How Firm Performance Impacts Females' Leadership Opportunities in Denmark

A Study of Female CEO Appointments and Length of Tenure Compared to Male CEOs Within Both Family and Non-Family Firms in Denmark

Master Thesis

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Abstract

This paper examines how firm performance impacts the likelihood of female CEO appointment and whether female CEOs are more likely to face turnover compared to male CEOs within both family and non-family firms in Denmark. We demonstrate that a significantly higher share of females is appointed as CEO in family firms compared to non-family firms. In non-family firms, female CEOs are more likely to be appointed to their role in firms experiencing a decline in profitability, hence the existence of a 'glass cliff'. The data warrants further inquiry into non-family firms regarding tenure, as findings on the difference in female and male CEO tenure are inconclusive. Overall, CEOs' tenure is longer in family firms compared to non-family firms, which might be partly explained by a significantly larger share of CEOs in family firms leaving office after the legal retirement age. We discuss the implications for the family firm literature and find that half of females appointed CEO in family firms are either the wife of an owner or the daughter of the departing CEO. Specifically, 9% of CEO transitions from males to females are from a father to a daughter whereas 18% are from a father to a son.

The data thus suggests that the conditions under which females are promoted to CEO in Denmark differ from the conditions under which men are promoted to CEO, due to financial performance in non-family firms and familial ties in family firms. However, since financial performance does not influence the likelihood of female CEOs to be replaced by male CEOs and it cannot be shown that female CEOs are more likely to face turnover, female CEOs get to prove their leadership capabilities just as male CEOs post-appointment.

These findings contribute to the discourse on how to reach gender equality as they suggest that to improve gender equality among CEOs in Denmark, focus should be on the *conditions* under which females are appointed CEO rather than their leadership capabilities. To the best of our knowledge, this is the first paper to examine the glass cliff and gender differences in tenure differing between family and non-family firms. Moreover, this is the first paper of its kind to study all firms in a country, in this case Denmark. Finally, recommendations are made for future research, where we call for investigations into *why* gender is a factor related to performance in the appointment of CEOs in non-family firms, and for this study to be replicated in other countries.

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1 Introduction

There are many extensive studies on why females are prevented from rising to top leadership positions, a phenomenon coined as the glass ceiling (Hymowitz & Schellhardt, 1986). More recent research also investigates under what circumstances females rise *when* they do. Studies reveal that females are more likely than males to be promoted to leadership positions when companies find themselves in precarious situations (Glass & Cook, 2016; Ryan & Haslam, 2005). This research on the so-called "glass cliff" emerged in 2005 in a study by Ryan and Haslam and has primarily been limited to publicly listed companies in the United States and the United Kingdom, with only one divergent study on German firms (Bechtoldt, Bannier, & Rock, 2019). Building on this research, Cook and Glass (2014b) examine whether female CEOs are more likely to be replaced by male CEOs post-appointment and how this is affected by pre-replacement performance. Elsaid and Ursel (2018) study a potential difference between females' and males' tenure in general, controlling for financial performance. This study contributes to the literature by investigating the glass cliff and the effect of gender on differences in tenure by studying all firms in Denmark, differentiating between family-owned and non-family-owned firms.

Conducting the research based on firms in Denmark provides a different institutional environment than studies based on data from the United States and the United Kingdom. With Denmark ranking 14th in the 2020 gender gap index by the World Economic Forum, while the United States ranks 53rd and the United Kingdom ranks 21st, we expect our study to yield differing results than what has previously been demonstrated (World Economic Forum, 2019). To our knowledge, this is the first study to investigate private family-owned and non-family-owned firms in addition to publicly listed firms within these topics. Analyzing a wide array of firm sizes and in particular, the differentiation between family and non-family ownership, will add new information relevant to the public debate on gender equality, as family firms seek to preserve legacy with a strong focus on people and relationships (Kellermanns & Hoy, 2017).

In section 2, the scope of this paper is laid out; section 3 reviews the family firm literature, the literature related to firm performance, and gender in leadership; section 4 describes the construction of our dataset and the methodological approach; in section 5, the analyses are performed; section 6 discusses the results and compares them to previous research. Section 7 provides an outlook before section 8 summarizes the conclusions of this study.

2 Research Question

The primary objective of this paper is to investigate differences in how firm performance impacts the likelihood of female CEO appointment and length of tenure, as well as the length of tenure itself, compared to male CEOs within both family-owned and non-family-owned firms in Denmark. While some researchers have created a unique dataset on female CEOs in the United States, the United Kingdom, and Germany (Bechtoldt et al., 2019; Cook & Glass, 2014b; Elsaid & Ursel, 2018; Glass & Cook, 2016; Ryan & Haslam, 2005), the literature on this subject is extremely limited for non-listed firms and for other institutional settings.

The public debate in Denmark intensified with an article in the Danish newspaper, Berlingske, stating that only 69 among the country's 1,000 largest firms are led by females in 2020, as opposed to 75 in 2019 (Dalgaard, 2020). In a 2021 study, the Allbright Foundation finds that in a Nordic comparison with Finland, Iceland, Norway and Sweden, Denmark has the lowest share of women in the management of large Nordic companies from 2015 to 2021 (Lundeteg, Hemberg, Inkala, & Bellini, 2021).

Motivated by the gap in the literature and the ongoing public debate on how to achieve greater gender equality, this paper aims to answer the following research question:

How does firm performance impact the likelihood of female CEO appointment and how is length of tenure compared to male CEOs, within both family and non-family firms in Denmark, and what can these findings contribute with to the discourse on how to reach gender equality?

To answer our research question, we will answer the following sub-questions:

- What characterizes female and male CEO appointments and their average tenure in both family and non-family firms in Denmark?
- How does firm performance affect the likelihood of females being selected for CEO positions, and how does this differ between family and non-family firms in Denmark?
- How does firm performance affect the likelihood of females getting replaced by males, and how does this differ between family and non-family firms in Denmark?
- How does the turnover sensitivity differ for male and female CEOs within both family and non-family firms in Denmark?

- In a discussion, how do the findings compare to previous research and what are the implications on gender equality research?

2.1 Delimitation and Scope

In this paper, we define a family-owned firm as a firm in which an individual or family has more than 50% equity ownership. A family is defined as individuals related by blood, and thus from the perspective of one individual, everyone whom this person shares the same mother, father, grandmother, or grandfather with is this person's family. In addition, if the individual is married the individual's partner is also family according to our definition. This is an operational definition, which makes it possible to separate family-owned from non-family-owned firms (Chrisman, Chua, & Sharma, 2005). We thereby do not define a family-owned firm from the socio-emotional wealth theory, where a family-owned firm is defined through identity, the ability to exercise family influence, and the perpetuation of the family dynasty (Gómez-Mejía, Haynes, Núñez-Nickel, Jacobsen, & Moyano-Fuentes, 2007; Kotlar & De Massis, 2013). Furthermore, we limit ourselves to limited liability companies in Denmark.

Likewise, in this paper, we refer to an individual's gender as either female or male as registered in the Danish Civil Registration System (CPR), and not an individual's personal gender identification, which may differ from this system (Duerst-Lahti & Kelly, 1995). The rationale is again that this makes it possible to separate females from males due to the last digit in the ten-digit CPR-number being even if an individual is registered as female and odd if an individual is registered as a male (CPR-Kontoret, 2008). The CPR-number is given to individuals at birth, and individuals that are not born in Denmark can get a CPR-number later in life.

For the literature review, we are not limiting ourselves to a certain time, geography nor academic field of study but include studies we find relevant for conducting our research. However, we do find research from the economic, accounting, finance, strategy, leadership, and management field to be most important for our interdisciplinary study. This is in part because this paper belongs to those fields but also because many studies within these fields are quantitative and thus supported by a thorough analysis that considers the issue of correlation and causation, which is especially important for studies concerning a gender variable. Therefore, and as our choices in the literature review reflect, we do not answer our research question according to individual preferences but rather observable patterns in our data. In other words, we are not going to explain gender inequality among CEOs by suggesting that women, for instance, are more likely to choose family over career.

For our methodology, we use the observable patterns of accounting-based measures to analyze the data because we are primarily concerned with private firms. While we distinguish between different industries to industry-adjust financial variables, we do not conduct the glass cliff and tenure analyses on different industries and the only type of industry that we exclude is registered holding companies with no operations. Additionally, as we want to analyze overall patterns in Denmark, we have included all firms where we have financial, management, and ownership data and that have experienced a CEO transition according to our criteria. Furthermore, we exclude boards because we are not investigating intergroup relations (Westphal & Milton, 2000), for instance whether a diverse board is more likely to lead to a diverse organization and thus a female CEO (Cook & Glass, 2014b, 2015). Norway legislated a gender quota of 40% for corporate boards in 2003 and implemented it in 2006 with a grace period until 2008 (Seierstad & Huse, 2017). It has, however, shown that the quota has not increased the number of female CEOs (Ahern & Dittmar, 2012; Wang & Kelan, 2013).

The analysis in this paper is concerned with under what circumstances females rise *when* they do, females' post-appointment tenure, and pre-replacement firm performance when females are replaced by males. Only in the discussion do we shed light on potential reasons for *why* we find what we do. Furthermore, this paper does not try to answer *why* females are prevented from rising to top leadership positions, hence the glass ceiling, but explore the existing literature on the topic as it serves as a foundation for our research.

Ultimately, we will in the remainder of the paper refer to *family-owned firms* as *family firms* and to an individual's *biological sex* as defined by the CPR-number as the *gender* of the individual, being either female or male. The words *females* and *women* as well as *males* and *men* are used interchangeably throughout this paper. Furthermore, *gender equality* is in this paper not defined as a 50/50 gender ratio in top management but rather as equal opportunities to attain and occupy a top management position.

3 Literature Review

As our research question and sub-questions distinguish between a family and a non-family firm, we begin our literature review by outlining the existing literature on family firms. We aim to first focus on the distinction between family and non-family firms, which becomes an important element for our methodological considerations. This is followed by providing the reader with a better understanding of the motives driving decision-making around CEO succession planning in family and non-family firms. Afterwards, we assess the literature on a CEO's impact on firm performance, dedicating sections to female CEOs' impact on firm performance and the glass ceiling; sections that will serve as the foundation for our research on gender equality regarding CEO appointment and length of tenure. Specifically, we provide the reader with the underlying theories adopted in this paper before we investigate the literature related to the glass cliff, female CEOs being replaced by males, in this paper referred to as *traditional leader replacement*, and CEO turnover sensitivity related to gender, in this paper referred to as *turnover gender sensitivity*. With a deep understanding of these topics from existing literature, this paper will contribute to driving the research on gender equality and potential discrimination among CEOs.

3.1 Comparing Family Firms to Non-Family Firms

Research has shown that family firms differ from non-family firms in terms of management and governance structure and that these differences affect, for example, strategic attitudes, corporate governance characteristics, financing and recruitment policies (Bornhäll, Johansson, & Palmberg, 2016; Ellul, Pagano, & Panunzi, 2010; Perez-Gonzalez, 2006). Family firms take up the largest fraction of firms in most economies and interests an increasing number of researchers (Gedajlovic, Carney, Chrisman, & Kellermanns, 2012; La Porta, Lopez-de-Silanes, & Shleifer, 1999). Despite family firm literature's popularity and exponential growth in output, no broadly adopted definition of a family firm exists in the literature (De Massis, Sharma, Chua, & Chrisman, 2012; Henssen, Voordeckers, Lambrechts, & Koiranen, 2011; Kellermanns & Hoy, 2017). Therefore, published research most often begins by outlining what definition has been applied for the respective study. A total of 90 definitions of a family firm is identified in a report conducted on behalf of the European Commission (Mandl, 2008).

Chrisman, Chua, and Sharma (2005) point to a convergence among family business scholars towards the use of mainly two approaches when defining a family firm. The first approach is the components-of-involvement approach, in which a family firm is defined by the family's involvement in the business through management, succession, ownership, and governance (J. Chua, Chrisman, & Sharma, 1999). Definitions of a family firm belonging to this approach are operational in nature and do not distinguish between two firms with the same level of family involvement, but where only one of the families would define their firm as a family firm. Therefore, a definition capturing the behavior of family members in the business was deemed necessary and the second approach is by Chrisman, Chua, and Sharma (2005) called the essence approach.

As with the components-of-involvement approach, scholars have in the essence approach developed different theoretical definitions: Drawing on embeddedness theory, which holds that economic action is influenced by the social context in which agents operate (Le Breton–Miller & Miller, 2009), Belenzon, Patacconi, and Zarutskie (2016) define a family firm by the social context of ownership and the family's influence over the strategic direction of the firm. Litz' (1995) definition of a family firm emphasizes whether the members of a family intend to keep control over the firm that they own and manage. Using the strategic management approach of agency theory, Chrisman et al. (2005) outline that researchers distinguish family from non-family firms through identifying altruistic behavior and tendency for entrenchment.

Building on Barney's (1991) resource-based view, Habbershon and Williams (1999) assess the competitive advantage of family firms through the resources distinct to family businesses that arises with the family's involvement in the business and call this bundle of resources the 'familiness' of the firm. Similarly, Sirmon and Hitt (2003) argue that by evaluating, acquiring, shedding, bundling, and leveraging their resources differently from non-family firms, family firms can attain a competitive advantage that by definition is not achievable for non-family firms. Henssen, Voordeckers, Lambrechts, and Koiranen (2011) go beyond both the components-of-involvement approach and the essence approach by complementing the agency theory and resource-based view with a psychological dimension relating to the feeling of being an owner.

Despite the many perspectives, an explicit definition of a family firm remains open to debate. In this paper, we use a definition similar to that of scholars of the components-of-involvement approach; a family firm is a firm where an individual or family has more than 50% equity ownership. Thus, non-family firms are in this paper all other firms. While this is our definition of a family firm, we keep in mind the perspectives of the scholars in the essence approach as the findings in their papers can help explain our results of differences between the leadership experience of female and male CEOs.

3.1.1 CEO Succession Planning in Family and in Non-Family Firms

CEOs are of crucial importance for a firm because they make big and small decisions that can dramatically affect organizational outcomes (Finkelstein, Hambrick, & Cannella, 2009). CEO succession is inevitable in a firm’s life cycle and thus carries substantial business impact (Finkelstein et al., 2009; Quigley & Hambrick, 2012; Tao & Zhao, 2019). In the following, we outline the current literature on CEO succession planning, while distinguishing and finding similarities between the succession planning process in family and non-family firms.

For firms with a board, the board faces a difficult task in managing the CEO succession process. The task is difficult because existing theory cannot explain succession planning processes in action and thus there is little guidance on best practices (Finkelstein et al., 2009; Schepker, Nyberg, Ulrich, & Wright, 2018). Additionally, the task is difficult for boards because they lack in-depth knowledge about the firm and its executives and therefore must rely on the CEO for information about and access to succession candidates (Zajac, 1990). Research has therefore taken two different approaches; one conceptualizing CEO successions as primarily influenced by the outgoing CEO (Vancil, 1987) and the other as a process of tensions between the CEO and the board (Zajac & Westphal, 1996). However, Schepker et al. (2018) argue that investigations on how boards perform their duties are largely absent from succession research.

Without emphasizing the responsibility of boards, Tao & Zhao (2019) seek to understand the way in which CEO succession planning affects firm performance and volatility during CEO turnover. The succession type they refer to is called relay succession, which is a succession type where the incoming CEO has been pointed out years before the CEO transition. An heir apparent is identified by estimating and comparing all the firm's non-CEO top executives' promotion likelihood based on a set of characteristics. The paper suggests that firms should consider using relay succession because it improves performance and reduces volatility during the CEO transition period (Tao & Zhao, 2019). An addition to relay succession is the former CEO staying on the board as that can also help smoothen CEO transitions (Tao & Zhao, 2019). According to Donald C. Hambrick & Quigley (2014), on the other hand, CEOs that are becoming a part of the board restrict a successor's choices, which hinders the new CEO in making strategic changes and delivering performance that deviates from pre-succession levels.

Relay succession is similar to long-term CEO succession planning in family firms. A clear difference between family and non-family firms, however, is the opportunity for family firms to pass the leadership on to the next generation. Succession is therefore one of the most important issues in the field of family business (J. H. Chua, Chrisman, & Sharma, 2003). Kellermanns and Hoy's (2017) investigation of current research on family firms found an increasing prevalence of mentors within the firm and family, actively preparing the next generation for managerial repsonsibilities. Taking a similar perspective, Le Breton-Miller, Miller, and Steier (2004) argue that the best preparational tool for children of the family firm is the transfer of knowledge around the dining table at home.

According to the socio-emotional wealth (SEW) theory, the owner of a family firm derives a non-economic value from their owning and controlling position in the firm and that firms willingly implement strategies that can result in otherwise avoidable business risk (Gómez-Mejía et al., 2007). Building on this view, Kotlar and De Massis (2013) hypothesize that decision-makers in family firms not only rely on economic evaluations but assess threats and opportunities based on a subjective view of what increases their perceived wealth. SEW theory can thus help explain differences in appointment of female versus male CEOs in family and non-family firms, as family firms might to a larger extent choose to pass down managerial responsibilities to a female to preserve SEW.

Building on the view of passing down managerial responsibilities to keep the responsibilities within the family, Kellermanns and Hoy (2017) highlight that little is known about how succession planning is affected by the economic performance of the business prior to succession. Management transitions with conflicting intentions may create inefficiencies that limit the ability of family firms to develop their familiness (Miller, Steier, & Le Breton-Miller, 2003). Furthermore, the combination of altruism, entrenchment, and intention to keep the firm within the family, can foster behaviors leading to dysfunctional cooperation that annuls the value of existing capabilities; an agency cost different from what non-family firms might incur (Schulze, Lubatkin, & Dino, 2003). Thus, these studies add further perspectives to differences between family firm performance and non-family firm performance before and after a CEO transition, helping explain why we might find differences between family and non-family firms in Denmark.

Furthermore, a study by Bennedsen, Nielsen, Perez-Gonzalez, & Wolfenzon (2007) should be highlighted. The extensive study on the impact of succession decisions on firm performance indicates gender discrimination in family firms. Used as an instrumental variable in the study, Bennedsen et al. (2007) find that family firms where outgoing CEOs' firstborn children is male are 9.6%-points more likely to pursue a family succession than their counterparts whose firstborn children is female (39% to 29.4%). While this study relates to ownership succession and not CEO succession; judging from their findings, there is gender discrimination in the appointment of successors in family firms.

Finally, Ahrens, Landmann, & Woywode (2015) investigate CEO successions in family firms in Germany, and find that a preference for male family CEOs persists, irrespective of human capital with which they find female successors are better equipped. Their findings confirm the discovery from Bennedsen, Nielsen, Perez-Gonzalez, & Wolfenzon (2007), as they also find that successions are significantly more likely to take place whenever the predecessor has a son.

In summary, CEO succession is of crucial importance for both family and non-family firms as Barney (1991) argues, employees and management structures are the firm resources most valuable and most difficult to duplicate. In the next sections, this paper will investigate a CEO's impact on firm performance followed by a focus on gender differences not only regarding their impact on performance, but also the glass ceiling, the glass cliff and the effect of gender on differences in tenure. Thereby, this section provides the foundation for understanding the differences in succession related to different ownership types, whereas the following sections will emphasize important literature for our study that is not by definition differentiating for ownership type.

3.2 A CEO's Impact on Firm Performance

In this paper, we base the notion that company performance can be traced back to the CEO as explained by the upper echelons theory, according to which a firm is a reflection of its top managers (Hambrick & Mason, 1984; Hambrick & Quigley, 2014). In a study from 1984, Hambrick and Mason argue that certain upper echelon characteristics; psychological, such as values; as well as observable, such as age and education, influence strategic choices which determine performance levels. Since then, the upper echelons theory has been investigated from two perspectives: the first being the top management team (TMT) and the second being the CEO.

Beginning with the first perspective, Wiersema & Bantel (1992) study the relationship between TMTs' demography and changes in company strategy. They argue that a firm's strategy drives performance and competitiveness by responding to internal and external opportunities and threats. Wieserma and Bantel (1992) collect a random sample of 100 firms out of the Fortune 500 companies and regressed strategic change, which was proxied by the individual levels of diversification, onto demographic characteristics of the TMTs. The results showed that the cognitive perceptions of top managers, as manifested in the management's demographics, are tied to the team's disposition to alter business strategy and thus performance.

The second perspective comprises of studies which examine the influence of the CEO on the company, as the CEO occupies the most influential position within the TMT. Chatterjee and Hambrick (2007) study how firm strategy and performance is influenced by CEO narcissism, which they measure through various indicators, such as ego-singular pronouns in interviews, the accentuation of the CEO portrait in the annual report, and the CEO's remuneration in proportion to the second-best paid manager. They find that CEO narcissism is affiliated with extreme performance, which is reflected in extreme measures of ROA and total shareholder return. Testing fluctuations in these same measures, they find significance regarding the accounting-based measure, ROA, however not for the market-based measure that is total shareholder return.

Expanding the scope of enquiry to the country level, Crossland & Hambrick (2007, 2011) study to what degree CEO influence differs across countries. In a study from 2007, they look to a country's values, company ownership structures, and board governance configuration to determine the freedom in decision-making given to CEOs in different countries, and in turn the chief executives' level of influence on firm performance. The authors arrive at the conclusion that within the United States, the latitude of action provided to CEOs is considerably greater than in Germany and Japan. (Crossland & Hambrick, 2007). Based on the freedoms granted to CEOs in the United States, it is easier for American CEOs to influence company performance.

Building on their study from 2007 in a research paper from 2011, Crossland and Hambrick study the concept of managerial discretion further to investigate if executive discretion provides a theoretical linchpin for resolving the issue of whether CEOs have a significant impact on corporate results. In this later study, they expand the scope of countries studied from three to fifteen and investigate formal and informal institutions within these countries to determine CEOs' effect on firm performance (Crossland & Hambrick, 2011). This institutional theory is taken from North's 1990 book *"Institutions, Institutional Change and Economic Performance"*, which claims that the primary function of institutions is to decrease uncertainty. As written in the introduction of a subsequent paper, North argues that informal and formal *"institutions are the humanely devised constraints that structure political, economic and social interaction"* (North, 1990). To measure informal national institutions, Crossland and Hambrick (2011) make us of Hofstede's measures for informal institutions, individualism, power distance, and uncertainty avoidance (Gladwin & Hofstede, 1981). The authors arrive at the conclusion that country-specific discretion affects CEO influence on firm performance. CEOs in the United States, the United Kingdom, and Canada having the strongest influence, and CEOs in South Korea, Italy, and Japan having the least influence on firm performance.

Based on research on the relationship between CEOs and their impact on firm performance, there has been an array of studies which look more closely to specific characteristics of CEOs, one important and intensely studied characteristic being gender. Female CEOs' impact on firm performance is examined in the next section.

3.2.1 Female CEOs' Impact on Firm Performance

Before examining the current literature on female CEOs' impact on firm performance, it is important to first examine the research on the definition of gender to better understand the existing research. In their book *"Gender Power, Leadership, and Governance"* from 1995, Duerst-Lahti and Kelly define gender as the socially constructed connotation attributed to biological sex, particularly with regard to the differences between the sexes. They note that gender is not only how we understand these differences, but also the fact that we often tend to inflate these differences.

According to Htun (2005), gender is embedded and transmitted in social and political institutions over time, reflected in differences in rights, opportunities and living situations. Most notably, she claims that comprehension of gender does not presuppose a theory of gender identity, and that gender does not define a person nor does the gender definition take all subjective experiences into account. In her essay on exploring what the meaning of using gender as a category of analysis is, Karen Beckwith (2005) suggests two meanings of gender: gender as category and as process. Gender as category is *"the multidimensional mapping of socially constructed, fluid, politically relevant identities, values, conventions, and practices conceived as masculine and/or feminine"* (Beckwith, 2005). As a process, gender constitutes *"behaviors, conventions, practices and dynamics engaged in by people, individuals, institutions and nations"* (Beckwith, 2005).

Referring to Duerst-Lahti and Kelly (1995), many studies, especially quantitative and including this study, use gender and sex interchangeably without considering the distinction. This is also the case for some of the current literature that this paper will now outline, and thus we find it important to stress that these studies refer to biological sex despite using the term gender. Not to conclude, however, that these studies do not relate certain attributes to belonging to the *female* or *male* category.

Overall, despite – or because of – the plethora of studies investigating female CEOs' influence on firm performance, no one clear answer to whether there is a proven impact is broadly accepted among scholars. We thereby start by outlining the studies that have found a positive effect on female CEOs on firm performance.

Krishnan and Park (2005) expand the upper echelons theory and research the direct impact of female representation on corporate performance, using a sample of 679 companies which they source from the 1998 *Fortune 1000* list. They find that a higher proportion of females in TMTs has a positive impact on firm performance, measured by ROA. Khan and Vieito (2013) show a similar result using a sample of 11,315 firms and Krishnan and Park (2005) provide a crucial contribution to the upper echelons theory, finding evidence in firm performance on the benefits of having a more diverse management team. With the companies' stock return variability as the dependent variable in another two stage least squares analysis, Khan and Vieito (2013) find that the variable *female CEO* is negative and statistically significant, indicating lower firm risk level for women occupying the CEO position.

Smith, Smith, and Verner (2006) conduct a panel study of 2,500 Danish firms, observed between 1993 and 2001, to determine whether female CEOs and the proportion of women directors on the boards have an impact on firm performance. With an average firm size of 219 full time employees in 2001, their study is one of the few studies that include considerably smaller firms and considers family firms. Overall, the results in their study range from no impact to a positive impact of female CEOs on firm performance. Smith et al. (2006) stress that the benefits of female leadership are a question of companies being able to attract and recruit more qualified women. The relationship between the proportion of women directors on a board and firm performance is positive (Smith et al., 2006). Yet, this positive effect is not transferred to other female board members, who have a negative effect – a finding attributable to the fact that a significant proportion of women on boards of directors are part of the ownership family within family firms (Smith et al., 2006).

Through meta-analyses, Jeong and Harrison (2017) and Hoobler, Masterson, Nkomo, and Michel (2018) find a small but significant positive effect of female CEOs on firm performance. Jeong and Harrison's (2017) study is of 146 primary studies in 33 countries and concludes that the effect is mainly driven by significant market-based measures, contrary to insignificant accounting-based measures. For female presence among the TMTs, Jeong and Harrison (2017) find a positive long-term financial performance effect for both market-based and accounting-based measures when investigated separately. The authors find that positive effects on financial performance are greater when executives are given more freedom regarding decision-making on an environmental and organizational level, a result which resonates with the conclusions by Crossland and Hambrick (2007, 2011).

