is the linear regressions in this paper. Three particular models are introduced and elaborated below.

4.3.1 Model for Hypothesis 1

Hypothesis 1a: In Routine CEOs' succession situations, the differences in firm performance between F2M successions and M2F successions are insignificant.

Hypothesis 1b: In Non-Routine CEOs' succession situations, F2M succession has a positive influence on firm performance, M2F succession has a negative impact.

This study will start the primary empirical investigation by conducting gender differences test to evaluate whether there are significantly different effects of M2F successions and F2M successions on firm performance. This model formed for hypothesis 1 refers to the main structure of the study by Huang and Kisgen (2013). The main regressions are as follows:

$$f_{i,t} = \partial + \beta_1 F2M_{i,t} + \theta X_{i,t} + \varepsilon_{i,t} \quad \text{Or} \quad f_{i,t} = \partial + \beta_1 M2F_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$$

Where $f_{i,t}$ is the decision variable representing firm performance (ROA & Tobin's Q) measured at the end

of year t; ∂ is the constant; $F2M_{i,t}$= male replaces female CEO, and $M2F_{i,t}$ is another indicator variable for females replacing male CEOs' succession. $F2M_{i,t}$ and $M2F_{i,t}$ are dummy variables ($F2M_{i,t}$=1 if firms with males replacing female CEOs' turnovers; $M2F_{i,t}$=1 if firms with females replacing male CEOs' turnovers). $X_{i,t}$ is a set of control variables for firm i measured at the end of year t (routine & non-routine succession situations with gender changes); t is defined as the first year that a new CEO in office (the succession year).

4.3.2 Model for Hypothesis 2

Hypothesis 2: The higher proportion of female directors on the boards increases the probability of nominating females as CEOs.

To estimate whether there are gender differences in CEOs' appointment decisions, I will test the relationship between gender diversity of the boards and the likelihood of females being as CEOs. The second regression is as follows:

$$P_{i,t} = \partial + \beta_1 NFDir_{i,t} + \beta_2 ONEFDiri_{i,t} + \beta_3 MAXFDiri_{i,t} + \beta_4 FracFDiri_{i,t}$$

$$+ \beta_5 FNom_{i,t} + \beta_6 NFNom_{i,t} + \beta_7 MAXFNom_{i,t} + \beta_8 HasFNom_{i,t} + \varepsilon_{i,t}$$

Where $P_{i,t}$ is the decision variable representing the decision of appointing females as CEOs of firm i in year t, ∂ is the constant; $NFDir$ is the total number of female directors; $ONEFDir$ represents firms with only one female director; $MAXFDiri$ is the maximum number of female directors on the boards of firms; $FracFDiri$ is the fraction of female directors on board size; $FNom$ is a dummy variable, and equals to one if female directors are nominating members during their term; $MAXFNom$ is the maximum number of female nominating members; and the dummy variable $HasFNom$ equals to one if firms have at least one female directors who are nominating members simultaneously.

4.3.3 Model for Hypothesis 3

Hypothesis 3: Equity-based components of the CEOs' compensation package (Restricted stocks & Options) impact firms led by female CEOs on evolving more risk-taking activities than firms led by male CEOs.

This paper explores gender differences in CEOs' risk-taking behaviors, and focuses on two equity-based components of the compensation: restricted stocks and options. The model used to estimate hypothesis 3 that whether gender differences in risk-taking performance exist between firms led by female CEOs and firms led by male CEOs.

$$P_{i,t} = \partial + \beta_1 G_{i,t} + \beta_2 FC_{i,t} + \beta_3 FracC_{i,t} * FC_{i,t} + \beta_4 FracSO_{i,t} * FC_{i,t}$$
$$+ \beta_5 OPTION_{i,t} * FC_{i,t} + \beta_6 STOCK_{i,t} * FC_{i,t} + \varepsilon_{i,t}$$

Where $P_{i,t}$ is the dependent variable of firm i in year t. In this paper, there are five dependent variables representing CEOs' risk-taking behaviors: R&D Expense Intensity, Cash Holdings, Acquisition Expenditure, Income Contribution from Acquisitions, and Sales Contribution from Acquisitions. ∂ is the constant; G is a dummy variable, which equals to one when the firms' CEO is female; FC as a dummy variable to represent the firms, and it equals to one if firms have female CEOs; $FracSO$ is the fraction of Restricted stock & Option to total compensation, and $FracC$ is the fraction of Bonus & Salary to total compensation. $OPTION$ is the value granted on the options to CEOs' compensation package, and $STOCK$ is the value granted on the restricted stocks to CEOs' compensation package by the board of firm i in year t.

CHAPTER 5 Analysis and Results

5.1 Summary statistics and Results for Hypothesis 1

Hypothesis 1a: *In Routine CEOs' succession situations, the differences in firm performance between F2M successions and M2F successions are insignificant.*

Hypothesis 1b: *In Non-Routine CEOs' succession situations, F2M succession has a positive influence on firm performance, M2F succession has a negative impact.*

Models: $f_{i,t} = \partial + \beta_1 F2M_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$ or $f_{i,t} = \partial + \beta_1 M2F_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$

This research employs two retirement age ranges to identify Routine and Non-routine succession situations: "62-66" for male CEOs and "59-63" for female CEOs. Panel A is the distribution of CEOs by gender and reasons for leaving offices. The sample of this paper partly includes four kinds of reasons: retired, resigned, deceased (only one variable), and unknown variables. I sort CEOs from the "retired" list into the routine succession situation and CEOs from the "resigned" & "deceased" lists into non-routine succession situations. About the "unknown" variables, first, this paper removes blank variables (35 variables) and the negative numbers (5 variables) for executives' age; second, I group "unknown" and other missing variables by hand based on the setting of retirement age ranges. The final sample in this paper contains 3002 CEOs, including 85 female CEOs and 2917 male CEOs. Also, there are 426 out of 2917 male CEOs in the routine succession situation, and 2409 in non-routine succession situation. Panel A shows that the proportion of CEOs who departed on account of normal retirement is small for both males and females, less than 15%. Non-routine succession plays a vital role in reasons for leaving office, which indicates that the succession process is more complicated than we thought usually.

Given the influences of gender changes (F2M & M2F) in CEOs' succession on firm performance, this paper filters the original sample to construct another dataset for analyzing gender changes. Panel B shows the distribution of CEOs by succession with gender change and transition years. In Hypothesis 1, I divide the year range into two parts: 1992 - 2004 & 2005 - 2018. After disposing of data by hand (remove executives overlapped in the same periods), there are 117 CEOs' successions with gender changes, including 80 M2F

successions and 33 F2M successions. Also, Panel B states that the amount of F2M is much less than the number of M2F in data collection, which indicates a noticeable trend of the increased female CEOs.