Hoobler et al. (2018) analyze 78 studies, entailing 117,639 organizations and consider the moderating effects of national gender egalitarianism. They relate gender egalitarianism which is a proxy for gender supportive climates to the critical mass theory, where a sufficient amount of women in the work environment will enable other women to leverage their unique capabilities (Jia & Zhang, 2013), to the social identity theory, where groups become more open to new perspective due to female presence (Tajfel & Turner, 2019), and to the upper echelons theory (Hambrick & Mason, 1984). They find that gender egalitarian cultures present a higher likelihood of female CEOs positively impacting financial performance (Hoobler et al., 2018).

While the above research documents positive effects, there have also been studies that predict a negative effect of female CEOs on firm performance. Singhathep and Pholphirul (2015) study 1,043 manufacturing firms in 2007 in Thailand; the country that has the highest proportion of female CEOs in Southeast Asia. Their results show that women have a negative effect on both short-term performance measured by revenues and net income and long-term growth as measured by product and process innovation and efforts concerning employee training (Singhathep & Pholphirul, 2015). However, they also conclude that these negative effects can be avoided if a university degree is obtained by the female CEO. This conclusion is similar to the one of Smith et al. (2006) in their research on 2,500 Danish firms, as their findings reveal that the positive firm performance effects are mainly associated with female managers with a university degree as opposed to female managers without a university degree. Singhathep and Pholphirul (2015), however, also find that small firms led by women performed better than small firms led by men and suggested that this may be due to a stronger focus on market orientation by female CEOs.

Jadiyappa, Jyothi, Sireesha, and Hickman (2019) apply a difference-in-differences analysis to 100 Indian firms and show that having women occupy the position of CEO has a negative impact on firm performance, measured by ROA and ROE. The authors prove through regressions that female CEOs are associated with higher agency costs than male CEOs, testing agency cost directly with the total expense ratio, and indirectly with the sales to total assets ratio. The authors suggest these results may be due to subpar financial and investment decisions and likely drawbacks for women due to gender bias in India (Jadiyappa et al., 2019). In their discussion, they highlight the fact that studies finding negative effects of female CEOs on firm performance are often conducted in developing countries, while studies coming to contrary conclusions are making use of data from developed countries (Jadiyappa et al., 2019). Based on this view, since Denmark is a developed country, we would expect that female CEOs have a positive impact on firm performance.

The importance of contextual factors is also stressed by Eagly and Karau (2002), whose paper revolves around social role congruity theory which argues that the observed incongruence between a woman's gender role and leadership role generates two biases. First, women are seen as less favorable potential leaders than men. Men are expected to have characteristics or gender norms such as assertiveness, ambition and competitiveness, while women are expected to have community characteristics such as sympathy (Doherty & Eagly, 1989). Professional and social structures in the developed world are built under the assumption that men are the ones expected and equipped to provide the economic resources to the family while women work unpaid in the household (Hobson & Townsend, 2003). Although the modern reality has developed to be incompatible with gender standards, people still follow gender-based assumptions (Hobson & Townsend, 2003). Second, actions taken by women in leadership roles are evaluated less positively than when taken by men (Eagly & Karau, 2002). Thus, not only are attitudes less favorable toward females in (potential) leadership positions, but it is also harder for women to "break through the glass ceiling". Investigating the announcement of female CEOs, Lee and James' (2007) find that this announcement is often followed by a drop in financial investment in those companies, pointing to the fact that attitudes towards women leaders are less favorable than towards men leaders.

Women being deferred to their male counterparts can also be explained through intergroup relations, according to which women (as well as ethnic minority) CEOs are out-of group minorities within the firm, which is typically led by white males (Westphal & Milton, 2000). Park and Westphal (2013) find that when attaining executive positions, minority CEOs' reputation among a variety of stakeholder groups may be tarnished, which can negatively affect future performance. Based on survey data questioning CEOs and journalists, Park and Westphal find that out-group bias together with status competition result in envy on white male CEOs' part, which leads them to attribute declines in firm performance in companies led by minority CEOs to internal rather than external causes in conversations with journalists. The resulting coverage on minority-led companies tends thus to be more negative. The paper does thus shed light on some of the challenges and biases facing minority CEOs when investigating their impact on firm performance; challenges and biases that can ultimately lead to decline in market-based measures and in financial investments.

Having now researched the current literature on female CEOs' impact on firm performance, we deem it important to also briefly review the literature on board diversity's impact on appointing a female CEO, before examining literature on the glass cliff.

3.2.2 Board Diversity's Impact on Appointing a Female CEO

Cook and Glass (2015) investigate whether board composition, both in terms of the share of women on the board and relative interlinks among female board members, increases the likelihood of women being appointed CEO. Interlinks were defined as female board members being part of more than one corporate board. To arrive at a conclusion, they investigate a sample of CEOs and board of directors on Fortune 500 firms from 2001 to 2010. They carry out a Cox model analysis in order to evaluate the impact of different variables on the likelihood of a woman being appointed CEO and regress the appointment of a female CEO on their explanatory variables, the percentage of female board members, and interlinks (Cook & Glass, 2015). Controlling for appointment year, industry, headquarter location, size and leverage, average age of the board of directors and firm performance, they found no significance for either explanatory variable.

Furthermore, Norway legislated a gender quota of 40% for corporate boards which sparked a worldwide discussion on whether such a quota should be introduced in other jurisdictions (Wang & Kelan, 2013). The Norwegian parliament ratified the quota in 2003 and implemented it in 2006 with a grace period until 2008 (Seierstad & Huse, 2017). Wang and Kelan (2013) made use of this natural experiment brought about by legislation to research whether the Norwegian gender quota changed the probability that women would be appointed CEO. While they found that the likelihood of female CEO appointment was positively related to female directors' qualification and female and male director independence, mere female presence on the board was not. This finding is similar to the findings of Ahern and Dittmar's (2012) study, who equally do not find evidence of a higher likelihood of women CEOs being appointed following the board quota in Norway.

Thus, research suggests that female board members do not have a significant positive influence on female CEO appointment, while scholars have found the impact of female CEOs on firm performance to be positive, neutral, and negative. Having outlined these contradictory results, the following section will provide the current literature related to a topic where scholars in general agree, namely that females are significantly underrepresented as CEOs, here researched through the lens of the *glass ceiling*.

3.3 The Glass Ceiling

The glass ceiling is a term used to describe the set of social and organizational constraints that create barriers preventing women from attaining senior management positions in organizations (Hull & Umansky, 1997). The term was coined in 1986 in the Wall Street Journal article: *"The glass-ceiling: Why Women can't seems to break the invisible barrier that blocks them from top jobs"* (Hymowitz & Schellhardt, 1986), and has subsequently been subject to a plethora of academic research. According to the bias-centered theory, the glass ceiling exists because male leaders are biased, albeit often unconsciously, against female promotions to the upper echelons of management (Cohen, Dalton, Holder-Webb, & McMillan, 2020). The development of these biases can be explained by social role theory and the homophily theory. The social role theory states that individuals have expectations of adequate and inadequate behavior for both men and women (Doherty & Eagly, 1989), and prescribes leadership attributes to men, as has been described above.

According to the homophily theory, people want to surround themselves with individuals who display resembling demographic characteristics (Dalton, Cohen, Harp, & McMillan, 2014). This in turn creates subconscious bias against out-group individuals who do not share these similarities, such as women in a male dominated environment. A threat to the homogeneity of the group may lead in-group members to seek conflict. However, one might suggest that resistance by the out-group could solve the issue of the glass ceiling. System justification seeks to explain why this is not the case. System justification theory is defined as the *"process by which existing social arrangements are legitimized, even at the expense of personal and group interest"* (Jost & Banaji, 1994). It demonstrates that not only the beneficiary group is invested in legitimizing the unfair situation, but so is the disadvantaged group. The existing system is legitimized by positively perceived norms and the system is seen as innate, commendable, and unavoidable.

Apart from the bias-centered theory, there are also theories which argue that systemic structures within the organization prevent women from ascending to the upper echelons, a lack of mentoring being a central issue. This has not only been a topic within academia, but also within businesses where firms have started to establish more mentoring programs to promote females along their journey to senior management. In a large-scale survey of Fortune 1,000 CEOs, male CEOs had a widely differing understanding of the organizational and environmental barriers that their female employees encountered (Ragins, Townsend, & Mattis, 1998). In their paper, they stress that while mentoring programs, which provide access to information exclusive to powerful networks, as well as access to high-profile job assignments, are crucial for advancement within the firm, they are difficult to obtain for female employees, who have to actively seek them out (Ragins et al., 1998). Their male counterparts, meanwhile, are often approached for said programs and assignments. Thus, structural, systemic organizational practices hinder females from being awarded the same opportunities for professional development.

Finally, barriers to the upper echelons may be explained by individual differences such as personality traits. Moutafi, Furnham, and Crump (2007) had 900 employees of British companies across seven different sectors complete two different psychometric tests, namely the NEO Personality Inventory Test and the Myers Briggs Type Indicator (MBTI), and specify which managerial level they had attained. To study the effects of personal features on attained managerial level, gender, age, and connections to top management were considered to account for these factors' influence on promotions. They then measured ordinal associations between managerial level, personality results and demographic factors by applying a Kendall's Tau-b test. The findings suggested that conscientiousness, extraversion and MBTI intuition, meaning a focus on the perception and patterns of information received, positively correlated with the managerial level attained and that neuroticism, MBTI introversion and sensing, meaning a focus on physical reality of information, was negatively correlated with the management level (Moutafi et al., 2007).

In sum, the challenges that women face to break through the glass ceiling are well-documented. Less researched and understood are the factors that influence the success of women who do rise above the glass ceiling. In the following section, we provide an overview of the current literature on this topic – *the glass cliff*.

3.4 The Glass Cliff

The term "glass cliff" first appeared in the literature in Ryan and Haslam's (2005) article: *The glass cliff: Evidence that women are over-represented in precarious leadership positions*. The term covers the body of research conducted in the early 2000s that suggested that women are more likely to be promoted to top positions than men when companies find themselves in precarious situations. The article was written as a reaction to the lead article in The London Times by

Elizabeth Judge (2003), which suggested that an increase in the number of female board members in companies in the United Kingdom resulted in worse firm performance (Bechtoldt et al., 2019). Ryan and Haslam (2005) turned the study around and argued that weak firm performance caused the appointment of female board members. At its core, the phenomenon suggests that any apparent progress towards gender equality in top management positions is in reality a *"perverse sign of progress"* (A. Hill, 2016), implying that compared to men, women are often promoted to precarious positions with a high risk of failure.

Following the study by Ryan and Haslam (2005), the glass cliff has been studied by several researchers and is now established in the literature as a validated phenomenon. For example, Bruckmüller and Branscombe (2010) examine the role of the gendered history of leadership and what role stereotypes of gender and leadership play in creating the glass cliff. Their results suggest that stereotypes regarding male leadership weigh more than stereotypes regarding female leadership.

Jalalzai (2008) compares almost all cases in the world of female presidents and prime ministers in power between 1960 and 2007. Focusing on the impact of institutional and structural factors, Jalalzai (2008) concludes that women are more likely to enter office when their powers are shared with men, constrained and relatively few. Furthermore, no woman in Latin America or Asia holding dominant executive power has ever come to power without familial ties to power and popular election is limited to women from political families (Jalalzai, 2008). By investigating the "glass cliff" phenomenon in a political context in like manner, Ryan, Haslam, and Kulich (2010) show support for the existence of the glass cliff in the 2005 United Kingdom general election in the Conservative party.

Furst and Reeves (2008) and Kulich, Lorenzo-Cioldi, Iacoviello, Faniko, and Ryan (2015) examine the nature of the performance downturn. Drawing on the concept of creative destruction first formulated by Joseph Schumpeter (1943), Furst and Reeves (2008) argue that women may rise to leadership positions in turbulent environments that are receptive to new talent and open to new innovative ideas. They propose that women may be seen as especially attractive candidates under these conditions because women are perceived to utilize a leadership style that promotes openness and inclusion and facilitates change.

Kulich et al. (2015) refine the conditions for the glass cliff by demonstrating a preference for a female leader when a company's poor performance is attributed to an internal, controllable cause, specifically past leadership, but not when it is attributed to external, uncontrollable causes such as global economic circumstances. A subsequent study revealed that in the controllable cause, a female candidate's potential to signal change, rather than her quality and suitability as a leader, accounted for the preference of the female candidate. The paper therefore concludes that appointing women is a strategic choice with the aim of signaling change to the investors when past leadership is held responsible for a crisis. Women are according to Kulich et al. (2015) therefore not expected to actually impact the company's performance through their leadership quality but can, however, do so through the stock market.

Many scholars have raised the question of whether adverse situations are best defined by means of market-based corporate performance measures or accounting-based proxies. Beginning with studies investigating market-based performance, Ahern and Dittmar (2012) investigate the impact on firm valuation following the Norwegian law requiring 40% of public Norwegian firms' board of directors to be women. They find that most of the time, women's access to the top elicits negative reactions among investors and thus a drop in the stock price. This is consistent with the idea that firms choose boards to maximize value and that imposing a severe constraint on the choice of directors leads to large declines in economic value. The quota led to younger and less experienced boards – with females being better educated than their male counterparts, increases in leverage and acquisitions, and deterioration in operating performance (Ahern & Dittmar, 2012).

Haslam, Ryan, Kulich, Trojanowski, & Atkins (2010) studied the presence of women on the boards of FTSE 100 firms from 2001 to 2005. They derived supportive evidence for a glass cliff when using market-based measures of firm performance, showing that companies with male-only boards enjoyed a valuation premium of 37% relative to firms with a woman on their board. On the other hand, they did not find an association between accounting-based measures of firm performance and female board member representation, which are measures that can be considered 'objective' (Haslam et al., 2010).

Elaborating on accounting-based proxies, Brady, Isaacs, Reeves, Burroway, & Reynolds (2011) examine listed US Fortune 500 firms' board compositions from 2001 to 2005 and through a logistic regression observe a positive association between the likelihood of female executives and declining accounting performance or organizational scandals in the year of the appointment. Likewise, Cook and Glass (2014) analyze transitions of CEOs in Fortune 500 companies between 1996 and 2010 and conclude that white women and both men and women of color's likelihood of being promoted to a CEO position is increasing with declining accounting performance during the predecessor's term in office. In a follow-up study, Glass and Cook (2016) selected all 52 women who ever served as CEOs in Fortune 500 companies up to 2014 and compared them to male CEOs in firms of similar size in similar industries. They concluded from a univariate comparison that women were more likely than men to ascend to higher risk CEO positions with less formal authority to accomplish strategic goals.

To provide an example of investigating the glass cliff from both a market-based and an accounting-based perspective, Elsaid and Ursel (2018) found evidence of women's higher chances for promotion to more precarious CEO positions in their analysis of CEO transitions in a broad set of North-American firms between 1992 and 2014. In a matched-sample approach, they showed that female CEOs assumed their position in firms of lower accounting-based profitability and higher stock price volatility than firms where male CEOs were appointed.

Despite much research concluding that a glass cliff exists in some shape or form, not all archival studies support the idea of a glass cliff. One very recent study by Bechtoldt et al. (2019) argues that previous field research has failed to elucidate the causal chain of effects and the study therefore applies a variety of methods to company data from two countries, Germany and the United Kingdom. Taken as a whole, this allows for more valid conclusions to be drawn than previous research because endogeneity concerns according to Bechtoldt et al. (2019) are properly addressed. They furthermore argue that due to cultural differences, the glass cliff cannot be assumed to be an internationally generalized phenomenon – and they emphasize the term as a phenomenon as opposed to a theory. Bechtoldt et al. (2019) conclude that promotion patterns of the current generation of female top managers in both Germany and the United Kingdom do not support the idea of a glass cliff.

In another paper, Brinkhuis and Scholtens (2018) examined the short-term stock market reaction to the appointment of female CEOs and CFOs. They matched a sample of 100 female appointments in international firms between 2004 and 2014 to a comparable set of firms appointing male CEOs and CFOs. They did not find statistically significant market reactions to female relative to male appointments, even when controlling for country-specific gender inequality, though they reported a substantial international heterogeneity in market reactions. This finding thus suggests that from an investor's perspective, there is no business case for a particular gender when it comes to appointing a CEO or CFO (Brinkhuis & Scholtens, 2018). Additionally, Cook and Glass (2014b) found no correlation between both market- and accounting-based firm performance and the appointment of female CEOs when analyzing CEO transitions in Fortune 500 companies between 1990 and 2011.

Eventually, Adams, Gupta, and Leeth (2009) use a sample of CEO appointments at US corporations over the years 1992-2004 and the firms' market-based performance during the 120 trading days leading up to the CEO appointment. Based on a t-test analysis, they did not find a glass cliff facing female CEOs at US firms. They actually found the opposite, that female appointments were preceded by higher stock returns than male appointments. Their study therefore calls for more research to identify where and for what types of positions the glass cliff phenomenon is prevalent.

To sum up, Ryan et al. (2016) provide an overview of the complex pattern of results and moderators that qualify the robustness of the glass cliff phenomenon by reviewing a decade of evidence, explanations, and impact. The following will shed light on a different view related to differences that female CEOs and male CEOs might experience, namely the effect of gender on differences in tenure.

3.5 The Effect of Gender on Differences in CEO Turnover

As the glass cliff phenomenon is currently formulated, it does not consider the potential consequences of the glass cliff on post promotion experience of female CEOs. However, this is needed as a full understanding of the consequences of the glass cliff requires analysis of the post promotion trajectories of female CEOs, who may be set up to fail (Cook & Glass, 2014a). To address the issue, Cook and Glass (2014a) introduce the "savior effect" that describes the phenomenon of occupational minorities, defined as white women and men and women of color CEOs, experiencing lower average tenure rates than white male CEOs and their replacement by white men in the case of declining firm performance under their leadership following the acceptance of a position as CEO in a weakly performing firm. The savior effect thus refers to tenure for occupational minorities during firm performance decline as opposed to average CEO tenure overall.

Cook and Glass (2014a) particularly highlight the fact that the replacement candidate, a male CEO, resonates with the traditional perception of the "perfect leader", since men are according to social role congruity (Eagly & Karau, 2002) seen as the more capable leaders, manifested in perceived traits such as assertiveness. They connect their argumentation to research conducted by Khurana (2011), who studies the CEO selection process and finds that companies repeatedly seek CEOs that are to save the firms from difficult times primarily on accounts of the power of their charisma and personality, and less so on their experience and abilities being the right fit for the firms' particular needs. Based on said research, the *traditional leader replacement* analysis conducted in this study concerns the replacement of female CEOs by male CEOs.

The savior effect is a new phenomenon; however, it is related to the broader known CEO *turnover performance sensitivity*, which posits that individual and firm underperformance increases the likelihood of executive dismissal (Gao, Harford, & Li, 2017). Gao et al. (2017) compare CEO turnover in public and large private firms using a dataset that consists of more than 4,000 CEO turnover cases during the period 2001-2011. They find that public firms have higher turnover rates and exhibit greater turnover performance sensitivity than private firms and that investor myopia, as discussed by Stein (1989), is one factor contributing to this. They also make the comparison when controlling for pre-turnover performance and find that in such cases, performance improvements are greater for private firms than for public firms. These results still hold when instrumenting for the public versus private status of a firm (Gao et al., 2017).

Two working papers have also compared CEO turnover performance sensitivity and firm performance between public and private firms. Lel, Miller, and Reisel (2014) examine CEO turnover in a large cross-country sample of European firms and find that public firms display a higher sensitivity of top management turnover to firm performance than private firms. Their results suggest that financial markets play an important governance role and that agency problems in publicly traded firms are less severe than previously thought. Coles, Lemmon, and Naveen (2003) study firms in the Forbes 1994 list and find that while private firms' profitability is less than half of that of public firms, there is no evidence of a difference in CEO turnover performance sensitivity between the two groups of firms. These papers contribute to the literature by also studying private firms in a field that has primarily examined public firms and thereby increase the understanding of CEO turnover performance sensitivity.

Jenter and Kanaan (2015) conduct survival analyses to demonstrate that CEOs are terminated following poor corporate performance induced by drivers outside of their control. While standard economic theory predicts that decision makers identify and extract exogenous industry and market factors from firm performance prior to considering letting the CEO go, their hand-picked sample of 3,365 CEO transitions from 1993 to 2009 shows that CEOs are significantly more likely to be terminated due to shocks caused by external factors. Such external factors are for instance the financial crisis that also impacts our data.

Taking another perspective on investigating the CEO turnover performance sensitivity, other scholars have, similarly to Cook and Glass (2014), examined whether gender has an impact on CEO turnover performance sensitivity. As in the case for public versus private ownership, the results are mixed. Gupta, Mortal, Silveri, Sun, and Turban (2018) investigate 2,390 firms from 2000 to 2014 and find that female CEOs are significantly more likely to be laid off compared to their male counterparts. The authors furthermore uncover an interaction between CEO gender and firm performance, meaning that male CEOs have a lower probability of dismissal with high firm performance (versus low firm performance), while women CEOs have a comparable level of probability of dismissal irrespective of firm performance.

Likewise, in their paper *"Gender Differences in Executive Compensation and Job Mobility"* Gayle, Golan, and Miller (2012) find female CEO tenure to be significantly lower than that of males. For their research, they compiled a large panel dataset on executives and find that both at age 39 and age 49, the probability of a female executive becoming CEO is less than half that of male executives. The explanation of the source of the gender differences in exit rates is, however, beyond the scope of their paper.

Opposite Cook and Glass (2014) and Gupta et al. (2020), Elsaid and Ursel (2018), not only study the glass cliff, but also conduct survival analysis on a matched sample of 386 North American companies to investigate whether time-to-job-loss differs according to gender. They control for variables that had previously shown to impact turnover, such as financial performance, CEO education and age. According to their findings, female CEOs are 40% less subject to turnover than male CEOs at any given time following appointment. They find proof that the increased time-to-job-loss rate is connected to the businesses' concern to prevent the unfavorable publicity that might be generated by their dismissal.

Using resource-based arguments (Barney, 1991), Hill, Upadhyay, and Beekun (2015) investigate whether female and ethnically diverse executives actually benefit from their minority status due to sheer rarity and inimitability of female and ethnic minority CEOs. Their sample is drawn from unregulated firms listed in the Compustat ExecuComp database over a 10-year period, and they use RiskMetrics when identifying ethnic minority defined as a person belonging to African-American, Asian, Caucasian, Hispanic, and Native American ethnicities. They find that the relationship between minority status and job exit is negative for female CEOs but positive for ethnic minority CEOs (male OR female).

Having researched CEO turnover performance sensitivity related to public firms and private firms as well as female CEOs and male CEOs, we have not found a single paper combining the theory with ownership and gender. The glass cliff relates per definition to gender/minorities, but similarly, we have not found a single paper relating the phenomenon to ownership characteristics. The findings from this paper will thus provide important insights to the current literature on the two phenomena and additionally have broad implications for the overall research on gender studies.

4 Methodology

There are many challenges in finding empirical evidence for the glass cliff, traditional leader replacement as well as CEO turnover gender sensitivity, which is why few scholars have done so. First, one needs to collect and construct a dataset containing information on CEO transitions, the gender and tenure of the CEOs, and financial information of the firms. Since both CEO gender and financial information can be highly sensitive and private, prior research has been limited to public companies where annual reports, press releases, and director information are publicly available. Second, the challenges related to identifying a causal relationship between firm performance and appointing a female CEO as well as firm performance and the length of tenure for female CEOs compared to male CEOs must be addressed.

In the following, we begin by constructing a unique dataset allowing us to ultimately test for the glass cliff and analyze the effect of gender on differences in tenure. For both the glass cliff analysis and the tenure analyses, we perform chi-square tests, independent t-tests, prepare our data by matching according to nearest neighbor, and run logistic and conditional logistic regressions. For the glass cliff analysis, we use the linear probability model before we run logistic regressions. For the analyses of tenure, we in addition to performing logistic and conditional logistic regressions conduct survival analyses to investigate the effect of performance and gender on turnover across companies in Denmark. The statistical software program used to perform these tests and analyses is Stata.

4.1 A Unique Dataset

For the empirical analysis, we use company data from the Danish Central Business Register (CVR) and data on the individual CEOs from the Danish Civil Registration System (CPR). Drawing on these two comprehensive data sources, we construct a unique dataset of all Danish firms that have experienced a CEO transition during the eleven years from 1st of January, 2005 to 31st of December, 2015. This time frame is chosen because it allows us to get financial information up until three years after a CEO transition for all the CEO transitions in our study (a CEO transition can happen in 2015 and we have financial information for 2016-2018). Besides information on the CEO transitions, the dataset contains financial information of the firms as well as: A family firm dummy variable, firm size measured in total assets, firm industry, CEO age, and CEO tenure. Studying the entire population, rather than a sample of CEO transitions, strengthens the internal validity of our findings (Gibbert & Ruigrok, 2010).

4.1.1 The Central Business Register and the Danish Civil Registration System

The CVR is the Danish state's master register of information about all companies in Denmark: public limited companies, private limited companies, entrepreneurial companies, partnerships, sole proprietorships, limited partnerships, self-governing public institutions, etc. (Virk, 2020a). The only firms that might not be registered in the CVR are personally owned firms with a yearly revenue below DKK 50,000, as they are not required to register (Erhvervsstyrelsen, 2020a). Since most of these firms are wholly owned by one person, who is typically also the only employee, these firms would have been excluded from our study anyway, as these firms have not experienced a CEO transition. Thus, we find the CVR to be the best possible source for information on companies in Denmark. Since 1999, the CVR has been the authoritative register for current and historical basic data on all registered companies in Denmark, containing information such as name, address, founding date and possibly dissolution date, company type, industry, contact information, number of employees, subscription rule, registered capital, etc. The data stems from the companies' own registrations in the Virk Report (Virk Indberet) (Virk, 2020b). Thus, we can get all company data that we need from the CVR, i.e., a single source, which ensures stronger comparability and reliability in our data.

The combination of the CVR with the CPR is what makes our dataset truly unique. When registering a business in Denmark, a person will have to use what is called a "personal NemID" (privat NemID), which is a digital tool used since 2010 that people with a Danish CPR-number use to confirm their identity (NemID, 2021). Before 2010, the CPR and the CVR were not linked directly, and the method used in this paper includes the use of services from information services provider, Experian. Experian collected the data from the CVR in the form of annual reports and other company information without the CPR connection. The names registered in Experian's database are then matched with names from the CPR register. Since matches are done according to exact matching, this creates missing data where there are no name matches. This can for instance occur due to spelling errors in the name or missing or added middle names registered in Experian's database. There are thus more mistakes before than after 2010 but despite this missing data, the sources provide the most complete data available for our study.

The CPR-number is a ten-digit number constructed with the person's date of birth as the first six digits, for example 010289 for the 1st of February, 1989 (i.e., DDMMYY), representing the first six digits (CPR-Kontoret, 2008). For each date of birth a consecutive 3-digit serial number is assigned, and the tenth and last digit is even if an individual is registered as female and odd if the individual is registered as male (CPR-Kontoret, 2008). All CPR-numbers given are real numbers, and a CPR-number is never used more than once. A CPR-number will always follow and belong to the same person, even if the person is not born in Denmark but receives their CPR-number later in life. CPR contains information on everyone who after the 2nd of April, 1968 has lived in

Denmark and been registered in a Danish commune, and the CPR contains information about approximately 8.4 million people (CPR - Det Centrale Personregister, 2020).