Panel C is the distribution of executives by gender and tenure. The original number of CEOs contains 85 female CEOs and 2917 male CEOs in S&P 1500 firms. After cleaning variables with less than 1-year tenure and missing tenure variables, the final sample contains 70 female CEOs and 1505 male CEOs. Majority of female CEOs and male CEOs are lying in the 1-10 year term range. However, the tenure field of male CEOs is larger than females: the term span of male CEOs is from 1 year to 54 years; for female CEOs, the range is from 1 year to the maximum 23 years. Furthermore, Panel C indicates that female CEOs' tenure is shorter around 0.34 years than male CEOs' (6.086 years for female CEOs and 6.426 years for male CEOs) on average. This finding is nearly close to a paper by Huang and Kisgen (2013), they propose that the difference in term of officers between female executives (contain CEO and CFO) and male executives is about 0.248 years (5.06 years for female executives and 5.309 years for male executives).

This paper will explore gender differences in CEOs' performance based on routine and non-routine succession. Considering the effects of the CEOs' term on firm performance, I exclude some CEOs whose tenure are less than one year. The reason is that firms need plenty of time to "digest" or "absorb" the new incoming CEOs; especially, firm performance takes time on reacting to the new policies from the new coming CEO. Also, this way could weaken biased results from insignificant and unexpected values of CEOs' term. Finally, the most matched sample for hypothesis 1 is formatted by 69 M2F and 27 F2M CEOs' succession within 68 firms.

Table 1 Summary Statistics

Table 1 presents the distribution of CEOs by gender and other characteristics, including reasons for leaving, transition year, and tenure. Reasons for leaving the CEO's position construct Routine and Non-routine succession situations. The year of transition is the first year that the new CEO shows up on the firms' public report, and gender changes in CEO succession include F2M and M2F. Tenure represents the number of years being as a CEO.

Panel A: Distribution of CEOs by gender and reasons for leaving firms

	Reasons for leaving	
GNEDER	**ROUTINE**	**NON-ROUTINE**
Female	9	76
(%)	10.588%	89.412%
Male	426	2491
(%)	14.604%	85.396%

Panel B: Distribution of CEOs by gender and transition year

	Transition Year													
Gender Change	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
F2M	0	0	0	0	0	0	0	0	0	2	0	2	1	1
	-	-	-	-	-	-	-	-	-	6.061%	-	6.061%	3.03%	3.03%
M2F	0	0	1	1	1	0	0	3	3	2	3	2	2	2
	-	-	1.25%	1.25%	1.25%	-	-	3.75%	3.75%	2.5%	3.75%	2.5%	2.5%	2.5%

	Transition Year													
Gender Change	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
F2M	2	5	0	1	0	3	7	1	1	2	2	2	1
	6.061%	15.152%	-	3.03%	-	9.091%	23.333%	3.03%	3.03%	6.061%	6.061%	6.061%	3.03%
M2F	6	5	4	6	5	10	3	3	7	3	5	0	3
	7.5%	6.25%	5%	7.5%	6.25%	12.5%	3.75%	3.75%	8.75%	3.75%	6.25%	-	3.75%

Panel C: Distribution of CEOs by gender and tenure

	Tenure(Year)								
Gender	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Female	4	9	10	9	9	5	6	4	70
(%)	5.71%	12.86%	14.29%	12.86%	12.86%	7.14%	8.57%	5.71%	
Male	207	213	176	161	137	103	82	81	1505
(%)	13.75%	14.15%	11.69	10.70%	9.1%	6.84%	5.45%	5.38%	

	9	10	11	12	13	14	15	15+	Total
Female	4	1	0	3	1	0	0	5	70
(%)	5.71%	1.43%	-	4.29%	1.43%	-	-	7.14%	
Male	62	46	34	32	26	16	17	112	1505
(%)	4.12%	3.06%	2.26%	2.26%	1.73%	1.06%	1.13%	7.44%	

Table 1 describes the summary statistics for CEOs' succession and CEOs' Characteristics. Panel A shows that the majority of CEOs' departure is not only because of retirement, but also because of non-routine CEOs' succession in firms. The normal retirement succession only accounts for about 10.6% for female CEOs and about 14.6% for male CEOs. Meanwhile, the proportion of CEOs' resignation is over 85% in most cases. Panel B shows an significant trend that more women have been hired as CEOs since the 21 century. The increase over time represents the growth in the supply of qualified women and the decrease in discriminatory attitudes (Huang & Kisgen, 2013). 69 female CEOs replace the former male, and 27 males replace the former female CEOs in this research. The peak of females replacing male CEOs (10 for M2F) is higher than males replacing female CEOs (7 for F2M) in S&P 1500 firms.

Panel C states some significant information about gender differences in tenure. In this sample, the majority of CEOs' tenure is around 1-5 years for both female and male. Besides, the proportion of term within five years accounts for about 58% for female CEOs and 59% for male CEOs, and the proportion of 3-9 years' term of female CEOs is greater than males'. Even if males dominate on longer CEO tenures (more than ten years), these findings imply that the term of female CEOs becomes growing, and firms are willing to provide the platform for female executives to prove their job skills. Moreover, females gradually show up in the CEOs' stage, and it gradually becomes popular for firms to hire female as their top executives.

The related literature employs several measures for representing firm performance, and these measures include 1) financial ratios from the balance sheet and income statements (e.g., Demsetz & Lehn, 1985; Gorton & Rosen, 1995; Mehran, 1995; Ang, Cole, and Lin, 2000); 2) Stock market returns and volatility (e.g., Saunders, Strock, and Travlos, 1990; Cole & Mehran, 1998); 3) Tobin's Q, which mixes market values with accounting values (e.g., Morck, Shleifer, and Vishny, 1988; Mehran, 1995; Himmelberg, Hubbard, and Palia, 1999). Tobin's Q is a popular function of the quality of a firm's current and past financial situation

under existing management (Lang & Walkling, 1989)

This paper uses Tobin's Q and ROA to proxy for firm performance. The Tobin's Q is calculated by the sum of the market value of equity, price to sales ratio and debt divides by the book value of the total assets of the firm, which cites the equation from an article by Chung and Pruitt (1994): "Approximate q = (MVE + PS + DEBT)/TA". Where MVE is the product of a firm's share price and the number of common stock shares outstanding; PS is the liquidating value of the firm's outstanding preferred stock; DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long term debt; TA is the book value of the total assets of the firm. (Chung & Pruitt, 1994). ROA is calculated as the net income after extraordinary items and discontinued operation divided by the book value of assets. More detailed information of formulas, please refer to the Appendix.

Table 2 Summary Statistics

Table 2 describes summary statistics of 96 CEOs' succession with gender changes (69 for F2M & 27 for M2F) during the 1992-2018 period. This dataset is merged by data from CEO succession characteristic and firm performance characteristic, including 2912 variables. Gender is a dummy variable (Gender equals to one if the CEO is female); F2M and M2F are dummy variables (F2M equals to one if firms with males replacing female CEOs, M2F equals to one if firms with females replacing male CEOs); Succession describes routine and non-routine succession situations, and equal to one if CEOs' succession proceed with routine cases.