The CPR-number is relevant for our study because it enables us to identify the gender of a CEO. To this end, we create a dummy variable which takes on a value of 0 if the CEO is male and a value of 1 if the CEO is female. Additionally, we can use the family ties to identify family firms and age of the CEOs for descriptive statistics.

4.1.2 Combining Financial Information and Management Information

When constructing the unique dataset, we first look at data combining the CVR with the CPR related to the management of a company. Our total dataset consists of 614,965 unique companies and 543,868 unique individuals, individuals that can both serve on the board of a company and as part of the management team. With this in mind, we first remove all positions other than the CEO from the dataset. This leaves us with 606,880 companies and 337,665 unique individuals. The data contains gender information on 309,653 of the individuals, and thus we remove 28,012 individuals from the data because knowing the gender is indispensable for conducting our research. Missing gender information can partly be explained by the situations where a foreign company is registered in the CVR without a person with a CPR-number connected to it. This is due to a form called 40.110, which allows individuals to register foreign companies wishing to provide goods and services in Denmark (Erhvervsstyrelsen, 2020b).

Foreign individuals without a CPR-number will be registered with the first numbers “40” because a month can never have 40 days, and thus the number will never conflict with any existing CPR-number. These foreign “CPR”-numbers are not constructed in the same way as the CPR-number, resulting in the absence of the tenth digit that specifies the individuals’ gender. This factor, together with the aforementioned method of using individuals’ names in Experian’s database to combine company information with CPR-numbers, explains the considerable number of individuals with an unknown gender in our study. Removing the individuals without a known gender leaves us with 488,436 unique firms.

We then generate time series data; in other words, we create indicator variables for every year from 2002 to 2018 and identify whether a given individual was the CEO in that year. For example, if the CEO was the CEO in 2002, 2003, 2004, and 2005, these years will take the value of 1. The rest of the years (2006-2018) take the value of 0. By identifying whether the CEO has been the CEO during the given year, we only look at the year and not the month nor the date, aligning the data with the annual financial data. We acknowledge the difference in impact whether a CEO enters office in January versus December but for our analyses, this will not skew the data in favor of earlier or later entrants overall as CEO transitions do not happen distinctly more often at a certain time of the year. Appendix 10.1 shows summary statistics of the number of CEO transitions in each month of the year. As was our hypothesis, CEO transitions are spread throughout the year. It is also worth noting that for the second part of our analysis, where we look at tenure, we calculate this variable as the difference in end- and start date, thus considering the exact amount of time a CEO has served.

We combine the CEO data with the financial information of the company, which is also expressed on an annual basis. If a company's fiscal year is different from the calendar year, we report the financial information belonging to the first year of the two calendar years that the fiscal year covers. For example, if a company's fiscal year is from June 2008 – May 2009, we use 2008 for that financial information. Since we use yearly accounting-based instead of market-based financial information, which is available for much shorter time intervals, the exact month and date of the CEO transition is immaterial for our study.

For some of the data, the start date of the CEO is missing, which is most likely because the individual was appointed CEO before 1999, where the CVR became the authoritative register for current and historical basic data on all registered companies in Denmark. For our different analyses, we take two different approaches.

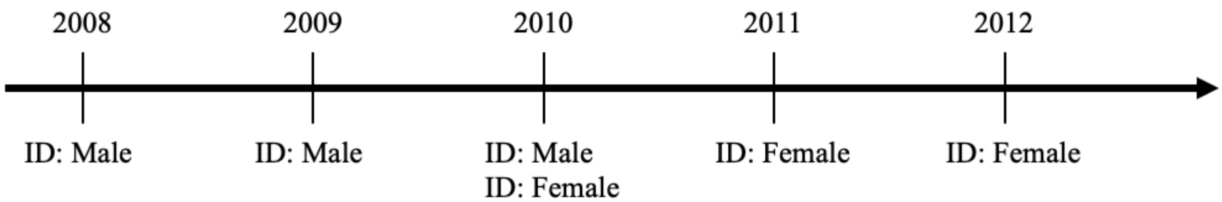
First, since we investigate companies from 2002 onwards for the glass cliff, knowing the exact year of the individual becoming the CEO is not critical, as long as it is before 2002, and thus we replace the missing data with 1st of January, 1990. This date is chosen because the date in most cases would be before 1999, except if the data is missing in the register, and to make sure that the start date is before the end date of the CEO's term. Likewise, some of the data does not have the end date of the CEO, which is most likely because the CEO is still the CEO (as per 31st of December, 2019). We therefore replace the missing date in these situations with 31st of December, 2019. We acknowledge that this procedure might skew the data towards CEOs holding the CEO position for a longer time than they may actually have. However, we find this replacement of missing data to be the best possible solution for the glass cliff and turnover gender analyses due to the high probability of the CEO being the CEO before 2002 if the start date is missing and the CEO still being the CEO in 2019 if the end date is missing. Furthermore, even in cases where both the start date and the end date are missing for a CEO, following this procedure will not lead to a CEO transition, and thus the CEO will be excluded from our study in a later step. An alternative solution is to exclude all CEOs, where we miss either the start date or the end date, however, taking this approach is a very conservative approach leading to massive loss of data.

Second, for the traditional leader replacement analysis where CEO tenure is a central predictor variable and we focus on the predecessor, we exclude CEOs for whom we do not have a start date, as having complete information on CEO tenure is vital in this case.

Before merging the management dataset containing CEO information with the financial information, we reshape the time series data (wide data) to panel data (long data). Furthermore, we only keep the years for which a CEO was the CEO; in other words, we remove the indicator variables equal to 0. When merging, we match on the company's unique identification number and the year. We merge many to one (m:1), which means that all CEOs in a year can be matched to the firm in the given year. We only want the matched data in the dataset, and thus data from each of the datasets that could not be matched is removed. Optimally, we would have matched one to one (1:1), which means that financial information of a company in a year is only matched with one CEO. However, due to the chosen procedure of identifying the year and not month of a CEO transition, there will be two CEOs in a year of transition in the dataset, as is visualized in Figure I (except for CEO transitions between December and January). Furthermore, since it is allowed to register up to six CEOs in the CVR, many of the firms in the dataset have multiple CEOs. We elaborate on how we treat these situations in section 4.1.5.

Figure I: How a CEO Transition Year is Defined and Looks in the Dataset

The figure illustrates how we define a CEO transition that happens in 2010.



After merging the management dataset with the dataset containing financial information, the combined dataset contains information for the years 2002-2018, for companies where we have the financial information and one or more CEOs' gender. The dataset contains 247,133 unique individuals and 389,092 unique companies. According to Statistics Denmark (Danmarks Statistik), there are around 300,000 active firms in Denmark and around 600,000 registered firms in the Danish CVR (Danmarks Statistik, 2019).

The dataset contains firms of the types: AMB, AND, ERF, E/S, FAP, FAS, FIV, FMA, FON, FOR, I/S, IVS, K/S, P/S, SMA, SMB, UOE – and Aps and A/S. We exclude all types other than Aps and A/S because these are the types of firms that can experience CEO transitions, have provided enough financial information, and that can either be family or non-family firms according to our definition. This is due to the requirements for registering as one of these firms, for example to provide management information, the publication of their annual report, and the foundation of these companies which must take place at a founding meeting. Among the other types of companies, there are firms with limited responsibility, single person entrepreneurs, funds, or ownership types that do not exist anymore. According to the limitations and scope of this paper, we focus solely on limited liability firms.

After excluding these ownership types, the dataset contains 383,371 unique companies, which means that 5,721 companies have been removed from the dataset by removing all other ownership types than Aps and A/S. Ultimately, we have not limited ourselves to only firms still active on 31st of December, 2019, and thus as long as a firm has experienced a CEO transition according to our criteria (outlined in Section 4.1.5, Table I), it will be included in our analysis, thereby limiting survivorship bias.

4.1.3 Identifying Family Firms

Having now described our two primary data sources, in the following paragraphs, we elaborate on how we distinguish between a family and a non-family firm. We include the ownership structure of a firm as a dummy variable, where 1 is assigned to family firms (i.e., firms where an individual or family holds more than 50% equity ownership) and 0 to non-family firms. Since ownership structures can change throughout an 11-year period, we identify the firm as either being family-owned or non-family-owned for each year and define the firm as a family firm in our regressions according to the structure at the year of the CEO transition. The ownership data consists of 349,119 firms and 238,101 unique individuals.

The ownership data used in our study exists because companies are required by law to hand in an annual report that among other things is to inform about individuals' ownership stake. Specifically, companies are required to inform about individuals that own more than 5% of the company. Ownership information can be provided within a given range or as an exact percentage. Additionally, the data consists of ownership stakes that are *"greater than 5%"* or *"greater than 33%",* which in some situations makes it hard to identify if an individual or a family owns 50% or more of a firm.

As was the case for the management data, we begin the analysis by replacing the missing start dates of a person's ownership stake in a firm with the 1st of January, 1990 and missing end dates with the 31st of December, 2019, both for the same reasons as for the management data. Hereafter, we generate time series data by creating indicator variables for every year from 2002 to 2018 and identify whether a given individual has an ownership stake in a company in that year. For example, if the individual owned part of a company in 2010, 2011, and 2012, these years will take the value of 1. The rest of the years (2002-2009 and 2013-2018) will take the value of 0. As with the management data and the account data, we thus only look at ownership in a given year, not month. After reshaping the data from wide to long to only investigate 2002-2018, the years of interest, the total ownership data consists of 308,257 unique firms and 220,588 unique individuals.

To identify family firms, the following process has been used, where each step is elaborated upon in the subsequent paragraphs of this section. To identify family firms, we first determine individuals that own 50% or more of a company. Thereafter, we identify families that own 50% or more of a company, including married couples who together own 50% or more of a company.

We then identify individuals or families that own 50-100% of a holding company that owns 50-100% of a firm, where the two ownership stakes multiplied are at least 50%. In the next step, we identify family firms by investigating companies with only one owner. Finally, we identify families or couples that are sharing last names or middle names who own more than 50% of a company. This procedure will be elaborated upon in the following, and after performing these steps, the ownership data will be combined with the file containing management and account data of 383,371 unique companies.

To begin the identification of family firms, we use the ownership stake to identify individuals that own 50% or more of a company, and we thereby classify 242,228 firms in Stata to be a family firm in at least one year throughout the period 2002-2018. This amounts to almost 79% of the 308,257 unique firms in our ownership dataset.

To identify families that own 50% or more of a company, we investigate family ties, which is possible due to the CPR-numbers and through marriage information. First, through personal identification numbers, we can link an individual to its siblings through the individual's parents and investigate whether these individuals together own 50% or more of a company. We define a family as individuals related by blood, and we do not only investigate an individual's siblings but also the individual's parents' siblings, and thus we end with four family identification numbers for individuals with; the same mother; the same father; the same grandmother; or the same grandfather, as listed in Table I. If just one of these four family identification numbers are shared by the owners of the company, and the individuals own 50% or more of the company, the company is classified as a family firm. This means that a family firm can also be a firm owned by cousins.

Table I: Identified Families in Our Dataset

	Same Mother	**Same Father**	**Same Grandmother**	**Same Grandfather**	**Married**	**Total**
Percent*	35.47%	34.91%	0.85%	1.37%	13.97%	41.52%**

*The percentage is calculated from the total number of entries, which is 3,322,378. The total number of entries come from the 308,257 unique firms in our dataset observed throughout the period: 2002-2018 (i.e., 17 years).

**The total percentage is the percentage of unique entries, where a firm is owned by individuals with either the same mother, the same father, the same grandmother, the same grandfather, or are married. Since these characteristics can overlap, the total is not calculated by adding the percentages together.

Even though the CPR-system is the best possible source of family ties in Denmark, we may miss some information on family ties if an individual's parents were not alive in 1968 since siblings are identified through their parents. Thus, if an individual's parents were not alive in 1968, it is not possible to identify the siblings' combined ownership stake and ultimately their family firm. We do not expect this to be the situation for many families in the dataset, however, it will skew the data towards more non-family firms than is actually the case according to our definition of a family firm.

Second, we have marriage information up to 2007, and we define a firm as a family firm if it is owned 50% or more by a married couple. As the data is from 2007, we are missing information on married couples after 2007 who might own a firm together. This will lead us to identify less family firms than there are, even when accounting for divorces, as the marriage rate is still above the divorce rate in Denmark (Olsen, 2021). Combining all information on families, here defined as individuals related by blood or married couples, there are 242,798 firms that are a family firm for at least one year between 2002 and 2018.

We then identify individuals or families that own 50-100% of a holding company that owns 50-100% of a firm, where the two ownership stakes multiplied are at least 50%. This is possible as we, besides individual ownership stakes, also investigate the ownership stake of a firm owning another firm. Consequently, there are 248,034 unique firms that for at least one year between 2002-2018 are classified as family firms, equaling 80% of all firms.

In the next step, we identify family firms by looking at companies with only one owner. If only one person owns the company throughout our period of observation, and the company is not partly owned by another company, we classify the firm as a family firm, even if the data does not contain information on the family stake. This results in 272,873 family firms for at least one year during the period 2002-2018, i.e., 89%.

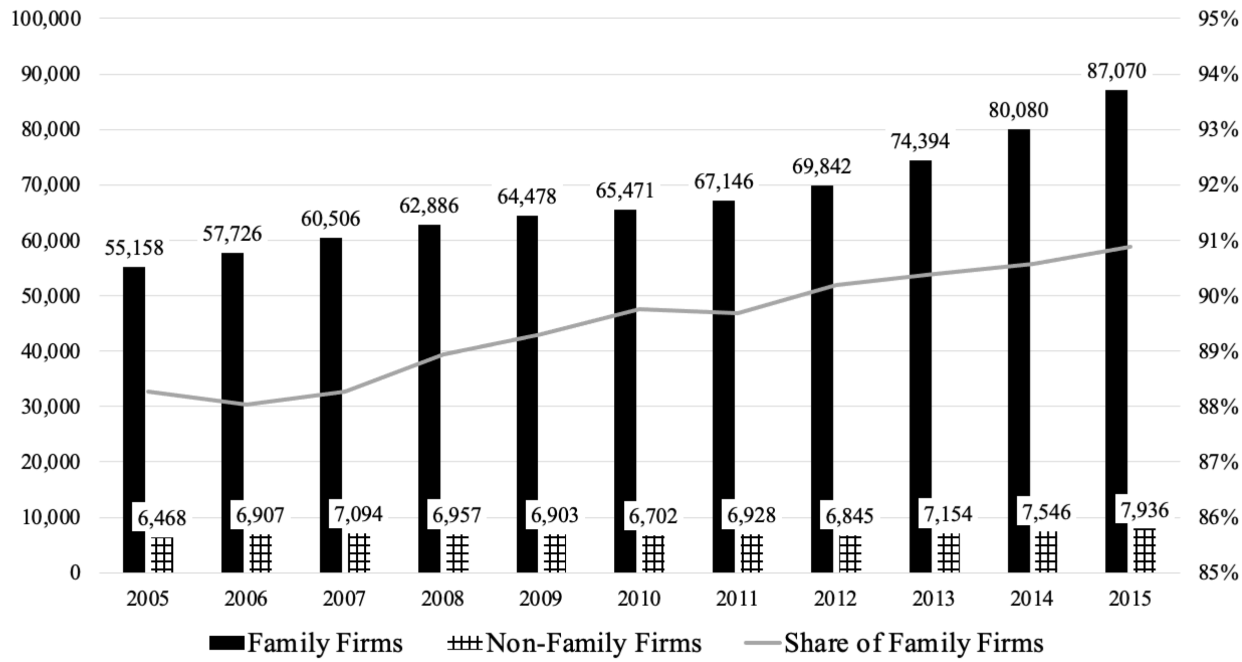
To make up for the missing family ties information for the years before 1968 as well as the missing marriage information from 2008 onwards, we create a loop utilizing the last and middle names of all individuals in the dataset. If a firm is solely owned by individuals with the same last or middle name, we additionally classify it as a family firm. This decision may lead us to identifying more family firms than what is actually the case because unrelated individuals within the same company may share a common Danish last name, such as "Jensen". However, we expect this to be the case for very few of the firms in the dataset and thus that this decision will not influence our results. Following this method classify 10,440 more family firms and thus for at least one year during the years 2002-2018, there are 283,313 firms with an individual or family owning 50% or more of the firm, defining it as a family firm. This is equivalent to 92%.

With this information, we merge the ownership data with the management and accounts data and require the merge to be a match. This means that a requirement for the dataset is that we have management information, financial information, and ownership information for a company for a given year. Of the 383,371 unique companies where we have management and financial data, we have the required ownership information for 225,752, which is the number of firms that we continue our analysis with. For at least one year during the years 2002-2018, there are 207,192 family firms. This is equivalent to a share of family firms of 92%.

The final step in identifying firms' ownership type is to remove the holding companies that function as a company between the owning individual or family and the family firm. We define holding companies as: i) companies that have the industry code of a holding company; ii) that are not owned by another company; iii) that are registered as an Aps; and iv) that do not have a board. In order to be classified as a holding company, the company's main activity must be to own controlling interests in other companies (Danmarks Statistik, 2021), and majority ownership by the holding company is thus included in this first condition. Doing so removes 36,448 firms and results in a dataset containing 189,304 unique companies from the period 2002-2018. Figure II illustrates the number of firms per year from 2005-2015, and the distribution of family and non-family firms.

Besides the distribution of family and non-family firms, Figure II also points to the fact that the number of firms overall is steadily growing each year, with 61,626 firms in 2005 and 95,006 firms in 2015. The share of family firms per year is increasing, driven by more family firms than non-family firms being founded. Lower capital requirements for founding an Aps may be a reason for this family firm increase, and Appendix 10.2 illustrates the gradual increase in Aps from 2005-2015, and the respective capital requirement for registering an Aps per year. The changes in capital requirement concerning our data are a change from DKK 125,000 until 2009 to DKK 80,000 in 2010, and then a further drop in required capital to the current level of DKK 50,000 in 2014.

Figure II: The Number of Firms per Year in Our Dataset by Ownership Type



4.1.4 Constructing Financial Variables

Having now elaborated on how we distinguish family from non-family firms, we describe the financial variables included in this study and how they have been constructed in the following paragraphs.

To examine whether the appointed CEOs enter firms that find themselves in precarious situations in the glass cliff analysis as well as whether female CEOs are more likely to be replaced by male CEOs compared to male CEOs according to firm performance in the traditional leader replacement analysis, we include financial performance measures of the firms three years prior to the CEO transition, meaning a transition in 2010 will include financials reported from 2007 to 2009. We exclude the year of the transition, as the performance of that year cannot be properly assigned to either predecessor or successor. When we examine the CEO turnover gender sensitivity, we include financial performance measures of the firms up to three years after the CEO transition took place.

We use accounting-based performance variables due to the nature of our study, i.e., the inclusion of private non-listed firms. For these firms, no company stock data can be obtained; hence, no market-based performance measures can be used. We thus investigate the years 2002-2018 for ROA and ROE. The Danish Financial Statements Act (Årsregnskabsloven) requires as the bare minimum for companies to register a financial statement consisting of a management statement, financial balance, income statement, and notes including a statement of accounting policies applied (Retsinformation, 2019). Our financial data will therefore as a minimum consist of EBIT (primary result), ordinary result, pretax earnings, net income, total assets, and equity. There are some – but only a few – cases where we do not have this financial information, and these are not included in the respective analyses, where the number of included firms are stated in each regression output table throughout the results section. The reason for missing data may be that the firm has not presented their annual report in a way that is living up to Årsregnskabsloven or simply because of a mistake in either reporting, extracting, or matching the data. In most cases, we additionally have information on current assets, paid in capital, and short-term debt.

ROA is a measure of a firm's profitability relative to its total assets and is defined as ordinary result for the fiscal year divided by the year-end book value of total assets. The measure indicates a company's ability to capitalize on its assets in terms of profitability, and unlike ROE takes company debt into consideration. ROE measures efficiency of equity deployment and is calculated as ordinary result divided by the year-end book value of common equity (Petersen & Plenborg, 2010).

In our dataset, ROA and ROE are perfectly correlated. Since they are both constructed using ordinary result, we investigate the correlation between the total assets and equity variables and find that they are 98% correlated. For the sake of completeness of the analyses in this paper, we run the tests for both variables, but move the tests for ROE to the appendix since due to the almost perfect correlation between the two financial variables, the results will be almost perfectly consistent. The reason for including ROA in the thesis is that it indicates the profitability of firms in comparison to their total assets, both equity and debt, and determines how well a company is performing. ROE measures how much a company is earning with the amount of equity in the company and does thus concern more with the efficiency of financial management as compared to operating management.

The reason for choosing ordinary result over net income to calculate ROA and ROE is due to extraordinary and financial items counting towards the net income of a given firm. For instance, in the unusual event of a company selling a large part of their business, it may count the difference between the realized market value and the book value towards the net income, which may result in some extreme values for net income, skewing our data. Since we are interested in a company's actual performance during a "normal" year, and not such unusual events, we choose to calculate ROA and ROE with the ordinary result.

To answer our research questions of firm performance having influence over whether a male or female is appointed CEO, we are interested in the change in firm performance between two and three years. The two-year change is calculated by subtracting the ratio two years before a CEO transition with the ratio one year before a CEO transition, i.e., if a CEO transition happened in 2010, and ROA in 2008 was 10% and ROA in 2009 was 12%, the change will be calculated: $12\% - 10\% = 2pp$ (percentage-points). Likewise, if ROA in 2007 was 13%, the three-year change would in this example be $12\% - 13\% = -1pp$.

For all analyses except for our initial t-tests that also investigate the level mean differences of ROA and ROE, we use the percentage-point change in ROA and ROE and a dummy variable equal to 1 if firm performance is increasing, i.e., the percentage-point change in ROA and ROE is positive and equal to 0 if the percentage-point change is negative. Using a dummy variable in this way enables us to investigate whether increasing or decreasing firm performance influence the gender choice of the CEO giving equal weight to each company represented in the dataset. Limitations to this method are, however, that we are not able to measure differences in the mean ROA and ROE change between males and females, which is our binary dependent variable. However, since we are more interested in the direction of the change than the change level, this method provides the most reliable results. Specifically, results are not driven by a few companies with very high or very low percentage changes.

Calculating growth rates for ratios such as ROA and ROE as opposed to the "simple" difference between two years is not as straightforward and economically sensible as what other scholars in the literature have done (Cook & Glass, 2014b), unless one is using market-based measures since the stock price can never be negative (Bechtoldt et al., 2019; Ryan & Haslam, 2005). Elsaid and Ursel (2018) completely avoid calculating ROA averages and instead use the

ROA mean across firms and compare the static measure of ROA two years after a CEO appointment across firms appointing a female versus a male CEO.

In this paper, we perform t-tests and regressions with the calculated change. Since the accounting-based performance variables contain extreme outliers that may distort the result, we accommodate for these outliers by winsorizing the change in ROA and ROE at the 2.5^{th} and 97.5^{th} percentile, hence we apply a 95% winsorization. Kennedy, Lakonishok, and Shaw (1992) compare six data accommodation procedures when working with financial variables and adjusting to outliers. According to their findings, the choice of the data fitting procedure has a large effect on the predictive ability and coefficient estimates of the regression model. They conclude that the winsorizing procedure generates a regression model which has a small prediction error and matches the data well.

4.1.5 Constructing Control Variables

Besides ownership and with that the family dummy variable, as additional control variables, we include total assets, firm industry, the year of appointment, CEO tenure, and a dummy variable for retirement. For the t-tests, we include firm and CEO age. All these variables and how we treat the firm in case of missing data are elaborated upon in the following.

We use the total assets of the year of the CEO transition as a proxy for firm size and in cases where we lack this information, the firm will be excluded from the t-tests and regression analyses that include total assets. We choose total assets as a proxy for firm size over Plant, Property and Equipment, as used by Bechtoldt et al. (2019), as total assets are reported more consistently throughout the dataset due to reporting requirements, and thus follow the example of studies like Cook and Glass (2014b) and Elsaid and Ursel (2018).

We use 'firm industry' in several instances. First, we use firm industry classification to find industry averages to industry adjust financial variables. Second, we control for industry effects in the logistic regressions and Cox survival analysis (Bechtoldt et al., 2019; Cook & Glass, 2014b). Third, we match according to industry during our matching process. For the industry classification, we use the six-digit DB07 code (Danish Industry Classification Code) for each firm. The DB07 is first and foremost developed for statistical use and the purpose of DB07 has thus been to register industries in the CVR according to the same set of rules for each firm (Danmarks Statistik, 2014). DB07 is a Danish sub-division of the EU's common industry framework, the four-digit NACE rev. 2, which builds on the UN's common industry framework, ISIC rev. 4 (Danmarks Statistik, 2014). There are four different versions of DB07 depending on the level of detail of the industry: 10 groups, 19 groups, 36 groups, and 127 groups. For our analysis, we divide the companies into 10 groups plus an eleventh "other" industry category, as we consider the classification of industries to be sufficiently detailed to adequately compare companies across groups. Furthermore, this classification ensures that while matching and thus accounting for different industries, there is no such aggregation of detail that prevents companies from finding a match.

The year of CEO appointment is controlled for as a trend variable, to account for special circumstances that may define a certain period. A special circumstance in this analysis is for example the financial crisis. This control variable is congruent with the studies by Cook and Glass (2014b) and Bechtoldt et al. (2019). For all firms in the dataset, we have the year of appointment.

Moreover, and only for the descriptive statistics, we construct a variable on firm age, by subtracting the year of company establishment from the year of the CEO change. For all firms in the dataset, we have the year of establishment.

For the analyses of differences in CEO turnover, we construct variables measuring CEO tenure in months as well as in years. These are first used for descriptive analyses and afterwards as an explanatory variable in the logistic regressions testing whether female CEOs of poorly performing companies are more likely to be replaced by males than male CEOs. Lastly, the CEO tenure variable is used as the time variable for the survival analysis that forms the second part of the effect of gender on differences in tenure analysis. When constructing these variables, we only include CEOs for whom we know the registered start date and if the end date is missing, we use 31st of December, 2019 as the end date. This is because a missing end date is most likely due to the CEO not having left office. To arrive at the number of months a CEO has served in a company, we subtract the respective CEO's start date at the company from the end date and multiply the difference by 12 months over 365 days. To construct the tenure in years, we subtract the respective CEO's start date at the company from the end date and divide the differential value by 365 days.

Lastly, we introduce a dummy variable for retirement age to control for CEO exits that are concerned with the CEO going into retirement. For this purpose, we first construct a variable on

CEO age by subtracting the CEO's year of birth from the respective year. It is worth noting that since we do not have the exact date of birth but only the year, the CEO could be almost a year younger than what we calculate, and thus our data is slightly skewed towards older CEOs. Second, we create the dummy variable for retirement, where 1 indicates that the CEO is aged 65 and above, since 65 years was the official retirement age according to the Danish Agency for Labor Market and Recruitment throughout or period of interest, 2005-2015 (Styrelsen for Arbejdsmarked og Rekrutering, 2021), and otherwise as a 0. Apart from controlling for retirement, this control variable also accounts for the fact that older CEOs are more likely to be affected by illness and death (Cziraki & Xu, 2014).

4.1.6 Identifying CEO Transitions

Before elaborating on our methodological approach for data analysis, we end section 4.1 about 'A Unique Dataset' by describing how we identify CEO transitions within the timespan 2005-2015 and group CEO transitions into the four groups: i) Male to male, ii) male to female, iii) female to male, and iv) female to female. For the glass cliff analysis, we investigate CEO transitions from a male to a female and compare it to CEO transitions from a male to a male. To investigate whether females who are put into CEO positions are facing a shorter tenure than their male counterparts before being replaced by men, we compare the differences in firm performance and tenure when a male CEO follows a female CEO and compare this to when a male CEO follows a male CEO.

With 189,304 unique companies identified, we begin by removing the firms from the dataset that have only had one CEO through the years 2005-2015, which is the case for 140,676 firms, leaving us with 48,628 firms. Thereafter, we identify firms that in the same year have both a "DIR" and a "DIA" registered, and in these situations, we only keep the "DIA". As mentioned previously, it is possible to register up to six CEOs in the Danish CVR, the reason being that it is possible to register three names with the position "DIA", i.e., *"Director of Administration"* (Administrerende direktør), which is the most common title for a CEO in Denmark. However, it is also possible to register three names with the title "DIR", i.e., *"Director"* (direktør), which is what most firms have done, and thus we cannot exclude all firms that have not registered a director of administration.

In identifying CEO transitions, we set up criteria that must be fulfilled before we call it a CEO transition within a given firm. We have listed the criteria in Table II together with an explanation of why these criteria are important to include.

Table II: Criteria that Must be Fulfilled for a CEO Transition to be Classified

#	**Criterium**	**Explanation of Importance**
1	The CEO transition take place in the period 2005-2015.	This is the range in which we analyze CEO transitions, however, we may investigate a company's financial performance from year 2002 until year 2018 depending on the year of the CEO transition.
2	The appointed CEO has a different personal identification number than the departing CEO.	In other words, this criterium defines a transition; the leadership position changes from one person to another person.
3	The departing CEO has been the CEO for at least two consecutive years prior to the CEO transition.	This ensures on one hand that departing CEO have had some time to influence the company's financial performance, and on the other hand that the firm has existed for at least two years.
4	The appointed CEO is the CEO for at least two consecutive years immediately after the CEO transition.	This ensures on one hand that the appointed CEO is chosen with a long time-perspective as opposed to an intermediate, and on the other hand that the company is still active two years after the CEO transition.

The decision of only including CEOs that have been in office for a minimum of 24 months has also been taken by Bechtoldt et al. (2019) and Jenter and Kanaan (2015) in their studies of the glass cliff and turnover performance sensitivity.

Furthermore, to avoid double-counting of CEO transitions, we identify situations of CEO transitions that has happened in the same year, with the same predecessor and the same successor, but in different companies. We want to only include these CEO transition once, and to decide which of the companies to include, we investigate total assets and for each of the same CEO transitions only keep the firm with the largest total assets. The reasoning behind this decision is that the larger firm is more likely to own part of the other firm(s) and that the larger firm is the largest output-producing company. It is the case for 215 CEO transitions. Overall, we identify 6,492 CEO transitions in 6,145 different firms.

Knowing all CEO transitions according to our criteria for the period 2005-2015, we afterwards group the transitions according to the departing and appointed CEO's gender, beginning with the dummy variable 1 for male to female and 0 for male to male. This will serve as the foundation for the glass cliff analysis. We create another dummy variable that is 1 for female to male and 0 for male to male for the traditional leader replacement analysis. For the survival analysis, we use the dummy variable describing if there was a transition, irrespective of gender.

Having now presented the construction of the unique dataset, what variables it contains, and how we identify CEO transitions, in the following sections, we evaluate the data for our analysis before we go through the methodological approach for data analysis.

4.2 Evaluating the Data for the Analysis

When researching and testing for the glass cliff, traditional leader replacement, and CEO turnover gender sensitivity for all firms in Denmark, we do not find any other data sources to contain more accurate and complete information than the Central Business Register (CVR) and the Danish Civil Registration System (CPR). However, our data is still unbalanced, primarily due to not all firms having existed from 2005 to 2015 but also because some datapoints are missing, and we intend to in this section outline how we treat the data of the latter example, and what impact it may have on the results. Before doing so, we first evaluate our decision on how to assess corporate performance.

4.2.1 Developments

To assess corporate performance, we employ accounting-based return measures because we investigate all firms in Denmark, the majority being private family firms and not only publicly listed firms. We acknowledge that previous research on the glass cliff has investigated both market-based and accounting-based return measures and that it can be argued that market-based stock returns is a more instantaneous measure because the stock market consists of a large and diverse set of market participants, who filter and aggregate information from many sources (Bechtoldt et al., 2019). Furthermore, market-based measures are generally characterized as forward-looking (Fama, 1970; Fama, Fisher, Jensen, & Roll, 1969). In contrast, accounting-based measures capture past firm performance and are subject to accounting rules that may allow for discretionary leeway on the part of the firm's management and there might be changes to accounting practices, which distort the picture (Bechtoldt et al., 2019). Furthermore, as ROA and ROE are calculated based on annual financial statements, they cannot be translated into monthly performance measures, which tends to further reduce their informational content in comparison to market-based return measures. However, as we with this study want to examine all firms in Denmark to provide a more accurate analysis of whether there are gender differences among the appointment of and length of tenure, we must use accounting-based performance.

A further development within our data, is that the number of firms increases over time, in particular the number of family firms. We attribute this largely to a change of rules that mandate the amount of paid in capital required to establish a company with the legal "Aps" form. The changes in capital requirement concerning our data are a change from DKK 125,000 until 2009 to DKK 80,000 in 2010, and then a further drop in required capital to the current level of DKK 50,000 in 2014. Appendix 10.2 illustrates this development based on our data.

4.2.2 The Quality of the Data

First and foremost, this data is the best data that we could possibly obtain on all companies in Denmark, however, the quality of the data is only as good as the quality of reporting by the companies. This means that in some cases, data is not living up to the standards of the Danish law on reporting standards, Årsregnskabsloven, or missing. Moreover, mistakes both due to human as well as technological error during extracting and matching data from Experian with CPR-numbers, lead to mismatches and losses of the data, resulting in an unbalanced dataset that is not a complete representation of reality, but very close to. On top of that, while Experian is an established company, mistakes such as the loss of annual reports, spelling errors, false decoding of Danish special characters, or missing or added middle names, are inevitable.

Regarding the information on individuals, the CPR system was established in 1968. As mentioned, this leads to a limitation in our ability to define families, as in the case of death before 1968, we are not able to connect siblings to one another, since we are establishing this connection through at least one shared parent. Family ties are furthermore defined through marriage and shared last and middle names within the same company. Since we are missing marriage data after 2007, we are not able to identify married couples that co-own a company and do not share last and/or middle names. On top of that, we are taking the strong assumption of spouses staying married, as we lack divorce data after 2007. That said, divorce is not synonymous with withdrawal from company ownership. Concerning our definition of family also on the accounts of shared last and middle names, company owners may share last and middle names irrespective of family ties, but we consider this number of cases to be low.

There are also limitations on defining exact ownership since we are not always given concrete ownership figures. At times, ownership is defined within a range, such as *"more than 5%"*. We took a conservative approach in defining these stakes at 5%; however, this was partly leveled out by defining family firms based on our information on family ties, whose main limitations are described above.

Moving from ownership towards management data, a CEO's age is identified from the year of birth, thereby assuming an individual has his/her birthday on 1st of January of the given year, which leads to overall identifying CEOs as older than what they are. Doing so has the largest effect when controlling for retirement, however due to it only being a matter of months, we do not consider this to overall affect the quality of our data. Furthermore, we are doing it for all firms and since females and males are both born throughout the year, we do not expect this to impact our results. Another person-related condition that limits our data are foreign CEOs. When there is a foreign CEO without a CPR number, we are not able to define their gender, as an artificial CPR number is created which misses the tenth digit that defines CEO gender. For this reason, these companies are removed from the dataset.

Finally, some companies have registered multiple CEOs and/or register their CEO so that they are registered as a board member. In the first case, we choose to keep the CEO that in Stata is coded as "DIA" over the CEO that in Stata is coded as "DIR". There may be cases, where this results in removing the individual actually holding the executive power, however, due to the size of our dataset, decisions on how to systematically treat these cases are indispensable.

4.3 Methodological Approach for Data Analysis

Having identified CEO transitions, the data will first be described through chi-square analyses and independent t-tests analyses. For comparison purposes, we construct matched sets of CEO transitions using nearest neighbor matching method. However, we begin our regression analysis on unmatched data and compare it to the regressions run on matched data. In the regressions, we use the cross-sectional part of our panel data, while the explanatory variables contain the time-series part of our panel data. In the following, we elaborate on the linear probability model, logistic regressions, and conditional logistic regressions. Finally, we perform a survival analysis to analyze differences among gender and CEO tenure.

4.3.1 Independent T-Test

The independent t-test analysis allows us to compare mean differences among our variables of interest, and thus the first step to perform an independent t-test is for us to identify the three groups of interest. For the glass cliff analysis, we compare the differences in firm performance measured by ROE and ROA when a female leader followed a male CEO compared to performance when a male leader followed a male CEO. To test for the likelihood of female CEO replacement by a male CEO, we compare the differences in firm performance, as measured by ROA and ROE, and length of tenure when a male CEO follows a female CEO and compare this to when a male CEO follows a male CEO, largely following the method of Cook and Glass (2014b).

We then test whether the groups have equal means from the null hypothesis: $H_0: \mu_1 = \mu_2$, with the differences between two sample means: $(\overline{x_1} - \overline{x_2})$ (Agresti, Franklin, & Klingenberg, 2018). The test statistic is:

$$t = \frac{(\overline{x_1} - \overline{x_2}) - 0}{se}, where\ se = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

When the null hypothesis is true, the statistic has approximately a *t* sampling distribution, and when the alternative hypothesis is two sided, the P-value is the two-tail probability beyond the observed *t* value. The test is thus for probabilities of results more extreme in either direction under the presumption that the null hypothesis is true with degrees of freedom given by Stata, the statistical software program used. Assumptions related to the independent t-tests are that the response variable observed in each group should be quantitative, independent random samples, either from random sampling or a randomized experiment, and each group should have an approximately normal population distribution (Agresti et al., 2018). The latter assumption, however, is mainly important for small sample sizes.

The t-tests serve as an initial analysis of the data. Due to the large dataset, we can go beyond the t-test analysis through different regressions analyses as well as a survival analysis with the Cox proportional hazards model, referred to in the rest of this paper as the *Cox model*. However, before conducting these analyses, we perform chi-square tests of independence.

4.3.2 Chi-Square Analysis

The chi-square test of independence allow us to test whether there is a significant difference between the number of female CEO transitions in family and non-family firms by measuring how close the observed cell counts in a contingency table fall to the expected cell counts (Agresti et al., 2018). The chi-square test statistic formula is:

$$\chi^2 = \sum \frac{(observed\ count - expected\ count)^2}{expected\ count}$$

When the null hypothesis of independence is true, the observed and expected cell counts are close in each cell leading to small chi-square contributions per cell and thus an overall chi-square value that is relatively small (Agresti et al., 2018). If the null hypothesis is not true, some observed counts and expected counts are far apart leading to a high chi-square contribution for the respective cell(s). This ultimately results in a chi-square value being relatively large, and thus a small P-value. The sampling distribution of the chi-square statistic is used to find the P-value for the chi-square test statistic. This sampling distribution is well approximated by the chi-square probability distribution for large sample sizes as ours (Agresti et al., 2018).

As the test with the null hypothesis of no difference between the number of female CEO transitions in family and non-family firms is significant at the 1%-level, we thus conclude that the ownership structure of a company influences the gender of the CEO. We therefore conduct the glass cliff and CEO tenure analyses three times: i) for all firms; ii) for family firms; and iii) for non-family firms.

Assumptions related to Pearson's chi-square test of independence are that it is conducted with two categorical variables, the expected values should be greater than five, and data cannot be correlated (Agresti et al., 2018). The P-value shows the right-tail probability above the observed chi-square value, for the chi-square distribution where the degrees of freedom in a table with *r* rows and *c* columns is equal to:

$$df = (r - 1) * (c - 1)$$

Besides testing for no difference between the number of female CEO transitions in family and non-family firms, Pearson's chi-square test of independence is used after the t-tests in the glass cliff and CEO tenure analyses, challenging different null hypotheses of no difference in male and female CEO appointments. For example, in the glass cliff analysis, the method is used to test whether female CEO appointments are equally likely in firms experiencing an increase and in firms experiencing a decrease in its two-year change in ROA.

4.3.3 Linear Probability Model

The linear probability model is the name for the multiple regression model where the dependent variable is binary rather than continuous. Because the dependent variable is binary, the population regression function corresponds to the probability that the dependent variable equals 1, given X. We start running linear probability regressions to complement our t-tests that also assumes a linear relationship. The linear probability model is the linear multiple regression model,

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} + u_i$$

Where i is all firms thus representing a cross-section. Because the errors of the linear probability model are always heteroskedastic, it is essential that heteroskedasticity-robust standard errors be used for inference (Stock & Watson, 2012). Applying the multiple regression model to a binary dependent variable Y_i, the linear probability model becomes:

$$\Pr(Y = 1|X_1, X_2, \dots, X_k) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$$

The regression coefficient β_1 is the change in the probability that $Y = 1$ associated with a unit change in X_1, holding constant the other regressors, and so forth for $\beta_2, \dots, \beta_k$. The regression coefficients can be estimated by OLS, and the usual heteroskedasticity-robust OLS standard errors can be used for confidence intervals and hypothesis tests.

4.3.4 Logistic Regressions

While the linear probability model is easy to use due to its linearity, that very linearity is also its main drawback. A regression with a binary dependent variable models the probability of Y=1. Per definition, probabilities cannot exceed 1 nor be less than 0, however, for the linear probability model this can be the case (Stock & Watson, 2012). Thus, the adoption of a nonlinear model with a binary dependent variable that constrains the predicted values to be between 0 and 1 is appropriate.

After the t-tests, we therefore for both analyses perform logistic regressions on the binary dependent variable; for the glass cliff, of females being appointed CEO following males versus the control group of male follows male, to investigate whether females are promoted in firms experiencing declining growth. For the traditional leader replacement analysis, the binary variable is defined as females getting replaced by men, versus the control group of males getting replaced by men. With this investigation, we are studying what happens after a potential glass cliff, namely whether women who are put into CEO positions are facing a shorter tenure than their male counterparts before being replaced by men, who are regarded as more competent leaders (Cook &

Glass, 2014b; Eagly & Karau, 2002). On top of that, their management is more vulnerable to scrutiny and detrimental evaluation bias (Park & Westphal, 2013). Focusing exclusively on transitions from females to males and males to males, the investigation assumes that men and women at the top of declining businesses are expected to be substituted by more traditional leaders, that is, men, and not other women.

The logistic regression then formulates the probability that a female gets replaced by a man (which equals Y=1) through a non-linear expression that constrains the predicted values to range between 0 and 1, namely the logistic cumulative distribution function, in the following denoted by F (Stock & Watson, 2012). According to Stock and Watson (2012), F is defined as:

$$F = \frac{1}{1 + e^{-\frac{(x-\mu)}{s}}} ,$$

where x is the random variable, μ is the mean, and s is a scale factor that is proportionate to the standard deviation.

The nonlinearity of the probability model is important, since the true population regression function is nonlinear (Stock & Watson, 2012). The coefficients are approximated with maximum likelihood, and t-statistics and confidence intervals for the coefficients can be calculated in the standard manner since the maximum likelihood estimator is both consistent and normally distributed in big samples like ours (Stock & Watson, 2012). Regarding assumptions, normality and homoscedasticity are not of concern for the logistic regression (Osborne, 2017, p. 84).

The logistic regression has four assumptions: i) independence of observations, ii) no inappropriately high correlation between the regressors, iii) no extreme outliers, and iv) linearity of the log odds and continuous predictors (Osborne, 2017). The (binomial) logistic regression model with multiple covariates states:

$$\Pr(Y = 1|X_1, X_2, \dots, X_k) = \mathrm{F}(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k)}} ,$$

where the regressand Y is binary, F is the logistic cumulative distribution function, and the regressors are $X_1, X_2, \dots, X_k$. The β_k coefficients are foremost interpreted by calculating predicted probabilities and the differences between said probabilities (Stock & Watson, 2012). Employing the control variables described earlier in this text, we first run the following regression for the glass cliff analysis:

$$\Pr(Y = 1 | X_1, X_2, \dots, X_k) = \mathrm{F}(\beta_0 + \beta_1 * (Financial\ Variable) + \beta_2 * Family + \beta_3 * (Total\ Assets) + \beta_4 * Industry + \beta_5 * (Year\ of\ Appointment)),$$

where the financial variable is either the two- or three-year change in ROA and ROE, or the dummy variable describing the two- or three-year growth in ROA and ROE. We control for ownership by including the family dummy variable, firm size by controlling for total assets, the industry after the DB07, and the year of appointment, which we in Stata code as a trend variable.

In the second part of the analysis, we investigate CEO tenure and run the following logistic regression to investigate the replacement of female CEOs by traditional leaders:

$$\Pr(Y = 1 | X_1, X_2, \dots, X_k) = \mathrm{F}(\beta_0 + \beta_1 * (Financial\ Variable) + \beta_2 * Tenure + \beta_3 * (Year\ of\ Appointment) + \beta_4 * (Total\ Assets) + \beta_5 * Family + \beta_6 * Industry + \beta_7 * (Retirement\ Dummy)),$$

where the financial variable is either the two- or three-year change in ROA and ROE, or the dummy variable describing the two- or three-year growth in ROA and ROE. As a second explanatory variable we include tenure, which is the preceding CEO's tenure in months. We control for the year of appointment, which we in Stata code as a trend variable, firm size by controlling for total assets, ownership by including the family dummy variable, the industry after the DB07, and last for retirement age, illness and death with the dummy variable that takes a value of 1 for the official retirement age in Denmark in the years of our study, which is 65 years (Styrelsen for Arbejdsmarked og Rekrutering, 2021).

Based on the results of the chi-square tests of independence with the two variables: Family and gender in a contingency table, we run logistic regressions first on all firms and then on family and non-family firms separately, to investigate differences in performance leading up to the transition as well as differences in tenure when separating the data according to ownership type.

In Stata, we have chosen to run the logistic regressions using the command *logistic*, which differs from the command *logit*, by reporting odds ratios and not coefficients. The difference is simply that the regression coefficients are the log of the odds ratios, and thus the choice is a matter of preference for the interpretation of the variables. A positive coefficient indicates that the probability of the event increases with the corresponding predictor variable equivalent to an odds ratio above 1. A negative coefficient implies that the probability of the event decreases with the corresponding predictor variable equivalent to an odds ratio below 1.

To interpret how the two- and three-year ROA and ROE change impact the probability of appointing a female CEO, in the glass cliff analysis, we type *"margins, dydx(*) atmeans"* in Stata to find the marginal change in the predictor variable at the means. Even with the marginal change in the predictor variable at the means, it can be hard to assess whether this value is economically significant. To figure this out, it is important to know what the probability of appointing a female is. This probability is then compared to the marginal change in the predictor variable at the means, and the result is a value like the odds ratio. Where the odds ratio tells how much more or less likely relative to the baseline firms are to appoint a female CEO, actually calculating the percentage-point change in the probability at the means and comparing it to the baseline percentage-point probability, provides more in-depth findings.

4.3.5 Matching

The overarching reason for matching firms in our study, is that we study a nonrandomized experiment and hence direct comparisons may be misleading because the firms exposed to appointment of female CEOs might differ systematically from the firms exposed to appointment of male CEOs. Matching is a method of sampling from a large pool of potential controls to produce a control group in which the distribution of covariates is similar to the distribution in the treated group (Rosenbaum & Rubin, 1983). Ideally, treated and control units would be exactly matched on all covariates x, so that the sample distributions of x in the two groups would be identical.

As such, to improve the comparability between the transitions we are studying, we create matched datasets so that any statistically significant difference in the change in gender diversity can be better attributed to our explanatory variables. The matching mitigates the nonequivalent distribution of covariates and is the most commonly employed approach to correct for selection-induced biases (Bechtoldt et al., 2019).

For our matching, we match n-1 categorical characteristics using exact matching, and then match the n^{th} characteristics as a nearest neighbor match. We decide to not use any of the matching commands Stata offers, since we want to create group identifiers for the treatment and control group, and none of the Stata commands researched offer such group identifiers, but rather create one large dataset which contains the control and treatment groups without any identification variable. Thus, we create two datasets per analysis, of which one treatment dataset contains the transitions involving female CEOs, and the other one, the control dataset, contains the corresponding control group involving solely male CEOs. This means, that for the glass cliff analysis, the treatment dataset consists of transitions from a male to a female CEO, and for the traditional leader replacement, the treatment dataset consists of transitions from female to male CEOs, while both their control group datasets consist of male-to-male CEO transitions. For the turnover gender sensitivity analysis, we create a treatment group and thus a dataset containing all transitions with an incoming female CEO between 2005 and 2015, and a dataset containing the control group comprising all incoming male CEOs for the same period.

After preparing the datasets containing the treatment and control group for each of the three analyses, we create three matched datasets accordingly. While the final datasets are different due to the varying treatment and control group data, the applied matching process is the same. Overall, we match on n=4 characteristics, specifically on the year, industry, family ownership, and firm size proxied by total assets variables. For this purpose, we first use exact matching along n-1 characteristics, expressed in the categorical variables year, industry, and the family dummy variable. This creates several matches per treatment firm, which are matched by all firms in the control group that are matching along the three characteristics we join by. For the last, n^{th} characteristic, our winsorized, continuous total assets variable, we employ nearest neighbor matching. Since we want 1:1, closely matched pairs, we also use an optimal matching method. Optimal matching finds the matched pairs that have the least average absolute distance over any matched pair (Gu & Rosenbaum, 1993).

Since we want each firm to appear only once within the dataset, for control firms matching several treatment firms, we sort each group of the same control firms on the lowest absolute difference in total assets between treatment and control firm. We decide to keep the control firm with the lowest absolute difference in total assets, so each control firm appears only once in the newly created matched dataset.

Yet, each treatment firm may still be matched with several unique control firms. In order to create 1:1 matches, we sort on the absolute difference in total assets again but this time grouping by each treatment instead of control firm. We keep the match with the lowest absolute difference between the assets of each treatment and control firm, thus determining the nearest neighbor for each firm experiencing a transition involving a female. Afterwards, we create identification numbers that clearly define each pair and serve as match identifiers for the conditional logistic regression.

As the newly created dataset lacks information on all the other important information needed for our analyses, such as financial information and data on CEO tenure, we as a last step merge the newly created matched dataset with the original dataset containing all transitions 1:1 by company ID and year. We match by the company ID of treatment firms as well as the company ID of control firms. This creates a complete data set with all the information needed for each specific analysis, including match identifiers. This is done individually for each of the three analyses, creating three distinct matched datasets according to the type of transition that forms the core to each analysis.

4.3.6 Conditional Logistic Regressions

Since the logistic regression takes the assumption that observations be independent of each other, we cannot apply this statistical method to our matched datasets (Iyer, Hosmer, & Lemeshow, 1991, p. 243; Osborne, 2017). Thus, for our investigations of the glass cliff phenomenon, traditional leader replacement and turnover gender sensitivity using matched data, we employ a conditional logistic regression (CLR), which allows for this lack of independence of observations.

CLR is a statistical method and particular type of logistic regression used for analyzing matched studies where observations are not independent (Iyer et al., 1991). The conditional logistic regression produces estimates of regression coefficients associated with predictors that differ across at least one stratum (Koletsi & Pandis, 2017). In a CLR, subjects are compared solely within the matched pairs, which is referred to as conditional likelihood (Koletsi & Pandis, 2017). The constant in each set is dropped from the model by means of conditional probability, leaving only the effect of exposure (Koletsi & Pandis, 2017).

According to Greene (2012, p. 833), the conditional logit model is expressed as follows:

$$Prob\left(Y_i = j \middle| x_{i1}, x_{i2}, \dots, x_{ij}\right) = Prob(Y_i = j|X_i) = P_{ij} = \frac{\exp\left(x'_{ij}\beta\right)}{\sum_{j=1}^{J} \exp\,(x'_{ij}\beta)} \ ,$$

where $j = 1,2, \dots, J$, the choice between a total of J alternatives. For the execution of CLR, we use Stata's clogit function, which fits a CLR model using maximum likelihood with robust standard errors according to a matched group variable, which in our case is the match identifier that we created in our matching process.

4.3.7 Survival Analysis with Cox Model

To investigate the effect of CEO gender and the potential risk on differences in turnover, we use survival analysis. Survival analysis refers to a set of statistical procedures that can be used to estimate or predict the time to occurrence of an event (Cox & Oakes, 2018; Elsaid & Ursel, 2018). Cox and Oakes (2018) refer to the time to occurrence as "failure time", which can occur no more than once for an individual. In relation to our study, this means that a CEO cannot lose the same job at the same company in year 1 and then again a following period – losing one's *current* position is final. Elsaid and Ursel (2018) point out that the inclusion of a tenure term to model this absence of independence, as we have done in our previous analysis of the replacement of females by males using a logistic regression, places undue constraints that can lead to bias and inefficiencies.

For our study, we wish to compare the failure times for females and males to investigate whether failure times are systematically different for either group. In their book, Cox and Oakes (2018, p.4) write that the time of origin does not have to be at the same calendar time for any given subject, in fact it typically is not. This fits our data, where CEO changes can occur at any given time between 2005 and 2015. Failure time is then measured from when a given CEO enters office to their replacement. "Failure" is defined as the CEO's end of tenure at the respective company. Failure time is not included as an explanatory variable, as it forms part of the response, meaning that we compute the conditional probability of a given CEO losing their position between 2005 and 2015. We use the Cox model to analyze failure times (Cox & Oakes, 2018; Elsaid & Ursel, 2018):

$$h(t,z) = exp(z;\beta)h_0(t),$$

where $h(t,z)$ is the hazard rate at time t, $h_0(t)$ is the unspecified baseline hazard rate which contains all those effects that are not accounted for in the second term, and the second is an exponential term used to produce different hazard rates for each individual based on which covariate groups they belong to. β are the regression coefficients estimated from the independent variables, z, and the estimated predictors of CEO turnover are included in the exponents as a linear function (Cox & Oakes, 2018). Whenever the hazard rate is greater (less) than 1, the corresponding variable accounts for a higher (lower) impact on CEO turnover than the baseline (Cox & Oakes, 2018; Elsaid & Ursel, 2018).