Variables	Number of Observations	Mean	Standard Deviation	Min	Max
Firm Performance Characteristic					
ROA	2,912	-0.000235	0.279137	-10.51632	1.625642
Tobin's Q	2,912	1.501022	2.246185	0.002447	88.75466
CEO Characteristic					
Gender (Dummy)	2,912	0.024725	0.155313	0	1
F2M (Dummy)	2,912	0.024382	0.154258	0	1
M2F (Dummy)	2,912	0.008242	0.090425	0	1
Succession Situations (Dummy)	2,912	0.138736	0.345731	0	1

Table 3 Correlation of variables in the Hypothesis 1

Variables	ROA	Tobin's Q	Gender (Dummy)	M2F (Dummy)	F2M (Dummy)	Succession (Dummy)
ROA	1.0000					
Tobin's Q	-0.0668	1.0000				
Gender (Dummy)	0.0182	0.0046	1.0000			
M2F (Dummy)	0.0182	0.0046	1.0000	1.0000		
F2M (Dummy)	-0.0119	-0.0052	-0.0149	-0.0149	1.0000	
Succession (Dummy)	0.0289	-0.0229	-0.0289	-0.0289	0.0002	1.0000

Regression Models: $f_{i,t} = \alpha + \beta_1 F2M_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$ and $f_{i,t} = \alpha + \beta_1 M2F_{i,t} + \theta X_{i,t} + \varepsilon_{i,t}$

Where Tobin's Q and ROA stand for f; F2M and M2F represent gender changes in CEO succession. Assuming the main objective factors (e.g., facility, plant) are the same in-sample firms, this model is used to test how gender changes in CEOs' succession situations affect firm performance,

Table 4 ROA and Succession situations with Gender changes

Table 4 describes three models shown in the Column (1), (2) and (3). Column (1) tests the influences of Gender and Succession situations on ROA. Models 2 and model 3 analyze individually gender changes-F2M & M2F in succession situations. Absolute values of t-statistics or z-statistics are in brackets. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Independent Variable	Dependent Variable		
	ROA		
	(1)	(2)	(3)
Gender (Dummy)	0.0354*		
	(2.35)		
Succession (Dummy)	0.0221**	0.0221**	0.0218**
	(2.63)	(2.63)	(2.60)

M2F		0.0323*	
		(2.16)	
F2M			-0.0578
			(-1.18)
Number of observation	2601	2601	2601
R-sq.	0.001	0.001	0.001
Adj. R-sq.	0.000	0.000	0.000

The first column indicates that CEOs' gender does influence firm performance, and the impact is statistically significant at the 0.1 significance level. The following two columns describe two specific gender changes (F2M & M2F) in the succession process, and the estimated results show that the relationship between ROA and M2F succession is significantly positive at the 0.1 significance level. In terms of male replacing the former female CEOs, results from Table 4 are impressive. As frequently cases found, it seems plausible that a female CEO who replaces male might negatively affect firm performance, and male performs better after replacing female executives. For example, Elsaid (2011) proposes that increased firm performance and decreased firm risk are following the males replacing female CEOs in general. However, in this research, the relationship between F2M succession and ROA is negative. In spite of an insignificant result, the negative coefficient inspires me to do an in-depth study, especially on gender change. Next, this paper estimates how mixed groups with gender changes and succession situations (Routine and Non-routine situations) influence firm performance.

Table 5 ROA and two particular succession situations with gender changes

Table 5 describes four models shown in the Column (1), (2), (3) and (4). Column (1) and (2) consider the effects of Gender changes in the retirement situation individually. Model 3 and 4 consider the mixed influences of gender changes (F2M & M2F) with two particular succession situations (Routine and Non-routine succession) as independent variables. Column (3) considers the influence of F2M succession with both Routine and Non-routine situations on ROA, called Group 1 situations; Column (4) considers the influence of M2F succession with both Routine and Non-routine situations on ROA, called Group 2 situations. Absolute values of t-statistics or z-statistics are in brackets. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Independent Variable	Dependent Variable			
	ROA			
	(1)	(2)	(3)	(4)
F2M	-0.0578			
	(-0.99)			
Succession (=1)	0.0218	0.0221		
	(1.38)	(1.40)		
M2F		0.0323		
		(0,93)		
Group 1 Situations				
F2M(0)&Succession(0)			(0)	
F2M(0)&Succession(1)			0.0210	
			(1.32)	
F2M(1)&Succession(0)			-0.0713	
			(-1.14)	
F2M(1)&Succession(1)			0.0525	
			(0.33)	
Group 2 Situations				
M2F(0)&Succession(0)				(0)
M2F(0)&Succession(1)				0.0221
				(1.38)
M2F(1)&Succession(0)				0.0322
				(0.87)
M2F(1)&Succession(1)				0.0551
				(0.52)
Number of observation	2601	2601	2601	2601
R-sq.	0.001	0.001	0.001	0.001
Adj. R-sq.	0.000	0.000	0.000	0.000

To test the impacts of gender changes in different turnover circumstances, this study generates two groups formed by gender changes and succession situations. There are four different combinations in each group. Table 5 clearly delivers the detailed information on succession situations.

Table 5 exhibits that the sign of routine succession (when succession situations equal to one) coefficients are positive for all models. That means the effect of retirement (routine succession) turnover is positive on firms' return on assets for both F2M and M2F successions. In model 1 and 2, the influence of F2M succession is negative on ROA compared to a positive impact of M2F, which is in line with results from the previous table (see Table 4). Besides, there are some findings from the Column (3) and (4). In the Group

1 situations, the influence of F2M succession is negative on ROA under the non-routine succession. In the Group 2 situations, the sign of M2F succession coefficients is positive in all cases. In those cases, the value of routine situations' coefficient is greater than non-routine situations' (0.0551>0.0322), which proves that the retirement turnover has a more favorable influence on firm performance on average.

Gender differences in firm performance based on succession situations tell that 1) In routine succession situations, both M2F and F2M succession affect positively on ROA, and the value of coefficients are nearly the same. These findings are consistent with hypothesis 1a; 2) In non-routine succession, the results indicate that M2F succession positively influences on ROA compared to a negative from F2M succession, which rejects hypothesis 1b. Also, there is an impressive finding from tables: the sign of F2M coefficient under routine succession situations is positive, whereas the sign of non-routine situations' keeps negative. One possible interpretation is that the influences of the routine succession could weaken the adverse effects from the F2M change on firm performance. Moreover, from the correlation table, the absolute value of the correlation between succession situations and ROA is higher than correlations between gender changes and ROA ($|0.0289| > |-0.0119|$ in F2M & $|0.0289| > |0.0182|$ in M2F). Therefore, it is possible to say that routine succession situation is a more favorable factor for ROA than gender changes in this study.

Table 6 Tobin's Q and two particular succession situations with gender changes

Table 6 describes four models shown in the Column (1), (2), (3) and (4). Column (1) and (2) consider the effects of gender changes in the retirement situation; Column (3) and (4) consider the mixed influences of gender changes (F2M & M2F) with two particular succession situations (Routine and Non-routine succession) as independent variables. Column (3) considers the influence of F2M succession with both Routine and Non-routine situations on Tobin's Q, called Group 1 situations; Column (4) considers the influence of M2F succession with both Routine and Non-routine situations on Tobin's Q, called Group 2 situations. Absolute values of t-statistics or z-statistics are in brackets. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Independent Variable	Dependent Variable			
	Tobin's Q			
	(1)	(2)	(3)	(4)
F2M	-0.127			

	(1)	(2)	(3)	(4)
	(-0.26)			
Succession (=1)	-0.147	-0.146		
	(-1.14)	(-1.13)		
M2F		0.0570		
		(0.20)		
Group 1 Situations				
F2M(0)&Succession(0)			(0)	
F2M(0)&Succession(1)			-0.147	
			(-1.14)	
F2M(1)&Succession(0)			-0.14	
			(-0.26)	
F2M(1)&Succession(1)			-0.193	
			(-0.15)	
Group 2 Situations				
M2F(0)&Succession(0)				(0)
M2F(0)&Succession(1)				-0.141
				(-1.08)
M2F(1)&Succession(0)				0.0841
				(0.28)
M2F(1)&Succession(1)				-0.394
				(-0.39)
Number of observation	2489	2489	2489	2489
R-sq.	0.001	0.001	0.001	0.001
Adj. R-sq.	0.000	0.000	0.000	0.000

This table cites "Tobin's Q" (Approximate q = (MVE + PS + DEBT)/TA) (Chung & Pruitt, 1994) to represent firm performance. Results from Column (1) and (2) prove the relationship between M2F succession and Tobin's Q is positive; and a negative one between F2M and Tobin's Q. These results are consistent with previous results from Table 4. However, there is a negative influence of retirement succession on firm performance for all models, which is inconsistent with results from Table 5. Besides, the correlation table (see Table 3) exhibits that the correlation value between Tobin's Q and succession situations is negative as well. These findings indicate that the succession process itself has a negative influence on Tobin's Q, whether under routine situations or under non-routine situations. Even though the results of the negative relationship between succession and Tobin's Q are insignificant, the negative sign is an important signal and direction for future research. However, this paper does not have convincing evidence to explain why retirement succession adversely affects Tobin's Q.

From group 1 situations in Table 6, all coefficients of mixed variables are negative (-0.147; -0.14 and -0.193), which implies that male CEOs cannot always turn the tables and carry-back of losses as customarily thought. From group 2 situations, 0.0841 indicates that M2F in non-routine succession situations has favorable influences on Tobin's Q, in line with the relationship between M2F succession and ROA. Besides, these finding support Huang and Kisgen's (2013) result that females already hired have higher quality on average, especially for some female CEOs who break the discriminatory preference. Therefore, it makes sense that male replace the outstanding female executives leads to the worse firm performance. Meanwhile, M2F succession in routine situations has adverse influences on Tobin's Q, where the negative coefficient is hard to be explained in this research.

In conclusion, this research obtains several findings about the influences of succession situations with gender changes on ROA and Tobin's Q: 1) In non-routine succession situations, gender changes indeed impact firm performance, and it exhibits a positive influence of the M2F succession on both ROA and Tobin's Q compared to the negative one from F2M succession, which rejects hypotheses 1a &1b. 2) In routine succession situations, F2M and M2F show nearly the same results from regressions, and gender differences in impacting ROA are insignificant. Moreover, retirement succession has negative influences on Tobin's Q for both gender changes; within those cases, the gender difference in coefficients' value (-0.193 for F2M & -0.394 for M2F) is pronounced. Thus, results based on Tobin's Q analysis in this research are insufficient to reject hypothesis 1a.

Table 7 Conclusion of Hypotheses 1a & 1b

Hypothesis 1a: In Routine CEOs' succession situations, the differences in firm performance between F2M successions and M2F successions are insignificant.		
Hypothesis 1b: In Non-Routine CEOs' succession situations, F2M succession has a positive influence on firm performance, M2F succession has a negative impact.		
	ROA	**Tobin's Q**
H1a	Accept	-
H1b	Reject	Reject

5.2 Summary statistics and Results for Hypothesis 2

Hypothesis 2: *The higher proportion of female directors on the boards increases the probability of nominating females as CEOs*

Model: $P_{i,t} = \partial + \beta_1 NFDir_{i,t} + \beta_2 ONEFDiri_{i,t} + \beta_3 MAXFDiri_{i,t} + \beta_4 FracFDiri_{i,t} + \beta_5 FNom_{i,t} + \beta_6 NFNom_{i,t} + \beta_7 MAXFNom_{i,t} + \beta_8 HasFNom_{i,t} + \varepsilon_{i,t}$

Bryant early cited the "glass ceiling" to describe the barriers of female's promotion at the top levels of firms in 1984. Over the last few decades, Female has few seats in firms' board and top executives' room. The situation changes under increasing pressure on achieving enterprises diversity. Besides, firms choose females as their senior executives because of the improvement of women's status and the widespread proof of women's ability. Although women's representation among top management remains very low (Taekjin, 2012), there is a noticeable trend that female executives have increased in the most recent decade. A report (Catalyst, 2010) addresses that the proportion of female directors -16 percentage is a big step forward for Fortune 500 companies compared to the last decade.

Using the sample of S&P 1500 firms, this paper finds that female directors have a substantial impact on executives' appointment decisions. The board of directors is more likely to have a woman when a female executive is hired (Huang & Kisgen, 2013). One of the goals in this paper is to estimate whether gender difference exists in CEOs' appointment decisions, and test the relationship between gender diversity of the board and the possibility of appointing females as CEOs. In the meantime, this paper performs an analysis of the effects of female nominating members on the board.

The dataset for hypothesis 2 is merged by two groups (CEO characteristics and board characteristics) from 2007 (the minimum year allowed) to 2018, including 4749 variables. In the "CEO characteristics" dataset, dummy variable "Has female CEOs" equals to one if firms are led by female CEOs. In the "board characteristics" dataset, there are two groups of variables generated: directors related and nominating members related variables. For example, variables "Number of female directors" is the number of female directors in the firm; "Fraction of female directors" is the proportion of female directors on the board size.

Dummy variable "Firm has only one female director" equals to one if firms have only one female director in the current year. The same way is used for generating "Nominating member" related variables. (More detailed information of variables, please refer to Appendix A)

Table 8 Summary Statistics

Table 8 describes the summary analysis of variables that are from CEO Characteristic dataset and Board Characteristic dataset, including information of mean, min, max and standard deviations. Dummy variable "Has Female CEOs" is from CEO Characteristic, which stands for firms led by female CEOs. There are two categories variables in "Board Characteristic"- female directors on the boards and female nominating members on the boards.