We perform the survival analysis on our matched dataset, in order to reduce noise and to compare the time-to-job-loss in a set of similar companies. In the Cox model, our primary explanatory variable is CEO gender, as the main goal of this analysis is to investigate whether the length of tenure is impacted by the gender of the CEO. Furthermore, we include the company's financial performance up to three years after appointment as expressed by ROA and ROE. This follows the claim within studies of turnover performance sensitivity, that deterioating performance is associated with poor management decisions, ultimately leading to the CEO's termination (Gao et al., 2017). Additionally, we control for retirement age through our previously constructed dummy variable, to account for CEO transitions that are based on the CEO going into retirement and a higher likelihood of being affected by illness or death (Cziraki & Xu, 2014).

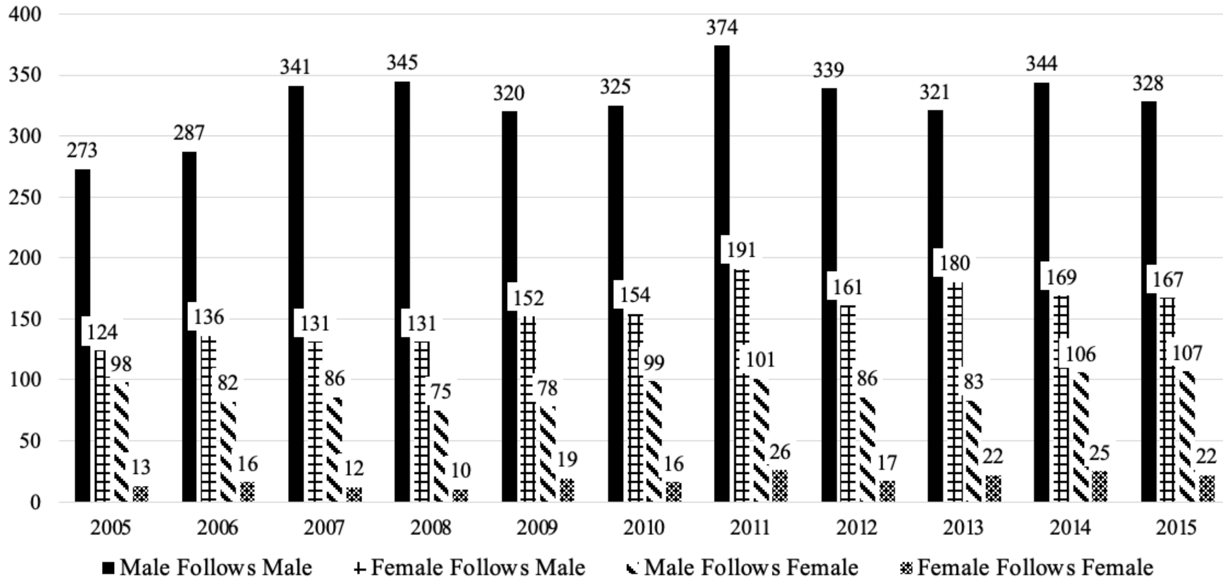
5 Results of the Data Analysis

When analyzing the data on CEO transitions in Denmark for the years 2005-2015, we first apply t-test analyses of the entire sample to investigate whether there is a statistically significant difference among the means of various variables; first between CEO transitions where a male follows a male and a female follows a male, and then between CEO transitions where a male follows a male and a male follows a female. Next, we conduct linear, logistic, and conditional logistic regressions to investigate whether females are promoted to CEO in firms that find themselves in precautious situations, thus testing for the existence of a glass cliff in Denmark.

This is followed by logistic regressions and conditional logistic regressions comparing the likelihood of female CEOs' replacement by traditional leaders, men, versus their male counterparts. This is to study whether women are given less opportunity to demonstrate their leadership skills relative to men. Additionally, we conduct survival analyses and thus investigate the effect of gender controlling for performance and retirement age on turnover, comparing men and women CEOs' turnover sensitivity across companies in Denmark.

Figure III: CEO Transitions for the Years 2005-2015 According to Gender

The figure shows the number of CEO transitions for the years 2005-2015. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.

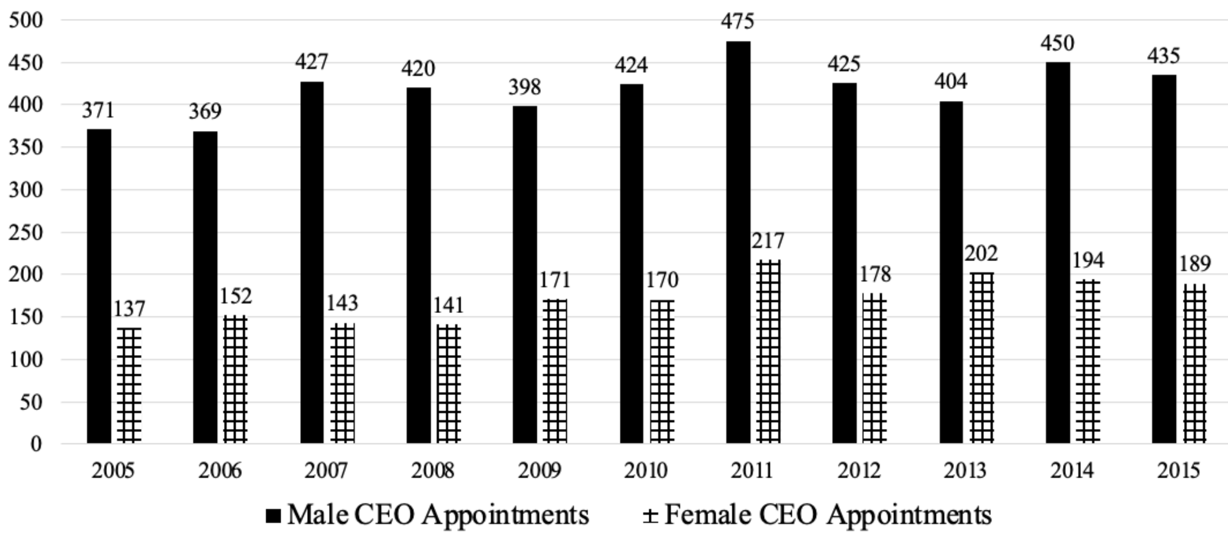


We start by identifying the different types of CEO transitions as this is data that will be examined in the glass cliff and traditional leader replacement analyses. Of the 6,492 CEO transitions in 6,145 unique companies, 3,597 transitions are from a male to a male, 1,696 are from a male to a female, 1,001 are from a female to a male, and 198 CEO transitions are from a female to a female. Figure III illustrates the number of CEO transitions per year for the four different combinations of CEO transitions. For all years, CEO transitions from male to male are by far the most common. Furthermore, the number of CEO transitions grows from a total of 508 CEO transitions in 2005 to 624 CEO transitions in 2015.

Figure IV illustrates the trend of the male and female CEO appointments; data that is used for the turnover gender sensitivity analysis.

Figure IV: CEO Appointments for the Years 2005-2015 According to Gender

The figure shows the number of CEO appointments for the years 2005-2015. A CEO appointment is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.



There are also large differences in the number of CEO transitions across industries. Table III presents the distribution of CEO transitions by industry. For this distribution, DB07's classification of 10 industries is used, with the 11th industry being *"Other"*. Table III illustrates that the number of CEO transitions from a male to a male is higher for all industries except for the *"Public administration, teaching, and health"* industry with 27 male to a male CEO transitions compared to 51 female to a male transitions.

Table III: CEO Transitions by Industry

The table shows the number of CEO transitions by industry for the years 2005-2015. Industries are classified using DB07's division into ten different industries excluding an "Other" industry category. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number. Row percentages are in parentheses.

Industry	All I	Male Follows Male II	Female Follows Male III	Male Follows Female IV	Female Follows Female V
1. Agriculture, forestry, and fishing	187	112	43	26	6
		(0.60)	(0.23)	(0.14)	(0.05)
2. Industry, raw material extraction,	406	281	72	45	8
and energy supply		(0.69)	(0.18)	(0.11)	(0.03)
3. Building and construction	355	234	58	59	4
		(0.66)	(0.16)	(0.17)	(0.02)
4. Trade and transport	1,311	751	292	214	54
		(0.57)	(0.22)	(0.16)	(0.07)
5. Information and communication	252	167	48	29	8
		(0.66)	(0.19)	(0.12)	(0.05)
6. Financing and insurance	1,746	907	561	238	40
		(0.52)	(0.32)	(0.14)	(0.04)
7. Real estate and rent	751	407	207	114	23
		(0.54)	(0.28)	(0.15)	(0.06)
8. Business services	1,080	558	275	213	34
		(0.52)	(0.25)	(0.20)	(0.06)
9. Public administration, teaching,	106	27	51	19	9
and health		(0.25)	(0.48)	(0.18)	(0.33)
10. Culture, leisure, and other services	119	53	37	23	6
		(0.45)	(0.31)	(0.19)	(0.11)
11. Other	179	100	52	21	6
		(0.56)	(0.29)	(0.12)	(0.06)

Table IV shows the mean of financial performance variables for the 11 different industries defined for our analysis. The "*Industry, raw material extraction, and energy supply"* industry has the largest mean ROA of 16.07%, which is almost twice the 9.59% mean ROA of the "*Public administration, teaching, and health" industry,* which has 24 transitions more to a female versus a male. The "*Public administration, teaching, and health"* industry has, however, the largest mean ROE of 17.19%. Given these large discrepancies among industries, it becomes crucial to industry adjust ROA and ROE in both the t-tests and regression analyses for more accurate analyses of whether women in Denmark are looking down a glass cliff and whether women are given less of a chance at being CEO, here through the experience of shorter tenures.

Table IV: Industry Means of Financial Performance Variables Among Firms Experiencing a CEO Transition

The table shows the industry means for ROA and ROE among the firms that have experienced a CEO transition. The ROA and ROE industry means are calculated by taking the total ordinary result for the industry, divided by the industry's total assets and total equity, respectively. Industries are classified using DB07's division into ten different industries excluding an "Other" industry category. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition.

	Industry	**ROA**	**ROE**
1.	Agriculture, forestry, and fishing	0.0291	0.0574
2.	Industry, raw material extraction, and energy supply	0.1607	0.3456
3.	Building and construction	0.0588	0.1426
4.	Trade and transport	0.0622	0.1382
5.	Information and communication	0.0271	0.0626
6.	Financing and insurance	0.0803	0.0980
7.	Real estate and rent	0.0320	0.0663
8.	Business services	0.1024	0.1345
9.	Public administration, teaching, and health	0.0959	0.1719
10.	Culture, leisure, and other services	0.0327	0.0852
11.	Other	0.0381	0.1028

Following these initial findings of our dataset, in the next section, we investigate under what conditions a female CEO is appointed to explore whether women in Denmark are looking down a glass cliff.

5.1 Main Results from the Analysis on the Existence of a Glass Cliff

This section provides descriptive statistics on the differences among the firms that appoint a female CEO following a male CEO compared to firms that appoint a male CEO following a male CEO. Afterwards, we perform different t-tests analyses to test whether the mean differs and finally, regression analyses to determine whether a glass cliff exists in Denmark. We prepare our dataset by only including firms where either a male follows a male CEO, or a female follows a male CEO. For these firms, we are only interested in the year of the CEO transition and the three years before the CEO transition (e.g. if a CEO transition happened in 2010, we include the years 2007, 2008, 2009, and 2010 in the analysis).

First, Table V provides an overview of total assets, where we observe mostly small firms with 60% of firms having total assets of less than DKK 5,000,000 and 6% of firms having total assets above DKK 50,000,000. Only 22% of the firms with total assets of more than DKK 50,000,000 appointing a CEO where the predecessor is a male appoint a female. The largest share of firms appointing a female CEO is 39%, and these firms are characterized with total assets from DKK 2,000,000 – 5,000,000. Thus, females are appointed CEO relatively more often in smaller firms than males.

Table V: Total Assets Among CEO Transitions

Total assets are in thousand DKK and for the year of the CEO transition. Row percentages are in parentheses.

	All	Female Follows Male	Male Follows Male
Total Assets	I	II	III
1. <100	284	77	207
		(0.27)	(0.73)
2. 100-500	885	197	688
		(0.22)	(0.78)
3. 500-1,000	479	158	321
		(0.33)	(0.67)
4. 1,000-2,000	655	235	420
		(0.36)	(0.64)
5. 2,000-5,000	1,000	385	615
		(0.39)	(0.62)
6. 5,000-50,000	1,637	567	1,070
		(0.35)	(0.65)
7. >50,000	348	77	271
		(0.22)	(0.78)

Table VI provides summary statistics on total assets when comparing family to non-family firms. We find the mean is twice that for non-family compared to family firms, but when comparing the maximum values, we find the largest family firm to be considerably larger than the largest non-family firm. The explanation for the largest firm not being a non-family firm can be; i) that we have not identified a CEO transition because we did not have the CEO's gender in cases where the CEO was foreigner; ii) that many large firms register multiple individuals as the CEO making it hard to identify a CEO transition; or iii) that some non-family firms register their CEO as a board member. However, the standard deviation is larger for non-family firms, leading us to expect to find significant differences in firms appointing a female versus a male CEO following a male CEO according to ownership type and total assets.

Table VI: Summary Statistics of Total Assets Among Firms Experiencing a CEO Transition

The numbers are in thousand DKK, except for the number of observations.

	Observations	Mean	Std. Dev.	Max
Family Firms	4,073	24,687	377,786	21,931,000
Non-Family Firms	1,216	49,204	514,374	13,824,00

Table VII shows the distribution of firm age among firms experiencing a CEO transition, where the predecessor is a male and the successor is a male or a female. Most females (39%) are appointed in firms that are 20-50 years of age, whereas around one in four firms of 2-10 years of age appoint a female CEO. This make us expect that female CEOs are on average appointed to older firms when comparing to male CEOs following male CEOs.

Table VII: Firm Age Among CEO Transitions

Firm age in this table is for the year of the CEO transition. Percentage share is reported in parentheses.

	All	Female Follows Male	Male Follows Male
Firm Age	I	II	III
1. 2-5	643	158	485
		(0.25)	(0.75)
2. 5-10	1,456	408	1,048
		(0.28)	(0.72)
3. 10-15	875	281	594
		(0.32)	(0.68)
4. 15-20	606	211	395
		(0.35)	(0.65)
5. 20-25	510	199	311
		(0.39)	(0.61)
6. 25-50	1,052	409	643
		(0.39)	(0.61)
7. 50-100	121	23	98
		(0.19)	(0.81)
8. >100	30	7	23
		(0.23)	(0.77)

Before performing t-tests, we test for differences in ownership type and the appointment of a female versus a male following a male CEO. Table VIII outlines the results from a chi-square test of independence, and we see that just 160 females follow a male in non-family firms, which is equivalent to 13% of all transitions from a male in non-family firms. On the other hand, the share of female CEOs following a male CEO is 38% of transitions where a male is replaced in family firms. With these large differences in mind, it is of no surprise that the results are significant at the 1%-level. That there are differences between family and non-family firms is crucial in moving this study forward, and thus we conduct several t-tests and regressions for all firms including a family firm variable that allows us to test for different ownership structures. Additionally, we conduct the same t-tests and regressions with only family firms and others with only non-family firms to capture under what conditions females are promoted to CEO.

Table VIII: The Share of Family Firms Among CEO Transitions

	Female Follows Male	Male Follows Male	Total
Non-Family Firms			
Frequency	160	1,058	1,218
Expected Frequency	*390.3*	*827.7*	*1,218*
Chi-Square Contribution	*135.90*	*64.10*	*200.00*
Cell Percentage	*3.02*	*19.99*	*23.01*
Family Firms			
Frequency	1,536	2,539	4,075
Expected Frequency	*1305.7*	*2769.3*	*4,075*
Chi-Square Contribution	*40.60*	*19.10*	*59.70*
Cell Percentage	*29.02*	*47.97*	*76.99*
Total			
Frequency	1,696	3,597	5,293
Expected Frequency	*1,696*	*3,597*	*5,293*
Chi-Square Contribution	*176.50*	*83.20*	*259.70*
Cell Percentage	*32.04*	*67.96*	*100.00*

Pearson's Chi-Square Value = 259.69
P-Value = 0.00

5.1.1 Main Results from T-Tests

The first tests we conduct to examine the glass cliff in Denmark are independent t-tests that allow us to compare mean differences among our identified CEO transitions within the groups; male to male and male to female. We first conduct descriptive t-tests to see whether firm characteristics differ among firms that appoint a female versus a male CEO. For these initial t-tests, we examine the *levels* by looking at static ROA and ROE ratios for single points in time. This is then followed by t-tests on the percentage-point change in ROA and ROE two and three years before a CEO transition, thus investigating *trends*.

We find that firms where a female CEO follows a male CEO are on average almost 18 years of age (significant at the 5%-level), compared to an average age of 17 years for firms where a male CEO follows a male CEO. Analyzing firm size measured by total assets, firms where a male follows a male are almost three times as large as firms where a female follows a male, mDKK 38.49 in total assets compared to mDKK 13.02 in total assets, significant at the 5%-level (see Table IX).

Table IX: Descriptive T-Test Analyses

The table reports summary statistics for the year of the CEO transition for firm age and total assets in mDKK as well as the year-end ROA and ROE for the year before, two years before, and three years before a CEO transition. Column I and II concern CEO transitions where a female CEO follows a male CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Descriptive T-Tests					
	Female Follows Male		Male Follows Male		
Variable	Mean	s.d.	Mean	s.d.	t-statistic
	I	II	III	IV	V
1. Firm Age	18	14	17	17	-2.25**
2. Total Assets	13.02	61.11	38.49	499.48	2.09**
3. ROA 1 Year Before	-0.10	2.73	-0.17	12.18	-0.23
4. ROE 1 Year Before	0.18	7.75	0.03	5.44	-0.84
5. ROA 2 Years Before	-0.13	5.09	-0.73	20.31	-1.20
6. ROE 2 Years Before	0.04	3.82	0.60	37.08	0.62
7. ROA 3 Years Before	-0.09	2.66	-0.51	15.31	-1.06
8. ROE 3 Years Before	0.02	2.84	0.12	4.01	0.88

We also see large standard deviations for ROA and ROE. This is because the data above is the raw data with no manipulation and thus large outliers influence the results. To better compare the means between our two groups of interest we industry-adjust ROA and ROE as well as winsorize at the 2.5^{th} and 97.5^{th} percentile.

Table X outlines the results of the industry adjusted and winsorized t-tests, where we find the standard deviations for ROA and ROE to be considerably smaller pointing to better comparability among our firms where large outliers do not drive the result. Overall, we additionally find that when industry-adjusting and winsorizing, many of the performance variables changes sign from positive to negative.

For all three years leading up to a CEO transition, ROA is significant at either the 10%-level or 5%-level. Additionally, ROE is significant at the 10%-level three years before a CEO transition. For ROA, females are promoted to CEO to firms that are more profitable than their male counterparts. However, for both firms appointing female CEOs and male CEOs, the mean ROA is negative. The finding of better performance in firms where females have been promoted versus firms where males have been promoted corresponds to the findings of Adams, Gupta, and

Leeth (2009), who found the opposite of a glass cliff when investigating market-based performance variables for the 120 trading days leading up a new CEO appointment. Here, female appointments were preceded by higher stock returns than male appointments. However, these are descriptive t-tests on the performance *levels*. To conclude whether the opposite of a glass cliff exists among firms in Denmark we additionally need to conduct an analysis of *trends.*

When investigating ROE three years before a CEO transition, firms appointing a male CEO compared to firms appointing a female CEO are, however, more profitable, significant at the 10%-level. Summarizing the findings from descriptive t-tests, females are promoted to CEO in companies with higher ROA, whereas males are promoted to CEO in companies where the ROE was higher three years prior to the appointment. This is an ambiguous finding, however, when examining ROA, this indicates the existence of the opposite of a glass cliff among firms in Denmark.

Table X: Descriptive T-Test Analyses Industry Adjusted and Winsorized

The table reports summary statistics for the year-end ROA and ROE for the year before, two years before, and three years before a CEO transition. ROA and ROE are industry adjusted where industries are classified using DB07's division into ten different industries excluding an "Other" industry. After industry adjusting, ROA, and ROE are winsorized at the 2.5th and 97.5th percentile. Column I and II concern CEO transitions where a female CEO follows a male CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Descriptive T-Tests Industry Adjusted and Winsorized					
	Female Follows Male		Male Follows Male		
Variable	Mean I	s.d. II	Mean III	s.d. IV	t-statistic V
1. ROA 1 Year Before	-0.07	0.25	-0.08	0.27	-1.88*
2. ROE 1 Year Before	-0.02	0.56	-0.00	0.65	0.88
3. ROA 2 Years Before	-0.06	0.25	-0.74	0.26	-2.18**
4. ROE 2 Years Before	-0.02	0.57	0.01	0.66	1.46
5. ROA 3 Years Before	-0.06	0.23	-0.07	0.25	-1.82*
6. ROE 3 Years Before	-0.03	0.54	0.01	0.64	1.85*

Since we know that there are significant differences among family and non-family firms appointing female CEOs, Table XI presents the t-tests for family and non-family firms where ROA and ROE are industry adjusted and winsorized. Beginning with family firms, we can yet again conclude that firm age is significantly different at the 5%-level, where females replace male CEOs in on average older firms, almost 18 years compared to almost 17 years. However, total assets are no longer significant even though firms where a male follows a male are on average almost three times larger than firms with female successions. ROA is again significant for all three years leading up to a CEO transition, and in all three years, firms appointing a female CEO are more profitable than firms appointing a male CEO. It should be noted again that the mean ROA is negative for both groups in all three preceding years. The mean ROE is negative in all three years leading up to a CEO transition, however the difference in means is not significant.

For non-family firms, we find no significant values. Thus, we conclude that when investigating all firms, the significant values are primarily driven by the differences in means among family firms. While the mean ROA remains negative in all cases, ROE is positive one- and two-years before a CEO appointment. Overall, the mean values for non-family firms indicate in some situations that females are promoted to CEO in firms that are less profitable than males, however, in other situations the opposite. This ambiguous finding therefore makes it necessary to not only analyze the ROA and ROE *levels*, but the actual change in ROA from year to year to test for the existence of a glass cliff among firms in Denmark through *trends*.

Table XI: Descriptive T-Test Analyses for Family and Non-Family Firms

The table reports summary statistics for the year-end ROA and ROE for the year before, two years before, and three years before a CEO transition. ROA and ROE are industry adjusted where industries are classified using DB07's division into ten different industries excluding an "Other" industry. After industry adjusting, ROA, and ROE are winsorized at the 2.5th and 97.5th percentile. Column I, II, and III concern CEO transitions among family firms, and column IV, V, and VI concern CEO transitions among non-family firms. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, level, respectively.

Descriptive T-Tests Industry Adjusted and Winsorized by Family and Non-Family Firms						
	Family Firms			Non-Family Firms		
	Female Follows Male	Male Follows Male	t-statistic	Female Follows Male	Male Follows Male	t-statistic
Variable	I	II	III	IV	V	VI
1. Firm Age	18	17	-2.17**	18	17	-0.68
	(13.88)	(15.56)		(14.47)	(18.96)	
2. Total Assets	12.89	31.83	1.55	14.31	54.49	0.92
	(63.62)	(476.01)		(27.02)	(551.71)	
3. ROA 1 Year Before	-0.06	-0.09	-2.50**	-0.08	-0.07	0.83
	(0.25)	(0.28)		(0.26)	(0.23)	
4. ROE 1 Year Before	-0.02	-0.01	0.74	0.01	0.01	-0.04
	(0.55)	(0.67)		(0.63)	(0.62)	
5. ROA 2 Years Before	-0.06	-0.08	-2.02**	-0.04	-0.07	-1.34
	(0.25)	(0.26)		(0.22)	(0.23)	
6. ROE 2 Years Before	-0.03	-0.00	1.09	0.04	0.03	-0.08
	(0.57)	(0.67)		(0.61)	(0.62)	
7. ROA 3 Years Before	-0.06	-0.07	-2.30**	-0.06	-0.06	0.09
	(0.23)	(0.25)		(0.22)	(0.23)	
8. ROE 3 Years Before	-0.03	-0.00	1.22	-0.01	0.04	0.90
	(0.54)	(0.64)		(0.50)	(0.64)	

Table XII provides summary statistics to the ROA and ROE percentage-point change two- and three-years leading up to a CEO transition for all firms, only family firms, and only non-family firms. Percentage-points are reported as decimals in the tables examining the change in ROA and ROE.

When investigating change, we find evidence of a glass cliff among firms in Denmark. Specifically, non-family firms have experienced a significantly larger change in ROA and ROE when a female is appointed CEO compared to when a male is appointed CEO. The two-year ROA and ROE mean for non-family firms appointing a female CEO following a male CEO is -6pp compared to +1pp in non-family firms where a male follows a male, significant at the 1%-level. We only find evidence of the existence of a glass cliff in Denmark among non-family firms as family firms' level of change is almost the same for firms appointing a female versus firms appointing a male CEO, which also holds true when analyzing all firms together.

Table XII: T-Test Analyses to Test for the Glass Cliff on Percentage-Point Change

The table reports summary statistics for the percentage-point change in ROA and ROE for the two and three years leading up to a CEO transition. Before finding the percentage-point change, ROA and ROE has been industry adjusted. Industries are classified using DB07's division into ten different industries excluding an "Other" industry category. The percentage-point change in ROA, and ROE are winsorized at the 2.5th and 97.5th percentile. Column I and II concern CEO transitions where a female CEO follows a male CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change					
	Female Follows Male		Male Follows Male		
Variable	Mean I	s.d. II	Mean III	s.d. IV	t-statistic V
All Firms					
1. ROA 2-Year, pp Change	-0.02	0.34	-0.02	0.34	0.73
2. ROE 2-Year, pp Change	-0.02	0.34	-0.02	0.34	0.73
3. ROA 3-Year, pp Change	-0.02	0.33	-0.02	0.35	0.13
4. ROE 3-Year, pp Change	-0.02	0.33	-0.02	0.35	0.13
Family Firms					
5. ROA 2-Year, pp Change	-0.02	0.34	-0.03	0.36	-0.49
6. ROE 2-Year, pp Change	-0.02	0.34	-0.03	0.36	-0.49
7. ROA 3-Year, pp Change	-0.02	0.33	-0.02	0.37	-0.33
8. ROE 3-Year, pp Change	-0.02	0.33	-0.02	0.37	-0.33
Non-Family Firms					
9. ROA 2-Year, pp Change	-0.06	0.30	0.01	0.28	2.62***
10. ROE 2-Year, pp Change	-0.06	0.30	0.01	0.28	2.62***
11. ROA 3-Year, pp Change	-0.03	0.32	-0.01	0.31	0.84
12. ROE 3-Year, pp Change	-0.03	0.32	-0.01	0.31	0.84

What we furthermore see is that all two- and three-year financial variables within the same firm population analysis are the same due to the correlation between total assets and equity as described in the methodology section. Henceforth, tables related to the percentage point change will only show the two- and three-year change in ROA, and the change in ROE will be provided in appendices.

To perform above t-tests, we have industry adjusted ROA and ROE and winsorized the change in ROA and ROE at the 2.5th and 97.5th percentile. It might, however, still be the case that firms with the largest or smallest change are driving our results. To give equal weight to all firms in the dataset, we create a dummy change variable equal to 1 for firms experiencing an increase in profitability and equal to 0 for firms experiencing a decrease in profitability. In the next section, we provide the results from using this dummy variable together with the dummy variable for gender in chi-square tests.

5.1.2 Main Results from Chi-Square Tests

As previously tested, there are significant differences among family and non-family firms in appointing a female CEO, and thus we conduct this test with the dummy variable for an increase or decrease in ROA and ROE change on all firms, on only family firms, and on only non-family firms. Table XIII outlines the results, where for non-family firms we find a chi-square value above 2, primarily driven by the actual number of female CEO appointments in firms with declining profitability higher than the predicted. It is not a significant difference, but it points to the existence of a glass cliff among non-family firms in Denmark.

Table XIII: Chi-Square Analyses to Test for the Glass Cliff on Change as Dummy Variable

The table reports summary statistics for the chi-square analyses on a decrease or increase in the change of ROA and ROE as a dummy variable, and gender. Column I and II concern CEO transitions where a female CEO follows a male CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the chi-square value. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Dummy Variable for Increase or Decrease in ROA and ROE

Variable		Female Follows Male		Male Follows Male		
		Frequency	Expected Frequency	Frequency	Expected Frequency	Chi-Square Value
		I	II	III	IV	V
All Firms						
1. ROA 2-Year Change	Decrease	860	860	1,788	1,788	0.00
	Increase	798	798	1,659	1,659	
2. ROE 2-Year Change	Decrease	860	860	1,788	1,788	0.00
	Increase	798	798	1,659	1,659	
3. ROA 3-Year Change	Decrease	766	771	1,545	1,540	0.11
	Increase	742	737	1,465	1,470	
4. ROE 3-Year Change	Decrease	766	771	1,545	1,540	0.11
	Increase	742	737	1,465	1,470	
Family Firms						
5. ROA 2-Year Change	Decrease	770	778	1,267	1,259	0.30
	Increase	732	724	1,162	1,170	
6. ROE 2-Year Change	Decrease	770	778	1,267	1,259	0.30
	Increase	732	724	1,162	1,170	
7. ROA 3-Year Change	Decrease	687	699	1,101	1,089	0.70
	Increase	683	671	1,033	1,045	
8. ROE 3-Year Change	Decrease	687	699	1,101	1,089	0.70
	Increase	683	671	1,033	1,045	
Non-Family Firms						
9. ROA 2-Year Change	Decrease	90	81	521	530	2.30
	Increase	66	75	497	488	
10. ROE 2-Year Change	Decrease	90	81	521	530	2.30
	Increase	66	75	497	488	
11. ROA 3-Year Change	Decrease	79	71	444	452	2.01
	Increase	59	67	432	424	
12. ROE 3-Year Change	Decrease	79	71	444	452	2.01
	Increase	59	67	432	424	

It should again be noted that the values for ROA and ROE two- and three-year change are the same within all three different population analyses, and thus in the following regression analyses we only include ROA in the tables and point to the appendices for the ROE values.

5.1.3 Main Results from Regression Analyses

The regression analyses allow us to test the glass cliff comprehensively through performance development, i.e., *trends,* over time including control variables. We do so by examining the probability of appointing a female CEO from both the linear probability model and the logistic regression model.

Beginning with the linear probability model, we start by plotting the percentage-point change against the probability of appointing either a female or a male CEO following a male CEO. Appendix 10.3 illustrates these scatterplots, where for all growth calculations we find a negative trend indicating that the larger the ROA or ROE growth rate, the lower the probability of appointing a female CEO, supporting the glass cliff phenomenon.

As explained in the methodology section, the linear probability model is not well suited for predicting the appointment of a female or a male CEO because the model mathematically allows for probabilities less than 0 and greater than 1, which do not occur in a real world scenario (Stock & Watson, 2012). Therefore, we also perform logistic regressions illustrated in the scatterplots in Appendix 10.4. At first sight, it is not clear that there is any difference between the two models from the scatterplots. However, the logistic model makes use of a specific distribution to provide an S-shaped curve (Gujarati, 2015). Even though the linear probability model scatterplots could have allowed us to test the existence of a glass cliff, we also complement the t-tests – that are also based on linear probability assumptions – with logistic regressions. The linear probability model scatterplots thus support the use of t-tests and linear probability model regressions. Refer to Appendices 10.5 and 10.6 for output tables.

Table XIV presents the results of testing for correlations among our variables of interest before conducting the logistic regression. We see that there is no issue with multicollinearity within our data except for the two- and three-year changes in ROA and ROE, which are fully correlated as previously explained. The correlations furthermore suggest a slightly negative relationship between a female CEO appointment and all four variables of change in profitability, indicating the existence of a glass cliff.

Table XIV: Intercorrelations of Variables of the Companies of Interest

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Female	1.00								
2. Family	0.23	1.00							
3. Total Assets	-0.03	-0.03	1.00						
4. Industry	0.11	0.02	-0.01	1.00					
5. Year	0.03	-0.00	0.01	0.04	1.00				
6. ROA 2-Year	-0.01	-0.02	0.01	0.02	-0.00	1.00			
7. ROE 2-Year	-0.01	-0.02	0.01	0.02	-0.00	1.00	1.00		
8. ROA 3-Year	-0.00	-0.01	0.00	0.01	-0.02	0.58	0.58	1.00	
9. ROE 3-Year	-0.00	-0.01	0.00	0.01	-0.02	0.58	0.58	1.00	1.00

Table XV outlines the results from the logistic regression model. Our dependent variable is gender, and our explanatory variables are the ROA two- and three-year changes. We perform the regressions with family, total assets, firm industry, and year as the control variables. We do not find any significant values among our predictor variables, but we find the odds ratios for the two-year ROA to be less than 1, indicating a higher probability of appointing a female when the change in ROA is negative. We are furthermore interested in investigating whether there are any differences between family and non-family firms, and thus we conduct the same regressions just without family as control variable (see Table XV). The values for ROE can be found in Appendix 10.7.

The two-year percentage-point change in ROA for non-family firms is significant at the 1%-level and with the odds ratio of 0.46. This is a strong indication of the existence of a glass cliff in Denmark as the odds ratio is well below 1.00, which is the value for females and males overall being appointed to firms with an equal change in profitability. At the mean, as the ROA two-period change increases by 1pp, the probability of a female CEO appointment will decrease by 8.18pp. With the percentage of female CEO appointments being: $\frac{158}{1203} * 100 = 13.13\%$, a decrease of 8.18pp is economically significant. This result thus points to the existence of a glass cliff among non-family firms in Denmark.

Table XV: Logistic Regressions on the Percentage-Point Change in ROA

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change in ROA												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROA 2-Year, pp Change	0.98	-0.28			1.05	0.58			0.46	-2.66***		
	(0.09)				(0.10)				(0.13)			
2. ROA 3-Year, pp Change			1.00	-0.02			1.03	0.28			0.78	-0.83
			(0.09)				(0.10)				(0.23)	
Control Variables												
3. Family	4.05	15.10***	4.03	14.12***								
	(0.38)		(0.40)									
4. Total Assets	1.00	-2.09**	1.00	-2.06**	1.00	-1.76*	1.00	-1.76*	1.00	-2.27**	1.00	-2.11**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
5. Industry	1.11	7.61***	1.12	7.32***	1.12	7.77***	1.13	7.63***	1.04	1.07	1.02	0.47
	(0.02)		(0.02)		(0.02)		(0.02)		(0.04)		(0.04)	
6. Year	1.02	2.49**	1.02	2.07**	1.03	2.73***	1.03	2.34**	0.99	-0.29	0.99	-0.43
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.03)	
7. Observations	5,180		4,567		3,977		3,534		1,203		1,033	
8. # Appointments	1,669		1,513		1,511		1,373		158		140	
9. Chi-Square	284.1***		249.13***		71.97***		67.42***		12.58**		5.43	
10. Difference in Predicted Probability of Female CEO Appointment - ROA	-0.51%		-0.04%		1.23%		0.62%		-8.18%		-2.64%	

We additionally perform logistic regressions where the predictor variables are dummy variables instead of actual percentage-point change to investigate whether we find a similar result when putting equal weight on each firm. The purpose is to make an investigation of whether an increase or decrease in firm performance overall influences the decision of appointing either a female or male CEO following a male CEO.

We do not find any of the predictor variables to be significant (Table XVI) when investigating all firms, as expected from the output of the t-tests. Appendix 10.8 presents the correlations of the variables and Appendix 10.9 presents the regression output values for ROE, which again are the same values for ROA.

Table XVI additionally presents the analysis for family and non-family firms, where we again do not find any of our predictor variables to be significant, but we find a clear difference in the odds ratio when comparing family with non-family firms. While the odds ratio for the two- and three-year change in ROA is above 1 for family firms, it is just 0.76 and 0.77 respectively for non-family firms. Despite not significant, this supports our previous finding of substantial differences between family and non-family firms, and that a glass cliff might exist among non-family firms in Denmark. However, for non-family firms, the overall regression containing the two-year change in ROA is just significant at the 10%-level whereas the overall regression containing the three-year change in ROA is not significant. This means that for the regression with the three-year change in ROA, the dependent variable is not better explained through this model than through a model without any predictors.

Table XVI: Logistic Regressions on ROA as Dummy Variable

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year change in ROA converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Dummy Variable for Increase or Decrease in ROA

	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROA 2-Year, Change	0.99	-0.15			1.03	0.47			0.76	-1.60		
	(0.06)				(0.07)				(0.13)			
2. ROA 3-Year, Change			1.01	0.17			1.05	0.74			0.77	-1.43
			(0.07)				(0.07)				(0.14)	
Control Variables												
3. Family	4.03	14.93***	4.04	14.04***								
	(0.38)		(0.40)									
4. Total Assets	1.00	-2.11**	1.00	-2.08**	1.00	-1.78*	1.00	-1.77*	1.00	-2.25**	1.00	-2.11**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
5. Industry	1.12	7.77***	1.12	7.48***	1.13	7.92***	1.13	7.80***	1.04	1.08	1.02	0.51
	(0.02)		(0.02)		(0.02)		(0.02)		(0.04)		(0.04)	
6. Year	1.03	2.54**	1.02	2.15**	1.03	2.76***	1.03	2.43**	0.99	-0.29	0.99	-0.48
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.03)	
7. Observations	5,101		4,514		3,929		3,502		1,172		1,012	
8. # Appointments	1,669		1,513		1,502		1,370		156		138	
9. Chi-Square	280.36***		248.92***		74.17***		70.76***		8.84*		6.56	
10. Difference in Predicted Probability of Female CEO Appointment - ROA	-0.19%		0.24%		0.73%		1.23%		-2.97%		-2.87%	

As a final step in our analysis of the glass cliff, we run conditional logistic regressions for family and non-family firms, as we deem it important to examine more homogeneous firms as the current study could be confounded by variables that differ between the companies (Cook & Glass, 2014b; Karon & Kupper, 1982). To create the matched sample, we do as Cook and Glass (2014b) match treatment firms, i.e., firms where a female CEO follows a male CEO, with control firms, i.e., firms where a male CEO follows a male CEO, in the same year, within the same primary industry, and with the same ownership type. Of the 1,696 firms where a female follows a male, we can match 844 treatment firms to one or more control firms. We then use an optimal matching approach to 1:1 match nearest neighbor according to the smallest absolute difference in total assets between the treatment firm and the matched control firms, as elaborated upon in section 4.2.5 of the methodology. For our analysis through conditional logistic regressions, we report odds ratios, thus exponentiated coefficients, which are interpreted in the same way as the ordinary logistic estimations.

Table XVII presents the results, where we no longer find the ROA two-year percentage-point change to be significant for non-family firms, and Appendix 10.10 presents the same result for ROE. The odds ratio is, however, 0.61, and the difference in predicted probability of female CEO appointment is -12.24%-points, still pointing to the existence of a glass cliff. The odds ratio for the ROA three-year percentage-point change in non-family firms is 0.72, and the predicted probability of female CEO appointment is -8.33%-points, again pointing to females being appointed CEO in times of decreasing firm profitability. The model indicates large differences between family and non-family firms as the odds ratios for family firms for the two and three-year percentage-point change are 1.14 and 1.11, respectively, compared to 0.61 and 0.72 for non-family firms. Despite no significant values after matching, the difference between family and non-family firms in the probability of appointing a female CEO as the ROA changes is larger when compared to the outcome of the logistic regressions.

Table XVII: Conditional Logistic Regressions on the Percentage-Point Change in ROA by Family and Non-Family Firms

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the conditional logistic regression model, where treatment firms (female follows male) are optimally matched 1:1 nearest neighbor with control firms (male follows male) according to year of appointment, industry, ownership type, and total assets. Financial performance variables are the two- and three-year percentage-point change in ROA. Standard errors are clustered on the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change in ROA by Family and Non-Family Firms								
	Family Firms				**Non-Family Firms**			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variables								
1. ROA 2-Year, pp Change	1.14	0.95			0.61	-1.06		
	(0.16)				(0.28)			
2. ROA 3-Year, pp Change			1.11	0.74			0.72	-0.83
			(0.15)				(0.29)	
3. Observations	1,688		1,688		244		244	
4. # Appointments	844		844		122		122	
5. Chi-Square	0.90		0.55		1.12		0.68	
6. Difference in Predicted Probability of Female CEO Appointment - ROA	3.26%		2.55%		-12.24%		-8.33%	

The two models are, however, not significant, which might be due to there only being one predictor variable in the regressions because all the control variables that we included in the linear probability model regressions and logistic regressions have been used to match on. Thus, we cannot reject that a glass cliff does not exist among non-family firms in Denmark.

The glass cliff analysis has shown that female CEOs are more likely to be appointed CEO in times of decreasing profitability in non-family firms. In family firms, the data suggests that female CEOs are more likely to be appointed CEO in times of increasing profitability.

5.1.4 Sub-Conclusion from the Analysis on the Existence of a Glass Cliff

Firms that appoint a male CEO following a male CEO have at the mean total assets worth mDKK 38.49, and firms that appoint a female following a male CEO have at the mean total assets worth mDKK 13.02, a difference that is significant at the 5%-level. As tested in a chi-square test of independence, the share of females following male CEOs are significantly larger for family than for non-family firms, significant at the 1%-level, with the share 38% in family firms compared to 13% in non-family firms.

Furthermore, when examining family firms, ROA one, two, and three years before a CEO transition is significantly larger when a female CEO is appointed than when a male CEO is appointed following a male CEO. This difference in levels of ROA is not mirrored for non-family firms. When we, on the other hand, test for the two- and three-year percentage-point change in ROA and ROE, we find evidence of the existence of a glass cliff in Denmark among non-family firms. The two-year ROA and ROE percentage-point change is significantly larger when a male CEO follows a male than when a female CEO follows a male, significant at the 1%-level.

When conducting the same research through regression analyses and thus being able to control for the firm being a family firm, total assets, firm industry, and year of CEO appointment, we find a similar result. Non-family firms in Denmark tend to appoint a female CEO in times of declining profitability. When investigating the percentage-point change in the two-year ROA and ROE, this result is significant at the 1%-level. Specifically, at the mean, as the ROA and ROE two-period change increases by 1pp, the probability of a female CEO appointment will decrease by 8.18pp. This study thereby demonstrates the existence of a glass cliff in Denmark among non-family firms.

Based on our findings of the glass cliff analysis that show clear differences between family and non-family firms, we in the following examine whether female and male CEOs' tenure varies.

5.2 Main Results from the Analysis on Differences in CEO Turnover

In the second part of this paper, we investigate what happens after individuals are promoted to CEO, with a focus on investigating whether gender has implications on a CEO's likelihood of facing turnover. Following the rational of the glass cliff, if females are promoted in precarious situations, they are given less of a chance at achieving what would be considered financial success and their tenure will subsequently be shorter than their male counterparts'. To this end, we conduct two analyses.

First, we run a logistic regression to determine whether financial performance influences the likelihood of female CEOs to be replaced by male CEOs. According to social role congruity, male CEOs are traditionally seen as bearing the characteristics that make up more capable leaders, such as assertiveness, and thus are appointed to "save" the firm (Eagly & Karau, 2002; Westphal & Milton, 2000), called the "savior effect" by Cook and Glass (2014b). This notion of a "corporate savior" is also based on Khurana (2011), who studies the CEO selection process and finds that companies repeatedly seek CEOs primarily on account of charisma and personality, who can salvage firms in precarious situations by the power of their personality.

Second, we study how the risk of CEO turnover is impacted by gender and firm performance post CEO appointment. Here, we do not look at the likelihood of replacement by a traditional leader nor the direct link between financial performance and replacement, but whether turnover is generally sensitive to gender.

Before performing any t-tests for the traditional leader replacement analysis, we perform a chi-square test of independence between ownership type and the replacement of female and male CEOs and find the difference to be significant at the 1%-level, presented in Appendix 10.11. Thus, looking at different ownership types when investigating traditional leader replacement is sensible. In the following t-tests and regressions for all firms we therefore include a family firm variable that allows us to control for different ownership structures. Moreover, we conduct the same analyses with family and non-family firms.

5.2.1 Main Results from T-Tests on Traditional Leader Replacement

We start the analysis of traditional leader replacement by conducting descriptive statistics, testing whether there are differences among groups, specifically gender and ownership type. Table XVIII shows the results from t-tests performed with the change in ROA two- and three-years prior to a CEO replacement. Appendix 10.12 presents the values for ROE. We find that when investigating all firms, firms are significantly larger when a male CEO replaces a male CEO, significant at the 1%-level, and additionally, firms are significantly older at the 5%-level when a male follows a male CEO. Firms where a male CEO is replaced are at the mean 64% larger measured in total assets than firms where a female CEO is replaced by a male CEO, and the standard deviation, which is mDKK 26.65 in total assets for CEO transitions where a male follows a male compared to mDKK 18.14 in total assets for CEO transitions where a male follows a female, shows that differences in firm size are more widely spread for firms led by male predecessors. Among all firms, there are no other significantly different means, however, we additionally perform the t-tests on family and non-family firms exclusively.

Family-firms exhibit the same significant mean differences; firms where a male CEO replaces another male CEO are significantly larger at the 1%-level, and firms are significantly older at the 5%-level. Specifically, the mean firm size of firms previously led by male CEOs as expressed by total assets is 48% larger than for firms previously led by female CEOs, and the difference in standard deviation, which is mDKK 25.56 in total assets for CEO transitions where a male follows a male compared to mDKK 17.96 in total assets for CEO transitions where a male follows a female, again shows more widely spread firm sizes for firms led by male predecessors. This similarity between the results from the analysis of all firms and the results from the analysis of only family firms is of no surprise as family firms make up the largest share of our data.

Looking at non-family firms only, we find the mean firm size to differ significantly at the 1%-level where a male CEO get replaced by a male CEO compared to where a female CEO gets replaced by a male CEO. Firms in which women are replaced are slightly less than half the size of the firms where males replace males. Additionally, the predecessors' mean tenure is significantly lower at the 1%-level, with female CEOs spending on average 15 months less in office before getting replaced by a male CEO than their male counterparts. This result suggests a higher likelihood of earlier replacement for female CEOs in non-family firms in Denmark.

Table XVIII: T-Test Analyses to Test for Traditional Leader Replacement on Percentage-Point Change in ROA

The table reports summary statistics for the percentage-point change in ROA for the two- and three-years leading up to a CEO transition. Before finding the percentage-point change, ROA has been industry adjusted. Industries are classified using DB07's division into ten different industries excluding an "Other" industry category. The percentage-point change in ROA is winsorized at the 2.5th and 97.5th percentile. Firm age is reported in years. Total assets are in mDKK. CEO age is reported in years, and CEO tenure is reported in months. Column I and II concern CEO transitions where a male CEO follows a female CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Percentage-Point Change in ROA

	Male Follows Female		Male Follows Male		
Variable	Mean I	s.d. II	Mean III	s.d. IV	t-statistic V
All Firms					
1. Firm Age	15	13	17	17	2.36**
2. Total Assets	7.94	18.14	13.06	26.65	5.71***
3. CEO Age	53	13	53	13	0.67
4. Tenure	90	53	90	52	0.22
5. ROA 2-Year, pp Change	-0.02	0.37	-0.02	0.34	0.11
6. ROA 3-Year, pp Change	-0.02	0.36	-0.02	0.35	0.35
Family Firms					
7. Firm Age	16	12	17	16	2.11**
8. Total Assets	7.94	17.96	11.76	25.56	4.12***
9. CEO Age	53	13	54	14	1.11
10. Tenure	93	54	93	53	0.26
11. ROA 2-Year, pp Change	-0.02	0.36	-0.03	0.36	-0.24
12. ROA 3-Year, pp Change	-0.02	0.36	-0.02	0.37	-0.10
Non-Family Firms					
13. Firm Age	14	14	17	19	1.22
14. Total Assets	7.99	19.71	16.17	28.88	2.85***
15. CEO Age	52	11	53	12	0.20
16. Tenure	69	40	84	49	3.14***
17. ROA 2-Year, pp Change	0.02	0.40	0.01	0.28	-0.55
18. ROA 3-Year, pp Change	-0.04	0.37	-0.01	0.31	0.94

None of the financial indicators show a significant mean difference which means that firms where females get replaced do not perform significantly better or worse than firms where male CEOs are replaced. This also holds true when we test whether financials performance differs across companies led by female versus male CEOs through chi-square analyses with dummy variables that indicate positive or negative change. The output for said analyses can be found in Appendix 10.13.

The independent t-tests show that for non-family firms, tenure is significantly lower despite no significant difference in pre-replacement financial performance. This is an interesting finding, which we would like to pursue further in the following. Thus, having conducted t-tests of the difference between female and male predecessors, we perform logistic regressions to model the probability of female CEO replacement by a traditional leader.

5.2.2 Main Results from Regression Analyses on Traditional Leader Replacement

To test whether the likelihood of replacement for female CEOs in non-family firms in Denmark is higher compared to male CEOs, we conduct logistic regressions that model the probability of traditional leader replacement, and furthermore analyze whether there is a difference in tenure and firm performance prior to female and male CEOs replacement. Overall, this will determine whether women are granted less of an opportunity to prove their leadership capabilities compared to men (Cook & Glass, 2014b).

Prior to conducting the logistic regressions, we find the correlations among our variables of interest, presented in Appendix 10.14 for percentage-point change financial variables and Appendix 10.15 for dummy variables describing the change in ROA and ROE. We see that there is no issue with multicollinearity within the independent variables that are included per regression.

Studying all firms, the ROA two- and three-year percentage-point change are not significant, as expected from the t-tests. Meanwhile, all control variables except for year of appointment, are significant at the 1- or 5%-level, confirming previous literature on CEO replacement. We run the same logistic regressions but differing between family and non-family ownership and present all the results in Table XIX. The regressions for ROE are shown in Appendix 10.16. The logistic regressions for the dummy variables describing change in ROA and ROE can be found in Appendix 10.17 and 10.18, respectively. They do not provide additional findings.

For family firms, there is no significance for any of our predictor variables. However, the control variables are significant, confirming previous literature. In non-family firms, on the other hand, the predecessor's tenure is statistically significant at the 1%-level. While the odds ratio is lower for female CEOs, which indicates that with increasing predecessor's tenure, a transition between two male CEOs is more likely than from a female to male CEO, its value of 0.99 shows that there is no economically significant difference. The difference in the predicted probability of traditional leader replacement for females is -0.05pp with the percentage of female CEO appointments being: $\frac{102}{1,147} * 100 = 8.89\%$, 8.89% thus being the baseline from which the 0.05pp should be subtracted from. These numbers show that women are only to a small extent more likely to serve a shorter tenure than male CEOs.

When comparing family and non-family firms it becomes clear that the likelihood of a female getting replaced by a traditional leader with the reason for job loss being retirement is only lesser in family firms, with odds ratios of 0.81 and 0.77. Furthermore, the non-significant finding regarding financial performance pre-replacement means that the analysis provides no indication that a change in company performance conditions female CEO replacement.

Before concluding that there is no difference in the opportunity awarded females and males to manage firms, we investigate traditional leader replacement with a matched dataset as the current study could be confounded by variables that differ between the companies replacing either a male or a female with a male (Karon & Kupper, 1982). This approach of comparing "apples and apples" has been taken previously by researchers investigating whether women are granted equal opportunity to lead post assignment (Cook & Glass, 2014b; Elsaid & Ursel, 2018), and is the same approach as taken in this study when performing conditional logistic regressions in the glass cliff analysis.

Hence, we perform exact matching along the categorical variables: Year of appointment, industry, and family ownership. We then perform a nearest neighbor, optimal matching by 1:1 matching firms uniquely according to the smallest absolute difference in total assets between two companies. This results in a treatment group of 660 firms where a male CEO replaces a female CEO and a control group of 660 firms where a male CEO replaces a male CEO.

Table XIX: Logistic Regressions on the Percentage-Point Change in ROA

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA prior to the CEO replacement. Tenure is the male or female predecessor's tenure reported in months. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measure the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Percentage-Point Change in ROA												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROA 2-Year, pp Change	1.04	0.35			1.03	0.25			1.05	0.11		
	(0.11)				(0.11)				(0.45)			
2. ROA 3-Year, pp Change			0.97	-0.30			1.00	0.04			0.69	-1.05
			(0.10)				(0.11)				(0.25)	
3. Tenure	1.00	-0.34	1.00	-1.09	1.00	0.49	1.00	-0.37	0.99	-2.66***	0.99	-2.55**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Family	3.66	11.67***	3.76	11.05***								
	(0.41)		(0.45)									
5. Total Assets	0.99	-4.7***	0.99	-4.50***	0.99	-4.21***	0.99	-4.10***	0.99	-1.86*	0.99	-1.71*
	(0.00)		(0.00)		(0.00)		(0.00)		(0.01)		(0.01)	
6. Industry	1.08	4.42***	1.08	4.42***	1.06	3.57***	1.07	3.48***	1.15	2.87***	1.20	3.18***
	(0.02)		(0.02)		(0.02)		(0.02)		(0.06)		(0.07)	
7. Retirement	0.83	-1.99**	0.79	-2.33**	0.81	-2.10**	0.77	-2.45**	1.00	0.00	1.00	-0.01
	(0.08)		(0.08)		(0.08)		(0.08)		(0.31)		(0.32)	
8. Year	1.01	0.48	1.00	0.17	1.01	0.90	1.01	0.78	0.96	-1.03	0.94	-1.55
	(0.01)		(0.01)		(0.01)		(0.01)		(0.04)		(0.04)	
9. Observations	4,482		3,920		3,335		2,940		1,147		980	
10. # Appointments	977		871		875		784		102		87	
11. Chi-Square	191.93***		179.1***		37.66***		38.5***		25.71***		28.63***	
12. Difference in Predicted Probability of Female Replacement - ROA	0.59%		-0.51%		0.51%		0.08%		0.32%		-2.61%	
13. Difference in Predicted Probability of Female Replacement - Tenure	0.00%		-0.01%		0.01%		-0.01%		-0.05%		-0.05%	

Initial t-tests on CEO tenure and age, presented in Appendix 10.19, show that after matching there is no significant mean difference in tenure between the genders for non-family firms anymore.