Variable	Number of observation	Mean	Standard Deviation	Min	Max
CEO Characteristic					
Has Female CEOs (Dummy)	4,749	0.5479048	0.4977522	0	1
Board Characteristic					
Number of Female Directors	4,749	0.9321963	1.319.142	0	23
Has Only One Female Director	4,749	0.2745841	0.4463515	0	1
Maximum Number of Female Directors	4,749	1.920.615	1.894.716	0	26
Fraction of Female Directors	4,749	0.1654243	0.1008934	0	0.4615385
Female Directors as Nominating Members (Dummy)	4,749	0.0678037	0.2514353	0	1
Number of Female Nominating Members	4,749	0.3832386	0.7157669	0	11
Maximum Number of Female Nominating Members	4,749	0.7506844	0.9688504	0	11
Has Female Nominating Members (Dummy)	4,749	0.5542219	0.4971036	0	1

Table 9 Correlation of variables in Hypothesis 2

	Has Female CEOs (Dummy)	Number of Female Directors	Has Only One Female Director	Maximum Number of Female Directors	Fraction of Female Directors	Female Directors as Nominating Members (Dummy)	Number of Female Nominating Members	Maximum Number of Female Nominating Members	Has Female Nominating Members (Dummy)
Has Female CEOs (Dummy)	1.0000								
Number of Female Directors	0.1195	1.0000							
Has Only One Female Director	-0.1825	-0.2177	1.0000						
Maximum Number of Female Directors	0.1841	0.6681	-0.2990	1.0000					
Fraction of Female Directors	0.3112	0.3990	-0.3541	0.5925	1.0000				
Female Directors as Nominating Members (Dummy)	0.0414	0.1618	-0.0346	0.0785	0.1454	1.0000			
Number of Female Nominating Members	0.1087	0.7768	-0.1515	0.5132	0.2755	0.3366	1.0000		
Maximum Number of Female Nominating Members	0.1270	0.5042	-0.1865	0.7275	0.3940	0.2198	0.6805	1.0000	
Has Female Nominating Members (Dummy)	0.1472	0.6338	-0.1098	0.3021	0.4272	0.2419	0.4802	0.2117	1.0000

Regression Model: $P_{i,t}= \partial + \beta_1 NFDir_{i,t} + \beta_2 ONEFDiri_{i,t} + \beta_3 MAXFDiri_{i,t} + \beta_4 FracFDiri_{i,t} +$

$$\beta_5 FNom_{i,t} + \beta_6 NFNom_{i,t} + \beta_7 MAXFNom_{i,t} + \beta_8 HasFNom_{i,t} + \varepsilon_{i,t}$$

Where "Has female CEOs" stands for $P_{i,t}$; the decision variable represents gender preferences for appointing females as CEOs of firm i in year t, ∂ is the constant; $NFDir$ is the total number of female directors; $ONEFDir$ represents firms with only one female director; $MAXFDiri$ is the maximum number of female directors on the boards of firms; $FracFDiri$ is the fraction of female directors on board size; $FNom$ is a dummy variable, and equals to one if female directors are nominating members during their terms; $MAXFNom$ is the maximum number of female nominating members; and the dummy variable $HasFNom$ equals to one if firms have at least one female nominating members.

Table 10 Female CEOs and female directors on the board

Table 10 provides three models. Column (1) only regards director-related variables; Column (2) considers a particular role of the directors - the nominating power from female nominating members. Column (3) is a combination of the first two. Absolute values of t-statistics or z-statistics are in brackets. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels.

Independent Variable	Dependent Variable		
	Has Female CEOs		
	(1)	(2)	(3)
Number of Female Directors	-0.00409		-0.0529***
	(-0.59)		(-4.60)
Has Only One Female Director	-0.0937***		-0.0971***
	(-5.52)		(-5.70)
Maximum Number of Female Directors	-0.00123		0.0133
	(-0.22)		(1.79)
Fraction of Female Directors	1.423***		1.353***
	(17.01)		(14.77)
Female Directors as Nominating Members (Dummy)		-0.0124	-0.0495
		(-0.40)	(-1.66)
Number of Female Nominating Members		-0.0321	0.0840***
		(-1.67)	(4.17)

Maximum Number of Female Nominating Members		0.0665***	-0.0264*
		(5.75)	(-1.98)
Has Female Nominating Members (Dummy)		0.144***	0.0530**
		(8.06)	(2.64)
Constant	0.344***	0.432***	0.336***
	(22.08)	(34.78)	(21.09)
N	4749	4749	4749
R-sq.	0.103	0.032	0.107
Adj. R-sq.	0.102	0.031	0.106

The most intuitive conclusion from Table 10 is a highly correlated relationship between female directors and female CEOs. In the column (1), it shows the positive and statistically significant relationship between the fraction of female directors and preference of females CEOs, which indicates that the likelihood of female CEOs will increase around 1.423% if one extra percentage of female directors on the boards on average. Besides, the relationship between the firms has only one female director and the decision on nominating females as CEOs is negative at the 0.01 significance level. This finding tells that the small size of female directors can't effectively promote firms to hire females as their top executives, and even reduce the probability of appointing female CEOs by 9.37%. These results provide robust evidence to support the null hypothesis 2. Moreover, the negative signs of coefficients of "number of female directors" and "maximum number of female directors" exhibit negative impacts on preferring females CEOs. This relationship could be explained by using the principle of "economy of scale". A certain number of female directors do promote the probability of females as CEOs; however, if the scale of female directors on boards is far larger than the equilibrium level, the favorable conditions would be turned into adverse influences.

Model 2 considers "nominating member" related variables as independent factors into regression to estimate the preference of nominating females as CEOs. The positive and significant coefficients of "the maximum number of female nominating members" and "has at least one female nominating members" indicate that these two variables effectively promote firms to nominate females as their CEOs. Moreover, firms with a female nominating member have 14.4% higher possibility of choosing females as CEOs than firms without female nominating members. Besides, there is a negative influence of the total number of female nominating members on the decisions of appointing females as CEOs. It will reduce possibility by

about 2.64% when one more female director is elected into the nominating committee, which is in line with the results from the maximum number of female directors in the column (1). These findings imply that there are equilibrium amounts of female directors and female nominating members to balance the influences of gender diversity on firm performance, which might be a plausible reason to explain why some policies request firms to reach the gender quota (Norwegian government requires 40% female directors on corporate boards).

Finally, model 3 integrates "female directors" and "female nominating members". Main results are consistent with previous findings from the last two columns. Considering the influences of the proportion of female directors on the board, the probability of nominating females as CEOs nearly remains the same (1.423% in model 1 & 1.353% in model 3). This result provides robust evidence to prove the null hypothesis 2. Besides, "-0.0971" reminds that firms with only one female director have limited power for reducing gender discriminatory attitudes.

Furthermore, there are two impressive results from the last column. First, the influence of the number of female directors exhibits significantly negative on female appointment, which supports the possible interpretation that mentioned before that there are gender equilibrium amounts for balancing the effects from gender differences. Wang and Kelan (2013) explore whether the gender quota on corporate boards changes the likelihood of appointing females as directors and CEOs, and their empirical results show that a positive impact of the gender quota on the number of female board chairs and CEOs. Second, in model 3, the influence of the total number of female nominating members is statistically positive at the 0.01% significance level, which is inconsistent with the result from the Column (2). The opposite sign motives me to take in-depth research on the different responsibilities of directors in the future. Focusing more on the gender quotas on the boards may neglect other important aspects (Noon, 2007); Thus, we need put more efforts for finding other essential factors to explain the influences of the scale of female directors and female nominating members in the future.

To sum up, the null hypothesis 2 is proved by the results from table 10. Firms with a higher proportion of female directors on boards are more likely to appoint females as their CEOs, especially when the firms have more female nominating members on the boards.