The analysis of all firms shows no significant values across any of the predictor variables of the two conditional logistic regressions (see Appendix 10.20). The retirement control variable is significant at the 5%-level, with a value of 0.72 for both two- and three-year changes in profitability ratios. This means that the likelihood of females being replaced due to retirement are lower than for male replacement. Yet again, we do not find evidence of females given less of chance. However, this result might change when we compare family and non-family ownership, as the preceding t-tests and logistic regressions have shown differences in the significance of our independent variables when we do so.

Table XX shows that there are no significant values across predictor variables for neither family nor non-family firms. When performing the regression on matched firms, we no longer find tenure for non-family firms to be significant. For family firms, the retirement control variable is significant at the 1%-level, with odds ratios for two- and three-year change in ROA of 0.68. Appendix 10.21 shows the results for ROE. This means that the odds of females being replaced compared to males being replaced due to retirement is lower in family firms, and the model is overall significant at the 5%-level, proving it to be a good fit. The opposite is true for non-family firms, where the matched dataset only comprises 70 matches, which means we must accept a loss of statistical power. There are no statistical significances across the regressions for two- and three-year ROA percentage-point change, and the overall model itself is not significant either, with chi-square values of 1.38 and 2.41, respectively.

Appendices 10.22 and 10.23 present the results of running the regressions with the percentage-point change in ROA and ROE expressed in dummy variables, which do not yield any novel insights.

Thus, we do not find that decision-makers award female CEOs less of an opportunity to lead before replacing them with a male CEO. Hence, the gendering of the CEO savior (Khurana, 2011) by applying the logic of social role congruity which posits that women are penalized for expressing personality traits that do not align with their social role such as assertiveness (Doherty & Eagly, 1989; Eagly & Karau, 2002) is not sensible among firms in Denmark.

Table XX: Conditional Logistic Regressions on the Percentage-Point Change in ROA by Family and Non-Family Firms

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the conditional logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA prior to the CEO replacement. Tenure is the male or female predecessor's tenure and reported in months. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Percentage-Point Change in ROA by Family and Non-Family Firms

	Family Firms				**Non-Family Firms**			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variables								
1. ROA 2-Year, pp Change	1.00	-0.02			1.20	0.38		
	(0.16)				(0.47)			
2. ROA 3-Year, pp Change			1.01	0.06			0.69	-0.85
			(0.16)				(0.44)	
3. Tenure	1.00	-0.86	1.00	-0.86	1.00	0.98	1.00	0.70
	(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables								
4. Retirement	0.68	-2.62***	0.68	-2.62***	1.45	0.72	1.40	0.68
	(0.15)		(0.15)		(0.51)		(0.50)	
5. Observations	1,180		1,180		140		140	
6. # Appointments	590		590		70		70	
7. Chi-Square	8.22**		8.22**		1.38		2.41	
8. Difference in Predicted Probability of Traditional Leader Replacement - ROA	-0.07%		0.24%		17.84%		4.30%	
9. Difference in Predicted Probability of Traditional Leader Replacement - Tenure	-0.02%		-0.02%		0.44%		0.11%	

The last part of the analysis looks at the overall risk of turnover between males and females, no matter by whom they may be replaced. This will provide the study with a more holistic picture on the circumstances of a female's leadership experience, from pre-appointment to post-appointment.

5.2.3 Main Results from T-Tests for Turnover Gender Sensitivity

For the turnover gender sensitivity analysis, we only use matched data to improve comparability among the investigated companies (Elsaid & Ursel, 2018). Furthermore, this analysis does not only examine CEO transitions from female to male and from male to male but all CEO transitions, providing more transitions on which to match. This approach is also reflected in previous literature studying the relation between gender and turnover (Cook & Glass, 2014b; Elsaid & Ursel, 2018).

We focus on CEOs where we possess full knowledge on their tenure, meaning that we have information on their start and end date. To gain an overview of the data at hand, we first conduct independent t-tests to compare mean differences among our continuous variables of interest, which are the tenure of female and male CEOs and their respective age (see Table XXI). In this way, we find the distribution of data between the genders and if there are any significant differences by comparing the means. To detect differences more clearly, CEO tenure is expressed in months.

When not differing for ownership, we find no significant difference in mean tenure between male and female CEOs, indicating that females are not facing lower tenure after their CEO appointment. Yet, differing for ownership, we find a mean difference in tenure of 10 months for non-family firms, with females experiencing a tenure of 61 months and male CEOs experiencing a tenure of 71 months. While the t-statistic is relatively high at 1.63, there is no statistical significance. We suspect that this is due to the small number of observations, with only 51 matched pairs. Thus, we deem it unjustified to confidently reject differences in tenure by gender for non-family firms based on this independent t-test.

Furthermore, we find that across all firms, female CEOs are two years older at 53 years, significant at the 10%-level, while the standard deviations from the means are similar for males and females, with 14 and 13 years from the mean, respectively. Family firms primarily drive this result, where the mean difference is again two years, significant at the 10%-level. In non-family firms, we do not find any significant difference in mean CEO age.

Table XXI: T-Test Analyses to Test for Turnover Gender Sensitivity Excluding Survivors

The table reports summary statistics for continuous variables of interest surrounding turnover gender sensitivity. CEO tenure is reported in months. CEO age is reported in years. Column I and II concern incoming female CEOs and column III and IV concern incoming male CEOs between 2005 and 2015. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

T-Tests of Continuous Variables for Cox Analysis without Survivors					
	Female CEO		Male CEO		
Variable	Mean	s.d.	Mean	s.d.	t-statistic
	I	II	III	IV	V
All Firms					
1. Tenure	70	33	71	36	0.47
2. CEO Age	53	14	51	13	-1.76*
Family Firms					
3. Tenure	71	33	71	36	-0.16
4. CEO Age	53	15	51	14	-1.80*
Non-Family Firms					
5. Tenure	61	30	71	35	1.63
6. CEO Age	49	12	48	11	-0.22

After gaining an overview on mean differences by CEO gender and across ownership types, we test whether there is a relation between gender and financial performance. If females are leading companies that are performing worse, as is proven by the glass cliff phenomenon and the newly introduced "savior effect" (Cook & Glass, 2014b), according to the literature on turnover performance sensitivity, their likelihood of facing turnover should be higher (Gao et al., 2017; Jenter & Kanaan, 2015). Jenter and Kanaan (2015) and Gao et al. (2017) find that CEOs are dismissed following poor company performance, with Jenter and Kanaan showing that the drop in firm performance is attributable to factors outside their control. While neither of these studies include gender in their evaluation of turnover sensitivity, we add this component to our study, as Elsaid and Ursel (2018) have done. We investigate a potential relation between gender and increasing and decreasing financial performance in the coming section by conducting chi-square tests.

5.2.4 Main Results from Chi-Square Analysis for Turnover Gender Sensitivity

Where the glass cliff and traditional leader replacement analyses examines profitability ratios before female CEO appointments, the turnover gender sensitivity analysis investigates the profitability ratios two- and three-years after a CEO appointment. As we wish to give equal weight to each firm's financial performance, we use a dummy variable indicating an increase or decrease in ROA and ROE two- and three-years after the incoming CEO's appointment. Before conducting regressions, we perform chi-square tests to understand whether a relationship exists between financial performance and gender for both all firms, family firms, and non-family firms.

The results of the chi-square tests can be found in Table XXII. We cannot reject the null hypothesis, and thus we do not find the chi-square to indicate a significant relationship between gender and firm performance, as expressed by ROA and ROE (see Appendix 10.24). The distribution of better or worse performing companies barely differs among male and female CEOs, with firms showing chi-square values of 0.00 and 0.10 for the percentage-point change in ROA and ROE two- and three-years after appointment, respectively. The distributions for family-firms are close to the expected value, with chi-square values of 0.12 and 0.77. For non-family firms, distributions are less balanced, with chi-square values of 0.63 and 1.42 for the percentage-point change in ROA and ROE two- and three-years after appointment, respectively. However, the observed values are not significantly far from the expected values and the small sample size limits representativeness.

Table XXII: Chi-Square Analyses to Test for Turnover Gender Sensitivity Excluding Survivors

The table reports summary statistics for the chi-square analyses on a decrease or increase in the change of ROA as a dummy variable, and gender. Column I and II concern female CEOs appointed, and column III and IV concern male CEOs appointed. Column V provides the chi-square value. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Turnover Gender Sensitivity on Dummy Variable for ROA Change						
		Female CEO		Male CEO		
Variable		Frequency	Expected Frequency	Frequency	Expected Frequency	Chi-Square Value
		I	II	III	IV	V
All Firms						
1. ROA 2-Year Change	Decrease	171	171	171	171	0.00
	Increase	145	145	145	145	
2. ROA 3-Year Change	Decrease	177	175	173	175	0.10
	Increase	139	141	143	141	
Family Firms						
3. ROA 2-Year Change	Decrease	142	144	146	144	0.12
	Increase	123	121	119	121	
4. ROA 3-Year Change	Decrease	153	148	143	148	0.77
	Increase	112	117	122	117	
Non-Family Firms						
5. ROA 2-Year Change	Decrease	29	27	25	27	0.63
	Increase	22	24	26	24	
6. ROA 3-Year Change	Decrease	24	27	30	27	1.42
	Increase	27	24	21	24	

Thus, we cannot conclude that male and female CEOs lead companies that differ on positive or negative trends in financial performance. The following survival analysis investigates whether time-to-job-loss differs by gender while controlling for post appointment financial performance and retirement.

5.2.5 Main Results from Cox Model Analysis on Turnover Gender Sensitivity

Following descriptive tests that first investigate mean differences between gender and tenure and gender and age, and subsequent investigations on the relationship between post-assignment performance for males and females, we apply the Cox model to investigate whether female CEOs are more at risk of facing shorter tenures compared to their male counterparts. Prior to estimating hazard rates, we graphically inspect CEO tenure by Kaplan-Meier curves, differentiating for gender. For clarity, CEO tenure is described in years and not months for the graphical depiction.

The probability that a CEO has “survived” in his/her position to a certain point in time is calculated using the Kaplan-Meier method. Graphically, survival times can be represented by means of a Kaplan-Meier curve, also called survival time curve, which in our case shows the duration of CEO tenure in serial time (Gillespie & Fisher, 2007). For the analysis, we create three Kaplan-Meier curves; one for all companies, another for family firms and the third for non-family firms. We differentiate between male and female CEOs to offer a graphical depiction of differences in time-to-job-loss for the two groups.

When examining Kaplan-Meier curves, the length of the horizontals along the x-axis, which represents serial time, illustrates the duration of time-to-job-loss for a given interval. The vertical intervals visualize the change in cumulative probability as the curve develops (Kaplan & Meier, 1958). The y-axis models the cumulative probability of survival at the beginning and throughout each interval by multiplying the interval survival rates up until that interval. The interval survival rate is the likelihood of outlasting the interval. The first survival rate begins at two years, as we condition that CEOs need a minimum of two years tenure to be considered for our analysis (Jenter & Kanaan, 2015). The Kaplan-Meier curve is not a smooth function, but provides incremental estimations – thus, it is challenging to compute a pointwise survival from these curves (Kaplan & Meier, 1958).

When constructing the dataset, we exclude “survivors”, that is exclude CEOs who are still the CEO in 2015, the last year of our period of interest, and who we only have part knowledge on their time in office. This limited knowledge is known as “censoring”, and this censoring arises when there is incomplete information regarding the survival of some individuals (Leung, Elashoff, & Afifi, 1997). This is due to the fact that we know the start date of their tenure but do not know the ultimate end date, which leads to right-censored data (Murphy & Kleinbaum, 1997). We exclude right-censored data to get a clear picture of the potentially differing circumstances of clearly terminated leadership positions alone between the genders. However, a CEO who is registered as out of the position while continuing as CEO is an example where our data could be censored, and which we do not accommodate for by excluding survivors. However, we assume that these cases are not frequent, and thus censoring is mainly an issue of "survivors", i.e., individuals that are the CEO in 2015, the last year in the investigated period of interest. Excluding "survivors" results in a matched dataset of 632 observations, 316 of which observe female incoming CEOs and 316 of which observe male incoming CEOs.

Before taking a closer look at the Kaplan-Meier curves, it is important to note how much data we have in each sectioned tail because if sections of the graph are populated with little data, the failure of a subject within one group may lead to large differences in the graphical representation of the two survival curves. At the extreme, and to pick an example to illustrate this, when there is one subject per group left, the termination of a CEO within one group leads to a pronounced gap between the two survival curves, however, two CEOs are only a small portion of the overall number of CEOs and as such, the gap graphically overstates the overall relationship between the two groups. Therefore, the x-axis does not include the number of years of the longest CEO tenure, but from two years and until fourteen years for family-firms, and from two years and until twelve years for non-family firms.

We find that data for tenures of more than fourteen years is extremely limited, with only two CEOs having tenures above this number of years in the full dataset. This leads to large differences in proportions when a failure is observed for that section. The number of companies that have CEOs with tenures above a defined number of years is shown in Table XXIII. With the fewer data points of the data as we move along serial time, proportions appear larger between the two genders.

Table XXIII: Number of Companies with CEOs with Tenures Above X Number of Years

The table reports the number of companies with CEOs that have tenures above the number of years shown in the upper row. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	632	421	241	131	71	26	2

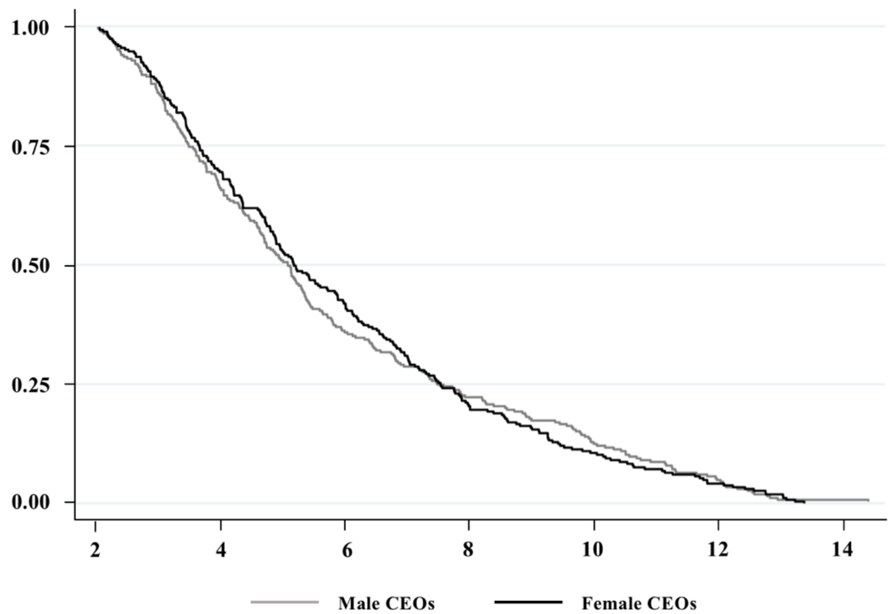
The Kaplan-Meier curve for all firms is largely aligned with the curve for family-firms since family firms make up most of the data. The curve for all firms can be found in Appendix 10.25. The Kaplan-Meier curves for family firms are illustrated in Figure V, and we find that the curves are somewhat aligned until five years of tenure. After that, and until seven years of tenure, the survival curve describing female tenure is above the one for male CEOs, indicating that female CEOs' probability of survival is higher during that time. Consecutively, meaning from seven to twelve years of tenure, where the curves almost align again, the relationship flips and the male CEO survival curve continues above the female survival curve, exhibiting higher probability of survival for male CEOs. Again, moving ahead in serial time, the data has fewer points and is thus less descriptive (see Appendix 10.26).

For non-family firms, also illustrated in Figure V, the curve describing female survival in the CEO position is consistently below the curve describing male survival as CEO. As can be seen by the marked gradations, there are only 102 datapoints, or 51 CEOs per gender, for non-family firms. The large visible difference may thus be due to large differences in proportions between datapoints. Appendix 10.26 further illustrates the few data points of the data for non-family firms as we move along serial time, with only two CEOs with tenures of above twelve years (one female and one male) and no observations past fourteen years of tenure.

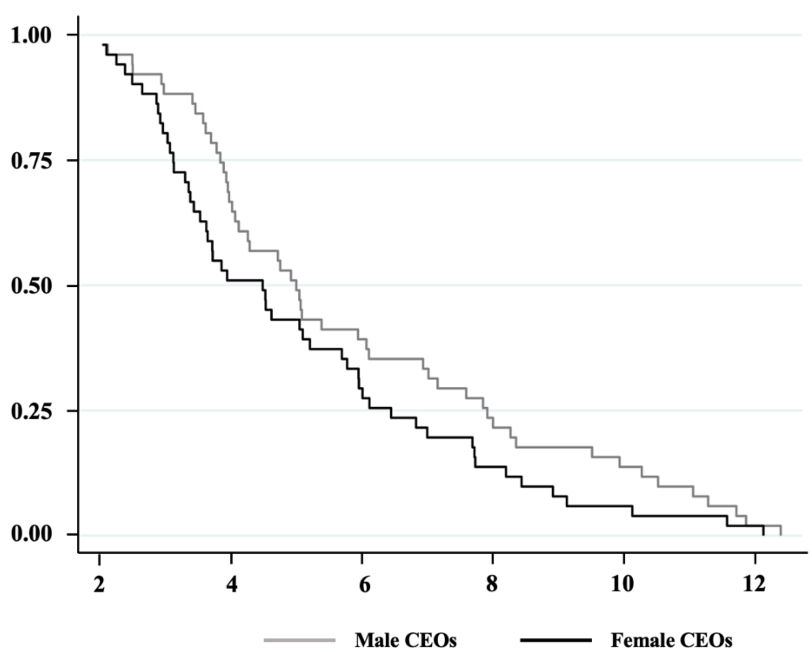
Figure V: Kaplan-Meier of Family and Non-Family Firms Excluding Survivors by Gender

The graphs below depict two graphs, one for family and one for non-family firms with each two Kaplan-Meier curves, one illustrating survival estimates for female CEOs and one illustrating survival estimates for male CEOs. The x-axis is tenure in years shown in serial time. The y-axis models the cumulative probability of survival at the beginning and throughout each interval, by multiplying the interval survival rates up until a given interval. Interval survival rate is the likelihood of outlasting the interval. The first survival rate begins at two years, as we conditioned that CEOs need a minimum of two year tenure to be considered for our analysis.

a) Family Firms



b) Non-Family Firms



It is critical to emphasize that it is the relationship between the "full curves" that is ultimately relevant. For all ownership types, we therefore perform a *log rank test* in Stata that is able to properly compare the two curves in their entirety by quantifying the difference and ultimately evaluating the statistical significance of that difference (Karrison, 2016). The log rank test computes the chi-square for any given time of occurrence for each group and adds these up. All the sums are added to arrive at the ultimate chi-square that allows for the comparison of entire curves. The ultimate chi-square for the Kaplan-Meier curves for all firms is 0.24, which is not significant, and hence the curves are not statistically significantly different. For family firms, the ultimate chi-square is 0.00, and thus there is no statistically significant difference in survival times. However, for non-family firms, the chi-square value is 2.75, showing a statistically significant difference in survival between the genders at the 10%-level. Given that the tenure means are ten months apart, albeit statistically insignificant, we continue with the inquiry. This finding again highlights differences between family and non-family firms, as the data indicates that for non-family firms, female CEOs experience a lower tenure, while this is not the case for female leaders of family firms.

Following the graphical inspection of different survival times for female and males, we continue with our main analysis. Since the log rank test only allows for the investigation of the difference in survival times between two groups, we run a Cox model to be able to analyze whether time-to-job-loss differs by gender, while controlling for post appointment financial performance and retirement age and provide hazard rates that quantify the difference in risk of job loss at any point in time. We control for performance, as studies on turnover performance sensitivity have shown it to influence turnover (Gao et al., 2017; Jenter & Kanaan, 2015). Just as in the traditional leader replacement analysis, we control for retirement (Jenter & Kanaan, 2015), with a dummy variable that takes on a value of 1 for CEOs that are 65 and above at the time of job loss, based on the official age of retirement in Denmark for the years 2005-2015 (Styrelsen for Arbejdsmarked og Rekrutering, 2021).

For all firms, we find no significance for our explanatory variable, gender (see Column I-IV in Table XXIV). The hazard ratio for female CEOs with 1.05 is above 1, which would suggest higher risk of turnover, however, the result is not significant. Regarding turnover gender sensitivity, the hazard ratios for two- and three-year ROA are ambiguous, meaning the hazard ratio for the dummy variable describing two-year percentage-point change is above, while the hazard rate describing three-year percentage-point change is slightly below the baseline, and not significant. Meanwhile, the control variable retirement is significant at the 10%-level running the Cox model for two- and three-year financials, with a hazard ratio of 0.84 in both cases, suggesting that retirement accounts for a lower risk of CEO turnover than the baseline, 1. This means that CEOs whose ultimate reason for job loss is retirement enjoy longer survival times, in line with the findings of Jenter and Kanaan (2015). The model overall is not statistically significant, which means that the selected variables do not optimally model the risk of turnover in all firms.

We then run the Cox model distinguishing between ownership type. The results are presented in column V-XII of Table XXIV. For ROE, the results are presented in Appendix 10.27. For family firms, there are no significant values across the explanatory variable, gender, and the hazard ratio nearly equals the baseline, which indicates no difference in turnover risk according to gender. The control variable for retirement is significant at the 10%-level for the Cox model including the two-year percentage-point change in ROA, meaning that when retirement is the reason for job loss, risk of turnover is decreased. The retirement control variable for the three-year percentage-point change in ROA model is not significant. The overall models for family firms meanwhile are not significant, meaning that turnover risk is not well described by these variables.

Looking at the Cox regressions for non-family firms only in Column IX-XII in Table XXIV, the gender variable is significant at the 10%-level for both the Cox regression including the two-year percentage-point change in ROA as well as the three-year percentage-point change in ROA. With as high hazard rates as 1.40 and 1.47 respectively, this indicates that female CEOs are 40% and 47% more likely to face the loss of their position at any given time as compared to their male counterparts. Among the control variables, the three-year percentage-point change in ROA post appointment is significant at the 10%-level with a hazard ratio of 0.71. This means, that an increase in ROA lowers the risk of CEO turnover, in line with research on turnover performance sensitivity (Gao et al., 2017; Jenter & Kanaan, 2015; Lel et al., 2014). In their study comparing turnover performance sensitivity in private and public firms Gao, Harford, and Li (2017) and Lel et al. (2014) find that turnover performance sensitivity is higher in public firms. Ultimately, the overall model is not significant, with chi-square values of 3.11 and 5.69. This is most likely due to the low statistical power of having a dataset with only 51 observations per group.

Table XXIV: Cox Model Excluding Survivors on Change in ROA as Dummy Variable

The table reports the estimated hazard rates by running the Cox model excluding survivors on all firms, family firms only, and non-family firms only. The female variable is a dummy variable equaling 0 for male and 1 for female CEOs. Financial performance variables are the dummy variable for two- and three-year percentage-point changes in ROA. Retirement equals 1 if the CEO was 65 and above years old at the time of job loss and takes on a value of 0 otherwise. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Cox Proportional Hazard Model on Dummy Variable for Increase or Decrease in ROA												
	All Firms				Family Firms				Non-Family Firms			
	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variable												
1. Female	1.05	0.61	1.05	0.62	1.00	0.00	1.00	0.05	1.40	1.66*	1.47	1.90*
	(0.08)		(0.08)		(0.09)		(0.09)		(0.28)		(0.30)	
Control Variables												
2. ROA 2-Year, Change	1.08	1.00			1.11	1.22			0.91	-0.46		
	(0.09)				(0.10)				(0.19)			
3. ROA 3-Year, Change			0.99	-0.12			1.03	0.31			0.71	-1.67*
			(0.08)				(0.09)				(0.15)	
4. Retirement	0.84	-1.94 *	0.84	-1.91*	0.85	-1.70*	0.86	-1.61	0.86	-0.48	0.82	-0.62
	(0.07)		(0.08)		(0.08)		(0.08)		(0.27)		(0.26)	
5. Observations	632		632		530		530		102		102	
6. # Appointments	316		316		265		265		51		51	
7. Chi-Square	4.97		3.99		4.21		2.83		3.11		5.69	

Concluding, this model is overall lacking power due to its small sample size. This has an influence on the significance of the covariates and the overall models. Excluding survivors decreases the amount of datapoints heavily. Furthermore, the matching process leads to a small sample size, since we already have a small treatment group of female CEOs from the start. By taking several conservative approaches on how we construct our data and the subsequent analyses, in addition to the disproportionate number of male versus female CEOs in the economy that limited the treatment group, we are not able to conduct the analysis excluding survivors on a sufficiently large sample size.

In the previous survival analysis, we intended to eliminate right censored data to the best of our ability by performing the analyses excluding CEOs where we have incomplete information on survival time (Murphy & Kleinbaum, 1997), to get a better picture of the potentially differing circumstances of clearly terminated leadership positions alone between the genders. However, due to the limited dataset, we now proceed to include survivors since many of the CEOs studied between 2005 and 2015 are still in office at the end of our study period, significantly increasing our sample size, decreasing variability in the sample statistic, and increasing the power of our analyses. However, this introduces a high amount of censored data into the study, meaning that for more than 70% of our datapoints, we do not know how long the CEO is in office and can only mathematically estimate survival.

Including survivors leads to a matched dataset of 2,318 observations (i.e., 1,159 female and male CEOs each). While we match under the same principles as before, the dataset looks different, as a "survivor company" might be the optimal match. We end up with 625 job losses, of which 314 are female CEOs and 311 are male CEOs, versus 1,693 CEOs who are still in office at the end of the studied period.