Table 11 Conclusion of Hypotheses 2

Hypothesis 2 The higher proportion of female directors on boards increases the probability of nominating females as CEOs	
H2	Accept

5.3 Summary statistics and Results for Hypothesis 3

> **Hypothesis 3**: *Equity-based components of the CEOs' compensation package (Restricted stocks & Options) impact firms led by female CEOs on evolving more risk-taking activities than firms led by male CEOs.*
>
> **Model**: $P_{i,t} = \partial + \beta_1 G_{i,t} + \beta_2 FC_{i,t} + \beta_3 FracC_{i,t} * FC_{i,t} + \beta_4 FracSO_{i,t} * FC_{i,t} + \beta_5 OPTION_{i,t} * FC_{i,t} + \beta_6 STOCK_{i,t} * FC_{i,t} + \varepsilon_{i,t}$

The adjustment of the executives' compensation package reacts to a problem that caused by the separation of ownership and control management (Aghion & Bolton, 1992). Since the top executives have the dominated power to decide the forward direction of companies' operating (Dow & Raposo, 2005), it is essential to adjust the payment package for aligning the top executives with shareholders, and then promote executives to maximize owners' benefits. Executive payment has increased across the board, and the growth has been much steeper in CEOs' compensation than other top executives (Frydman & Jenter, 2010).

In this paper, hypothesis 3 estimates how CEOs react to the equity-based components of their compensation package - Options & Restricted stocks. Furthermore, it will test whether gender differences exist in CEOs' risk-taking behaviors between firms led female CEOs and firms led by male CEOs. The sample of hypothesis 3 is merged by three groups of variables (CEO Characteristics, Firm Performance Characteristics, and Executives' Compensation Characteristics). To improve the accuracy of results, I remove some CEOs whose tenures are less than one year, and the final dataset contains 8629 variables within the year range 1992-2018.

Table 12 Summary Statistics

Table 12 provides summary information of mean, min, max and standard deviations of variables from the Firm performance characteristic, CEO Characteristic, and Executives' Compensation Characteristic. Dummy variable *Gender* equals to one if CEO is female; dummy variable *Has Female CEOs* equals to one if firms are led by female CEOs in the current year; *Cash Holdings* describes the firms' assets that hold in cash; *R&D intensity* represents the intensity of all costs incurred during the year that relate to the development of new products or services. *Acquisitions* represent cash outflow of funds used for the acquisition of a company in the current year; *Acquisitions-Income Contribution* means the effect of a purchase or pooling of interest acquisition in the current year on a company's income for the prior year; *Acquisitions-Sales Contribution* describes the effect of either a purchase or pooling of interest acquisition in the current year on a company's sales for the prior year; *Fraction of Stock & Option to Total Compensation* is the proportion of the sum of restricted stock & option to the compensation package; *Fraction of Bonus & Salary to Total Compensation* is the proportion of the sum of bonus & salary to the compensation package; *Restricted Stock Grant* and *Option Grant* represent the value granted on the option and the value granted on restricted stocks in CEOs' compensation package. (Note: The unit of values in the table is Millions in U.S. Dollar)

Variable	Number of Observation	Mean	Standard Deviation	Min	Max
Firm Performance Characteristic					
Cash Holdings ($)	7,787	0.1489189	0.1847266	-0.0019456	0.9982455
R&D intensity	4,362	0.0648877	0.1715033	0	9.251703
Acquisitions ($)	7,240	88.4671	721.597	-6393	26633.6
Acquisitions - Income Contribution ($)	5,094	-2.709539	97.47054	-3656.429	1376
Acquisitions - Sales Contribution ($)	5,118	92.66472	709.8346	-446.315	15128.3
CEO Characteristic					
Gender (Dummy)	8,471	0.0296305	0.1695757	0	1
Has Female CEOs (Dummy)	8,471	0.033172	0.1790961	0	1
Executives' Compensation Characteristic					

Fraction of Stock & Option to Total Compensation	3,998	0.3775722	0.3406602	0	1
Fraction of Bonus & Salary to Total Compensation	6,746	0.473137	0.3272499	0	1
Restricted Stock Grant ($)	5,491	339.7172	1818.583	0	65557.4
Option Grant ($)	4,017	1680.569	6387.561	0	182319.4

Regression Model: $P_{i,t} = \partial + \beta_1 G_{i,t} + \beta_2 FC_{i,t} + \beta_3 FracC_{i,t} * FC_{i,t} + \beta_4 FracSO_{i,t} * FC_{i,t} +$

$$\beta_5 OPTION_{i,t} * FC_{i,t} + \beta_6 STOCK_{i,t} * FC_{i,t} + \varepsilon_{i,t}$$

Where R&D Intensity, Cash Holdings, Acquisition Expenditure, Income Contribution from Acquisitions, and Sales Contribution from Acquisitions represent the dependent variables ($P_{i,t}$). ∂ is the constant; G represents Gender, which equals to one if the firms' CEO is female; FC describes the firm led by female CEO of year t; $FracSO$ is the fraction of Stock & Option to total Compensation, and $FracC$ is the fraction of Bonus & Salary to total compensation. $STOCK$ represents the value granted on restricted stocks in CEOs' compensation package, and $OPTION$ represents the value granted on options in CEOs' compensation package. These variables are considered with 1) firms led by female CEOs; 2) firms led by male CEOs as independent variables into regression models.

Table 13 Correlation of variables in Hypothesis 3

	Cash Holdings	R&D Intensity	Acquisitions	Acquisitions - Income Contribution	Acquisitions - Sales Contribution	Gender	Has Female CEO	Fraction of Stock & Option to Total Compensation	Fraction of Bonus & Salary to Total Compensation	Restricted Stock Grant	Option Grant
Cash Holdings	1.0000										
R&D Intensity	0.1485	1.0000									
Acquisitions	-0.0830	-0.0296	1.0000								
Acquisitions - Income Contribution	0.0094	0.0045	0.0900	1.0000							
Acquisitions - Sales Contribution	-0.0440	-0.0161	0.3947	0.1597	1.0000						
Gender	0.0276	-0.0175	-0.0259	0.0037	-0.0103	1.0000					
Has Female CEO	0.0227	-0.0186	-0.0273	0.0040	-0.0115	0.9057	1.0000				
Fraction of Stock & Option to Total Compensation	0.1274	0.0979	0.0463	-0.0349	0.0349	-0.0062	-0.0127	1.0000			
Fraction of Bonus & Salary to Total Compensation	-0.0725	-0.0804	-0.0692	0.0299	-0.0461	0.0062	0.0011	-0.9444	1.0000		
Restricted Stock Grant	-0.0460	-0.0259	0.1309	0.0934	0.2334	-0.0078	0.0129	0.2320	-0.2262	1.0000	
Option Grant	0.0629	0.0156	0.0925	-0.5185	0.1360	-0.0238	-0.0086	0.4099	-0.3882	0.1951	1.0000

Table 14 Risk-taking performance and CEOs' compensation structure

Table 14 provides five models to estimate CEOs' risk-taking behaviors between firms run by female CEOs and firms run by male CEOs, according to CEOs' reactions to equity-based compensation. Model 1, 2, and 3 measure the preferences of taking risky activities, and represented by dependent variables: *R&D intensity, Cash Holdings,* and *Acquisitions.* Model 4 and 5 measure risk-taking contributions represented by *Acquisitions-Income Contribution* and *Acquisitions-Sales Contribution*. Five regression models contain the same independent variables: *Fraction of Stock & Option to Total Compensation*; *Fraction of Bonus & Salary to Total*; *Restricted Stock Grant* and *Option Grant*. And all models consider independent variables with conditions - firms run by female CEOs (=1) & firms run by male CEOs (=0) simultaneously. Absolute values of t-statistics or z-statistics are in brackets. Asterisks indicate significance at 0.01 (***), 0.05 (**), and 0.10 (*) levels. (Note: The unit of values in the table is Millions in U.S. Dollar)

Independent Variable	Dependent Variable				
	(1)	(2)	(3)	(4)	(5)
	R&D intensity ($)	Cash Holdings ($)	Acquisitions ($)	Acquisitions - Income Contribution ($)	Acquisitions - Sales Contribution ($)
Gender (Dummy)	-0.00785	0.0551	-11.23	0.202	5,999
	(-0.07)	(0.85)	(-0.15)	(0.01)	(0.03)
Has Female CEOs (Dummy)	0.0300	-0.0231	-135.1	-10.15	-283.8
	(0.12)	(-0.14)	(-0.73)	(-0.14)	(-0.55)
Firm run by Female CEOs (=1) combined with					
Fraction of Bonus & Salary to Total Compensation	0.0157	0.184	34.92	0.372	20.00
	(0.05)	(1.03)	(0.17)	(0.00)	(0.03)
Fraction of Stock & Option to Total Compensation	0.0405	0.181	61.51	-0.219	7,976
	(0.14)	(0.98)	(0.29)	(-0.00)	(0.01)
Restricted Stock Grant ($)	-2.58e-08	0.000000206	0.000884	-0.0000858	0.0000459
	(2.78)	(7.66)	(-3.18)	(0.54)	(-3.98)
Option Grant ($)	6.92e-08	-0.00000375	-0.00204	0.0000859	0.00000998

	(0.01)	(-0.41)	(-0.19)	(0.02)	(0.00)
Firm run by Male CEOs (=0) combined with					
Fraction of Bonus & Salary to Total Compensation	0.0509	0.121***	-95.73***	-13.07	-258.5***
	(1.15)	(5.18)	(-3.47)	(-1.19)	(-3.30)
Fraction of Stock & Option to Total Compensation	0.119**	0.174***	-86.07**	5,791	-305.6***
	(2.78)	(7.66)	(-3.18)	(0.54)	(-3.98)
Restricted Stock Grant ($)	-0.00000479*	-0.00000600***	0.0108***	0.00595***	0.0547***
	(-1.99)	(-3.44)	(5.22)	(7.36)	(9.38)
Option Grant ($)	-0.000000575	0.00000150**	0.00646***	-0.00510***	0.0109***
	(-0.75)	(3.04)	(9.56)	(-22.18)	(6.57)
Constant	-0.00476	0.00822	110.0***	9,845	271.2***
	(-0.12)	(0.39)	(4.39)	(0.98)	(3.79)
N	1995	3726	3411	2688	2690
R-sq.	0.012	0.031	0.051	0.165	0.057
Adj. R-sq.	0.007	0.028	0.048	0.162	0.053

Table 14 tests gender differences in CEOs' risk-taking behaviors between firms led by female CEOs and firms led by male CEOs, according to CEOs' reactions to equity-based compensation (Restricted stock & Option). There are several findings concluded from regression models.

First, model 1, 2, and 3 focus on CEOs' risk-taking activities, and table 14 divides two groups of variables for comparing gender differences: firms led by female CEOs and firms led by male CEOs. In the Column (1), firms run by male CEOs have a statistically positive influence on R&D expenditure intensity compared to insignificant results from female CEOs. The R&D expenditure is a typical investment in long-term, and right managerial decisions on this type of investments are favorable to firms' (shareholders') long-term value. R&D projects are more likely to be firm-specific and knowledge-based (Jensen, Solberg, and Zorn, 1992). Nam, Ottoo, and Thornton (2003) propose that R&D projects are more costly for investors (especially for external investors) to proceed, and come with higher volatility.

Besides, Column (2) shows that the firms run by male CEOs keep more cash holdings when the proportion

of equity-based compensations increase, which is consistent with the result "-86.07" from the Column (3). Male CEOs are more likely to invest in R&D projects rather than regular acquisitions. Meanwhile, firms run by female CEOs are more likely to take regular M&A activities to obtain short-term benefits, and an indication is relative risk-averse executives have less incentive to invest in R&D projects (Smith & Watts, 1992). Based on findings from model 1, 2, and 3, I cannot directly conclude apparent gender differences in CEOs' risk-taking activities. However, there is reasonable to believe that females and males have different attitudes toward different types of risky investments (short-term and long-term horizons).

Second, Table 14 indicates important information on the influences of the value in equity-based compensation on CEOs' risk-taking behaviors. In the group of firms run by female CEOs, the signs of coefficients bring with some indications. For example, the increased value in restricted stocks does not promote females to invest in R&D projects on average, and they are more likely to take regular M&A activities, which are consistent with the previous conclusions. Besides, when considering the influences of the value of restricted stocks and options on male CEOs, I find a more significant effect of these increased value on making acquisitions. Like Agrawal and Mandelker (1987), and DeFusco, Zorn, and Johnson (1991) argued that sensitivity to stock return gives the executives an incentive to take more risk, and then take more M&A projects for obtaining their benefit in short-time. Besides, a paper by Carpenter (2000) concludes that options also could have an opposing effect on managerial incentives to bear risk compared than restricted stocks, and he believes that there is a direct link between the payoff of an option and the underlying stock price. This result provides a possible explanation for opposite influences of restricted stocks on CEOs' risk-taking activities and of options on CEOs' risk-taking activities.

Third, model 4 and 5 focus on CEOs' risk-taking contributions to firms' sales and income, between firms run by female CEOs and run by male CEOs. An apparent result is that the increased value of restricted stocks and options in CEOs' compensation package improves acquisition contributions for both sales and income. The results are more statistically significant from firms led by male CEOs than firms led by female CEOs. This paper finds 1) in firms run by female CEOs, the contribution to firms' sale is greater than to firms' income on average; 2) in firms run by male CEOs, the contribution to firms' income is greater than to firms' sale on average. These findings prove that there are economic benefits from CEOs' equity-based compensation for firms.

However, the results of gender differences are only based on the average level, and many results are insignificant, especially in a group of firms run by female CEOs. Thus, there are not sufficient robust evidence to prove distinct gender differences in CEOs' risk-taking activities and acquisition contributions in this study. Manning and Saidi (2010) find that there is no definitive answer to gender differences in performance according to the payment. Also, they propose that many studies, those suggest men and women have different performance toward compensation, only indicate the direction for future research instead of providing empirical evidence for explaining gender differences. Therefore, it is a challenge to estimate gender differences in executives' performance based on the compensation package.

In conclusion of Table 14, the equity-based components of CEOs' compensation play essential roles in CEOs' risk-taking behaviors on average, particularly for male CEOs (most results of firms run by male CEOs are significant). There is a finding that female CEOs are more likely to take regular acquisition activities to purchase their short-term benefits, and males CEOs prefer risky long-term investments, such as R&D projects. Also, acquisition contribution to sales is greater in firms run by female CEO, and acquisition contribution to income is greater in firms run by male CEOs. However, to some extent, findings indicate that gender differences in risk-taking activities and risk-taking contributions vary to different conditions. In future research, we should realize that model designs for gender differences may vary in other related factors, such as firms' particular situations and CEOs' backgrounds (Manning & Saidi, 2010).

Table 15 Conclusion of Hypotheses 3

Hypothesis 3 Equity-based components of the CEOs' compensation package (Restricted stocks & Options) impact firms with female CEOs on evolving more risk-taking activities than firms without female CEOs.	
H3	-

CHAPTER 6 Conclusion and Discussion

This paper contributes in two aspects to the previous researches on gender differences. First, this article estimates gender differences in firm performance according to gender changes (F2M & M2F) in CEOs' succession. Second, this study estimates gender differences in the influences of the board's power. More specifically, this paper examines two responsibilities of the board - appointing CEOs and determining CEOs' compensation package. In these cases, I explore gender differences in CEOs' appointing decisions on the basis of the boards' gender diversity, and in CEOs' risk-taking behaviors on the basis of equity-based (restricted stocks & options) components of compensation structure.

First, this paper proves that gender changes in CEOs' turnover play important roles in firm performance, and M2F succession (females replace male CEOs) has statistically positive influences on ROA at the 0.1 significance level. However, the relationship between F2M succession (males replace female CEOs) and ROA is negative. Besides, this paper tests the influences of two particular succession situations on firm performance. To conduct the investigation, I category routine succession and non-routine succession by identifying whether the succession situation is retirement turnover. Therefore, in this article, the retirement situations belong to routine succession situations, otherwise are non-routine succession situations. After considering CEOs' succession situations with gender changes as factors to test their impacts on firm performance, I obtain several findings. 1) In non-routine succession situations, gender changes impact firm performance, and it exhibits a more positive influence of M2F succession on both ROA and Tobin's Q compared to the negative one from F2M succession. 2) In routine succession situations, F2M and M2F successions show nearly the same results, and gender differences in performance are insignificant. These findings indicate that instead of gender differences, particular situations in firms affect the overall firm performance.

Second, this paper explores gender differences in influences of the boards' responsibilities, particularly in nominating CEO positions and constructing CEOs' compensation package. In the analysis of the influences of boards' gender on CEO appointment decisions, the results exhibit that a greater proportion of female directors on the boards leads to a higher possibility of appointing females as CEOs, especially if female

directors hold more of the nominating member seats. One extra female nominating member on the boards will increase the probability to appoint females by 8.4%. However, there are opposite directions of relationships between the number of female directors/nominating members and the probability of females being CEOs. One possible explanation is that there is a gender equilibrium amount for firms to balance the influences of gender diversity of the boards. Over seated females on the boards might harm firms' gender balance and decrease public welcome to female CEOs.

Moreover, this paper explores gender differences in risk-taking performance based on CEOs' compensation package. First, I test gender differences in CEO's risk-taking behaviors between firms run by female CEOs and firms run by male CEOs. The results show that female CEOs are more likely to spend money on regular acquisitions and underinvest R&D projects. Male CEOs have a statistically positive influence on R&D expenditures. The R&D expenditure is a typical long-term investment compared to regular acquisition activities, and R&D projects are more costly to proceed and come with higher volatility (Nam, Ottoo, and Thornton, 2003). It is reasonable to believe that female CEOs are prone to take M&A activities to pursue short-term benefits, and male CEOs have a higher risk-bearing in chasing long-term benefits. Females and males have different attitudes toward different types of risky investments (short-term and long-term horizons). Second, this paper explores gender differences in CEO's risk-taking contributions between firms run by female CEOs and firms run by male CEOs. The apparent result is that the increased value of restricted stocks and options in CEOs' compensation will increase acquisition contributions on both firms' sales and income on average, but gender differences are insignificant.

Findings from this paper have important ramifications for corporate governance. An impressive and significant result indicates that female CEOs are performing better than males in some cases, even improving firm performances after replacing the former male CEOs, which counters the gender discriminatory attitudes. Also, there is no apparent conclusion of gender differences in risk-taking performance, and females and males behavior vary in different situations. Therefore, I can't simply conclude that female CEOs are over risk-aversion or risk-bearing. These findings provide empirical evidence and direction to further research in gender differences.

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APPENDIX A [Description of Variables]

Variables	Description
Year	Current year
F2M$_{i,t}$	Male CEOs replace Female CEOs
M2F$_{i,t}$	Female CEOs replace Male CEOs
Gender (Dummy)	Equals to one when CEO is female
Succession Situations (Dummy)	Equals to one when CEO leaves firms because of retirements, otherwise equals to zero.
Has Female CEO (Dummy)	Equals to one when firms led by female CEOs, otherwise equals to zero.
Number of Female Directors	The number of female directors of the firm in the current year
Has Only One Female Director (Dummy)	Equals to one when a firm has only one female director in the current year, otherwise equals to zero.
Maximum Number of Female Directors	The maximum number of female directors in the current year.
Fraction of Female Directors	The fraction of female directors to the board size.
Female Directors as Nominating Member (Dummy)	Equals to one when the female director is the nominating member as well, otherwise equals to zero.
Number of Female Nominating Members	The total number of female nominating members of the firm in the current year.
Maximum Number of Female Nominating Members	The maximum number of the female nominating members in the current year.
Has Female Nominating Member (Dummy)	Equals to one when the firm has at least one female nominating member, otherwise equals to zero.
ROA	Return on assets; ratio of net income before extraordinary items and discontinued operations to book value of assets.
Tobin's' Q	The sum of the market value of equity, price to sales ratio and debt

	divides by the book value of the total assets of the firm [Approximate q = (MVE + PS + DEBT)/TA].
Cash Holdings ($)	The firms' assets that hold in cash, calculated by the cash and short-term investments to total assets.
R&D Intensity	Represents the intensity of all costs incurred during the year that relate to the development of new products or services. Calculated by the R&D expenditure to total assets.
Acquisitions ($)	Represents the cash outflow of funds used for the acquisition of a company in the current year.
Acquisitions-Income Contribution ($)	Represents the effect of a purchase or pooling of interest acquisition in the current year on a company's income for the prior year.
Acquisitions-Sales Contribution ($)	Describes the effect of either a purchase or pooling of interest acquisition in the current year on a company's sales for the prior year.
Fraction of Stock & Option to the Compensation package	Describes the proportion of the sum of restricted stock & option to CEOs' compensation package.
Fraction of Bonus & Salary the Compensation package	Describes the proportion of the sum of bonus & salary to CEOs' compensation package.
Restricted Stock Grant ($)	Represents the value granted on Restricted Stocks in CEOs' compensation package.
Option Grant ($)	Represents the value granted on Options in CEOs' compensation package.