As opposed to the Kaplan-Meier estimates and the Cox model, the independent t-tests do not consider information on censored data. Therefore, due to censoring, when comparing mean tenure between the genders by performing independent t-tests, tenure is understated. Appendix 10.28 shows the mean differences in tenure between female and male CEOs. Compared to the previous analysis conducted with companies where we had a clearly defined survival time, we find no significant difference. This also holds true for non-family firms, where the mean tenure for female CEOs is just one month shorter that of male CEOs.

As before, our investigation into a potential relation between financial performance expressed as a dummy variable and gender through chi-square tests shows no significant values (see Appendix 10.29). We conclude that CEO gender does not influence financial performance when measured by ROA or ROE.

The Kaplan-Meier-curves for the graphical investigation of the difference in time-to-job-loss for female and male CEOs can be found in Appendix 10.30. This time, none of the graphs show a clear difference between the Kaplan-Meier-curves, unlike the curves for the non-family firm analysis excluding survivors. The log rank tests on all firms, family and non-family firms confirm this with ultimate chi-square values of 0.08, 0.24 and 0.17 respectively. For non-family firms, we have again visibly less datapoints. In a dataset of 2,318 firms, there are only 250 non-family firms, a number that decreases over serial time as presented in Appendix 10.31. Thus, in line with the mean tenure comparisons from the independent t-tests, we find no indication of a difference in tenure for women as we did in the analysis excluding the censored data.

Table XXV presents the results of running the Cox model on the matched data including survivors and illustrates no significance among the predictor variables. The regressions including ROE as the financial variable are presented in Appendix 10.32. Retirement is significant at the 5% and 10% levels, with protective hazard rates below one, meaning that if the ultimate reason for job loss is retirement, survival time is longer. The overall model is significant only in the case of family firms, where the number of observations is 2,068, compared to just 250 observations for non-family firms.

Table XXV: Cox Model on Family and Non-Family Firms Including Survivors on Change in ROA as Dummy Variable

The table reports the estimated hazard rates by running the Cox model. The female variable is a dummy variable equaling 0 for male and 1 for female CEOs. Financial performance variables are the dummy variable for two- and three-year percentage-point changes in ROA. Retirement equals 1 if the CEO was 65 and above years old at the time of job loss and takes on a value of 0 otherwise. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Cox Proportional Hazard Model by Family and Non-Family Firms with Dummy Variables for ROA Change

	Family Firms				Non-Family Firms			
	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variable								
1. Female	1.09	0.95	1.09	0.96	0.95	-0.27	0.95	-0.25
	(0.10)		(0.10)		(0.19)		(0.19)	
Control Variables								
2. ROA 2-Year, Change	0.96	-0.50			0.75	-1.46		
	(0.08)				(0.15)			
3. ROA 3-Year, Change			0.93	-0.78			0.93	-0.34
			(0.08)				(0.19)	
4. Retirement	0.79	-2.52**	0.79	-2.52**	0.57	-1.81*	0.59	-1.72*
	(0.07)		(0.07)		(0.18)		(0.18)	
5. Observations	2,068		2,068		250		250	
6. # Appointments	1,034		1,034		125		125	
7. # Failures	522		522		103		103	
8. Chi-Square	7.05*		7.41*		5.70		3.68	

Censoring is taken into account by the Cox model (Cox & Oakes, 2018), hence the CEOs that "survive" are recognized as still in office by the model. Comparing censored and uncensored datasets, Efron (1977) finds that censoring appears to exert little influence on the efficiency calculations. However, efficiency is asymptotic, which means that it is reliant on sample size. For non-family firms where conservative decisions were taken in constructing the dataset, we are not able to test on a large sample size, which may well affect the efficiency with which the Cox model handles the censored data (Efron, 1977).

5.2.6 Sub-Conclusion from the Analyses on Differences in CEO Turnover

The second part of the analysis focused on comparing female CEO tenure to their male counterparts following the analysis of the existence of the glass cliff, as it can be expected that when females are appointed to poorly performing firms their tenure is shorter.

In the analysis of whether female CEOs are given the same opportunity to lead as their male counterparts before being replaced by a traditional leader (Cook & Glass, 2014b; Eagly & Karau, 2002), we find statistically significant evidence of tenures 15 months shorter for female predecessors when comparing sample means for non-family firms. These findings are still statistically significant after introducing other variables into the analysis; however, they are not economically significant with an odds ratio close to 1. We find no significance when running conditional logistic regressions on our matched dataset, however the model for non-family firms possesses little statistical power with only 70 matched pairs among non-family firms.

Another significant result from our analyses on traditional leader replacement is the fact that male CEOs lead significantly larger companies measured by total assets, no matter the ownership type. Furthermore, there is only a lower likelihood of a female CEO versus a male CEO getting replaced by a traditional leader when the reason for job loss is retirement in family firms.

We have made use of survival estimates to investigate the likelihood of turnover at any given time post CEO appointment, both excluding and including survivors. The trade-off across the different models is one of comparability of subjects, to what degree censoring should be present (which is considered in the survival function), and statistical power.

When we excluded survivors and therefore only looked at CEOs where we had a confirmed termination of the CEO position, for the models including two- and three-year change in ROA, female CEOs were 40% and 47% more likely to face turnover than male CEOs, respectively. However, with our limited dataset comprised of fewer observations by matching, we had to accept serious losses in statistical power. When including survivors and thus censored data, we do not find that gender has an influence on turnover.

5.3 Sub-Conclusion: Results of the Data Analysis

The analysis implies that non-family firms in Denmark tend to appoint a female CEO in times of declining profitability. At the mean, as the ROA and ROE two-period change increases by 1pp, the probability of a female CEO appointment will decrease by 8.18pp from a base level of 13.13% female CEO appointments. This finding is economically meaningful and statistically significant at the 1%-level. The difference between family and non-family firms is supported by the data. There are more female CEO appointments in family than in non-family firms, 38% of all appointments compared to 13% of all appointments, respectively, significant at the 1%-level. When examining family firms, ROA one, two, and three years before a CEO transition, is significantly larger when a female CEO is appointed than when a male CEO is appointed following a male CEO. This difference in levels of ROA is not mirrored for non-family firms.

Regarding female leadership experience post appointment in family firms, we conclude that females do not face a higher probability of replacement by a traditional leader, and generally females do not face higher likelihood of turnover post assignment. However, we propose further investigations within non-family firms, as results in this case are inconclusive. Here, mean comparisons show a clear difference in tenure. Meanwhile, regressions that are based on data with information on time-to-job-loss where we have a registered start and end date point towards a difference, but lack in statistical power.

6 Discussion of Findings Compared to Previous Research

Let us revisit the research question for this study: *How does firm performance impact the likelihood of female CEO appointment and how is length of tenure compared to male CEOs, within both family and non-family firms in Denmark, and what can these findings contribute with to the discourse on how to reach gender equality?* To investigate the research question, we formulated five sub-questions to guide our research and methodological approach. With the results from our study guided by the first four sub-questions, the following section primarily answers the fifth sub-question: *In a discussion, how do the findings compare to previous research and what are the implications on gender equality research?* As the first four sub-questions have included a distinction between family and non-family firms, we start this discussion by revisiting the family firm literature to examine the implications that this study has on the literature when compared to previous research on the glass cliff and the effects of gender on CEO tenure. This is then followed by a discussion of what the implications of this study are on gender equality research.

6.1 Implications for the Family Firm Literature

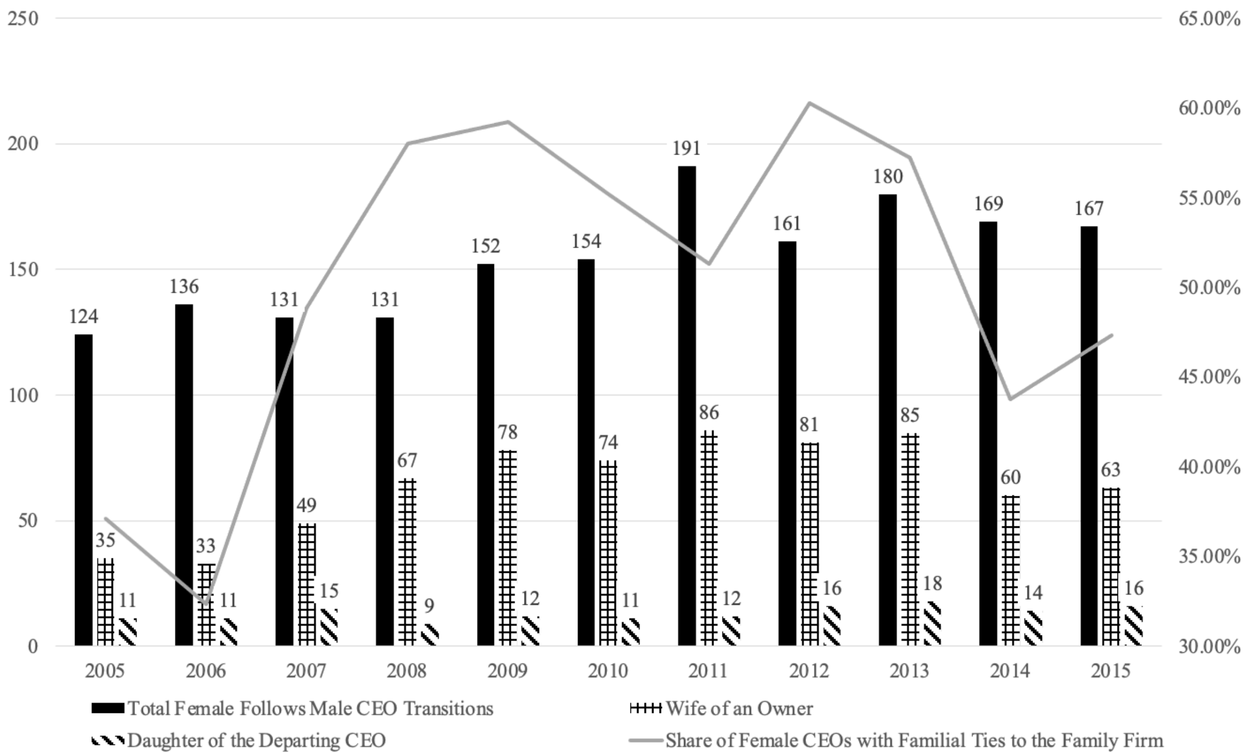
The analysis of whether firm performance impacts the likelihood of female CEO appointment demonstrates that women in Denmark are looking down a glass cliff in non-family firms when examining the percentage-point change in ROA and ROE. This finding is consistent with several research papers; Ryan and Haslam (2005) who were the first to make the connection between weak firm performance and the appointment of female board members and did so for FTSE 100 companies in 2003; Cook and Glass (2014) who conclude that white women and both men and women of color's likelihood of being promoted to the CEO position is increasing with declining accounting performance during the predecessor's term in office in Fortune 500 companies between 1996 and 2010; Elsaid and Ursel (2018) who found evidence of women's higher chances for promotion in firms of lower accounting-based profitability and higher stock price volatility than firms where male CEOs were appointed.

While we on one hand find evidence of the existence of a glass cliff in non-family firms, we do, on the other hand, not find evidence of the existence of a glass cliff in family firms. There may be many reasons for why this is the case, one of them being that 38% of the CEO appointments in family firms where the predecessor is a male is to a female. With this in mind, it is worthwhile investigating whether the appointed female CEO is in some way related to the owners of the firm, for example through marriage or by being the daughter of the departing CEO, thereby keeping control of the firm in the family (Belenzon et al., 2016; J. Chua et al., 1999; Litz, 1995). If it is the case that many of the females that are promoted CEO in family firms are related to the owner(s) of the firm, it is a similar finding to that of Jalalzai (2008), who studies exactly this but within politics. Though politics and business are two very different disciplines, it might be some of the same dynamics that are in play. Jalalzai (2008) compares almost all cases in the realm of female presidents and prime ministers in power between 1960 and 2007, and concludes that women are more likely to enter office when their powers are shared with men, constrained, and relatively few.

Specifically, no woman in Latin America or Asia holding dominant executive power has ever come to power without familial ties (Jalalzai, 2008). Figure VI illustrates that we indeed find a substantial share of females appointed CEO in family firms to be either the wife of an owner or the daughter of the departing CEO.

Figure VI: Share of Females Appointed CEO Related to Controlling Family

The figure shows the total number of female follows male CEO transitions for the years 2005-2015, and the number of females that within the total number of female follows male CEO transitions is the wife of an owner or the daughter of the departing CEO. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.



The averaged share is 50% and thus half of CEO transitions in family firms where a female follows a male, the female is through familial ties somehow involved in the business already before appointment. Since we have not defined CEO transitions to other females with familial ties and only have data on marriage for individuals until 2007 depicted in this figure, the share of females involved in the firm before being appointed CEO might be even larger. Appendix 10.33 illustrates above figure including females who own (part of) the firm before she becomes the CEO, and when including female owners, the share fluctuates around 74%. We previously argued that gender equality is higher in family compared to non-family firms in Denmark. However, when scratching the surface of why this might be the case, we find that more female CEOs in family firms cannot solely be explained by family firms to a larger degree facilitating equal chances within their recruitment process. The opposite might even be the case i.e., that it is even harder for females to be appointed CEO in family firms if they are not related to the firm.

This finding therefore has a twofold implication for the family firm literature. First, future research must consider that a female CEO appointment in family firms might not be directly comparable to a female CEO appointment in a non-family firm, and particularly in public firms – an ownership type that draws several researchers' attention (Cook & Glass, 2014b; Elsaid & Ursel, 2018; Glass & Cook, 2016; Ryan & Haslam, 2005). Second, that future research on succession planning in family firms should study the wives of owners and female owners themselves when considering future female CEOs in tandem with the existing literature on next generation succession planning. This could for example yield interesting insights on whether it is female co-founders that are appointed CEO and whether the wife of an owner taking over the position of CEO is deliberately planned or happens due to sudden death. This will add to (the rare but) existing literature on gender and CEO successions in family firms (Ahrens et al., 2015).

When examining succession planning for family firms, the one-, two-, and three-year ROA and ROE *level* before a CEO appointment is significantly higher when a female CEO is appointed than when a male CEO is appointed following a male CEO. This difference in levels of ROA is not mirrored for non-family firms where the ROA *levels* are lower. From a long-term succession planning perspective in family firms, this might be explained by the predecessor and owner preparing the firm for a CEO transition, and only performing the CEO transition when the firm is performing well as family firms seek to preserve legacy (Kellermanns & Hoy, 2017). This exact reason might also explain why there are differences among females and males *within* family firms if more appointed female CEOs are related to the owner(s) than appointed male CEOs.

Revisiting the data, we find that 635 CEO transitions are from a father to a son (see Appendix 10.34). With a total of 3,597 transitions from a male to a male in family firms, this is equivalent to a share of 18%, which is considerably lower than the share of females having familial ties to the firm (50%). This finding can help explain the differences in performance when appointing a female compared to a male CEO within family firms. Furthermore, since 145 CEO transitions are from a father to a daugther, equivalent to a share of 9% of female follows male CEO transitions, it also confirms existing literature on next generation successions in family firms, which has concluded that family firms are more likely to pass on control to a family CEO when the departing CEO has a male child compared to a female child (Ahrens et al., 2015; Bennedsen et al., 2007).

The equivalent to long-term succession planning in family firms is relay succession in non-family firms, which is a succession type where the incoming CEO has been pointed out years before the CEO transition, which can improve performance and reduce volatility during the CEO transition period (Tao & Zhao, 2019). Data on whether the female CEOs in non-family firms are internal hires of the firm or external would have allowed us to compare what role relay succession plays for firm performance around a CEO transition, since firms are better able to prepare for a CEO transition with an internal hire compared to an external one.

Continuing with the topic of succession planning but focusing on CEO tenure, family firm literature shows that financially preparing the firm for a CEO transition is a process that can take a long time (Le Breton–Miller et al., 2004), and the outgoing CEO can postpone the succession planning activities because they are not yet ready to give up leading the firm (Barach & Ganitsky, 1995; Lansberg, 1988). These are potential reasons for why we find the likelihood of CEOs leaving office due to retirement, i.e., with an age of 65 or above (Styrelsen for Arbejdsmarked og Rekrutering, 2021), to be significantly higher in family compared to non-family firms.

With more CEOs waiting until retirement to leave the office in family firms, the average tenure in family firms is higher compared to non-family firms. This finding is consistent with the findings of Gao et al. (2017), who compare CEO turnover in public and large private firms using a dataset that consists of more than 4,000 CEO turnover cases during the period 2001-2011. While public firms are not necessarily non-family firms and private firms are not necessarily family firms, similarities can be drawn. The authors find that public firms have higher turnover rates and exhibit greater turnover-performance sensitivity than private firms, and that these results still hold when instrumenting for the public versus private status of a firm (Gao et al., 2017). The authors find that public-firm CEOs are more likely to be fired than private-firm CEOs but do not examine the CEOs' decision to leave him-/herself further. This might, however, be another potential reason for the higher turnover in public firms compared to private firms as CEOs of private firms might decide to stay in the role for a longer time than CEOs in public firms.

This paper overall contributes to the family firm literature by describing differences between family and non-family firms in appointment, likelihood of replacement and the length of tenure of female CEOs. While this paper does not investigate the underlying reasons for these differences, which can be manifold and are thus difficult to identify and prove statistically (Kellermanns & Hoy, 2017), the findings contribute to the discourse on how to reach gender equality. It does so by providing evidence that family firms do not necessarily provide more equal chances for females and males compared to non-family firms, since half of the females in family firms that are appointed CEO, are married to the owner or the daughter of the departing CEO.

6.2 Implications for the Gender Equality Research

To our knowledge, this is the first study investigating the glass cliff, traditional leader replacement, and turnover sensitivity related to gender in family firms. By conducting the three analyses all in one research paper while using data on all firms in Denmark, a newly studied institutional context, we are able to offer a thorough examination of circumstances affecting female leadership from pre-appointment to replacement in Denmark.

Related to the exploration of a different institutional context than the ones previous studies have examined, comparing the countries where the analyses have previously been conducted, the United States, the United Kingdom, and Germany, using Hofstede's cultural dimensions theory, Denmark most clearly sets itself apart from the other countries on the masculinity dimension (Gladwin & Hofstede, 1981). While the United States, the United Kingdom, and Germany score above 60, and thus are all defined as masculine countries, Denmark has a score of 16, thus it is defined as a feminine society (Hofstede Insights, 2020). According to Hofstede Insights (2020), a main goal in feminine societies is that everyone is included, and that people value solidarity in their management. In this way, one might not expect poorer conditions surrounding the promotion and demotion of female leadership, such as the existence of a glass cliff, or that females may have a lower tenure post appointment with no indication of leading companies better or worse. While this assumption holds across all firms and family-firms in general, as our study shows, non-family firms break with this expectation. With that, inequality across different institutional contexts persist. This should be considered encouragement for future research to not only conduct research in countries that appear particularly unequal. Uncovering patterns should be encouraged in any institutional context, as Bechtoldt and colleagues (2019) also stress when they emphasize that the glass cliff phenomenon cannot be considered an international one, and has to be investigated on a national level.

It is also important to clearly state that our study can uncover the "what", meaning whether circumstances are less favorable for women, but not "why" they are. One very popular reasoning is social role congruity, which has been mentioned several times throughout this paper and explains that females are seen as less qualified leaders since they are not associated with traditional leadership traits, such as assertiveness (Doherty & Eagly, 1989; Eagly & Karau, 2002). Yet, are we to trust the more recent research by Hofstede Insights (2020), the Danish people value an accessible management that facilitates and empowers. These communal characteristics, which are concerned with the welfare of others, are according to Eagly and Karau (2002) more associated with women. It is therefore debatable to what extent social role congruity can explain inequalities in the Danish upper echelons. Others then have argued, that precisely because of the perception that women exhibit a leadership style that promotes openness, inclusion, and facilitates change, the glass cliff exists, as they are seen as the more fitting candidates for challenging times (Furst & Reeves, 2008). Thus, the Danish society, as a feminine society with low power distance, can be an interesting contribution in the discussion of how leaders and genders are perceived. Social role congruity arguments are reinforced by the embeddedness theory, which affirms that economic action is shaped by the social context in which the agents engage (Le Breton–Miller & Miller, 2009).

Hoobler and colleagues (2018), who present the business case for female leadership in their analysis of 78 studies, find that countries with a both culturally and legally more gender supportive climate demonstrate a higher likelihood of female CEOs impacting financial performance positively. Denmark as a gender egalitarian culture (Hofstede Insights, 2020) would then present a higher likelihood of said positive impact. Our analysis cannot confirm this, as in the second part of the analysis, the chi-square tests testing for a potential relationship between gender and firm performance did not indicate any significantly different distribution, nor did it test for traditional leadership replacement, which relates firm performance to female replacement. By measuring financial performance through ROA and ROE, we are only looking at accounting-based measures to determine financial performance, since the majority of the companies analyzed are private and thus no market-based information is available. Jeong & Harrison (2017) find that only market-based measures drive positive firm performance, while accounting-based measures are insignificant, the latter in line with our findings.

This study also updates the findings of Smith, Smith, & Verner (2006), who investigate 2,500 also smaller firms between 1993 and 2001, and find none to a small impact on firm performance. Looking at family firms, just as we have, they find that a significant portion of women in family-firm leadership positions are part of the owner family. Smith, Smith, and Verner (2006) emphasize that the gains from female leadership are a matter of companies' ability to attract and hire more skilled women. Adding information on female CEOs' education and experience, as Elsaid and Ursel (2018) and Ahrens, Landmann, and Woywode (2015) have done in their study, could help measure how successful Danish companies are in currently doing so, and whether better educated women enjoy more favorable conditions when being appointed CEO and if they are subsequently extended the same opportunity to lead. However, this would be most effective in a study beyond leadership, as diverse talent must be promoted from entry level on to build a workforce in which many qualified women are available for leadership positions. With the Gender Gap Report by the World Economic Forum (2019) finding that educational gaps are virtually closed in Denmark, the pipeline should offer the necessary talent to foster future female leaders, albeit this study does not consider the distribution across educational fields.

Even though talent is nurtured, many women may choose to work more sustainable hours for other reasons than being let go. It is of course not unusual that the job loss is in fact the result of a woman's own decision to leave. This might be due to the decision to focus more on the family, which next to work is a focal point of life (Netemeyer, Boles, & McMurrian, 1996). Work and family are not always compatible, and this often leads to job dissatisfaction, psychological stress, and turnover (Netemeyer et al., 1996). Even if women leave their position voluntarily, if this voluntariness stems from the dilemma of not being able to commit to both family and career without psychological strain, then the conditions for female leadership are still adverse. The only difference then is that these circumstances are not to the same extend conditioned by the decision-makers in the company directly, but more by the prevailing social structures.

In our study, we have not made a distinction between voluntary and involuntary job loss. While giving up one's position for reasons related to the family has traditionally been more the concern of women, and likely will be for the foreseeable future. In addition, for both genders, the departure from the position may also be for other voluntary reasons, such as seeking a position in another company, starting a new business, or early retirement. Jenter and Kanaan (2015) confirm turnover performance sensitivity and find that CEOs are dismissed following a drop in financial performance, even when shocks to firm performance can be attributed to exogenous factors. To this end, they hand-collect and analyze 3,365 press reports on CEO transitions and determine whether the departure of the CEO was voluntary or not. Cases where the CEO is dismissed or coerced, or retires or resigns as a result of policy differences or pressure are considered forced, and all other cases and instances where the CEO was 60 years old or above at the time of transition are considered voluntary (Jenter & Kanaan, 2015). While highly time-consuming, this is an effective approach of dealing with the nature of job loss, which we could not take due to a very limited amount of press releases covering the CEO transitions in our dataset.

Furthermore, to the best of our knowledge neither the glass cliff, the replacement of female CEOs by traditional leaders, nor turnover gender sensitivity have been explored with as extensive data on transitions at disposal, leading to more robust results. The connection of the Danish CVR and CPR system make this possible. This unique set up for data collection provides a valuable basis to explore the different circumstances that define the rise and descent of female talent, and thus the richness and quality of the data is a worthy contribution itself. Regarding the "savior effect", while the concept was developed and argued for by Cook and Glass (2014), their limited sample size regarding female to male transitions did not permit for any analyses beyond independent t-tests. With the data at hand, we were able to test this concept for the first time in a more sophisticated model that can control for other variables' influence on the likelihood of replacement, namely a logistic regression and a conditional logistic regression on matched data.

Since we examine and compare the circumstances that define women's experience as a CEO of non-family firms to that of family firms in the same institutional context, we can isolate and compare differences in the female leadership experience related to gender according to the ownership type. As laid out above, since half of female CEOs in family firms have familial ties to the owner or departing CEO compared to just 18% of males, these differences may still not define how females are perceived as leaders. For instance, Ahrens et al. (2015) find that irrespective of human capital, male CEO successors are still preferred over female successors in the family firm, which is a similar finding of this study, where 635 CEO transitions are from a father to a son (18% of male follows male CEO transitions), and 145 CEO transitions are from a father to a daugther (9% of female follows male CEO transitions). Nonetheless, even if it is for reasons such as building a dynasty, the support female leaders receive can still be an example to non-family firms.

Kellermanns and Hoy (2017) find an increasing prevalence of mentors within the family firms that actively support the next generation, be it men or women, for their managerial responsibilities. Le Breton-Miller, Miller, and Steier (2004), too, stress that the transfer of knowledge to the next generation, particularly informally, is vital. Not focusing on family firms, Ragins, Townsend, and Mattis (1998) also highlight the indispensability of mentorship in order to advance within the firm. They stress that mentorship is difficult for women to obtain, while men are approached to become mentees. Being provided with the advantages of mentorship as part of the owner-family, then, can demonstrate why women more often become leading professionals in these contexts. Studying only outside hires in family and non-family firms could give more concrete insights into the different dynamics within the two ownership types. Then, if gender equality is to progress, different dynamics also ask for different solutions on how to extend the same opportunities to female leadership as we do to male leadership. Nonetheless, our research lays the ground for asking these questions in further analyses by uncovering that there are differences depending on the ownership, and that it is thus important to take these into account.

Finally, we control for industries, by industry-adjusting our financial variables, as control variable or by matching on industry codes. Yet, the fact that men and women are spread across disparate industries also highlights inequalities. While we controlled for these inequalities to not inflate differences affecting other variables of interests disproportionately, barriers within industries create enduring gender horizontal segregation (Navarro-Astor, Román-Onsalo, & Infante-Perea, 2017). For females such industries are typically construction, engineering and manufacturing, despite more females becoming educated in these sectors (French & Strachan, 2015; Navarro-Astor et al., 2017). Hence, while we control for industries to not introduce bias into our quantitative analyses, bias within the industries persist.

In conclusion, we find that while we can uncover structures that are crucial for further investigation of gender inequalities in Denmark, we are not able to uncover the reasons why these structures exist as they do. To this end, we may merely draw on previous literature that has tried to investigate these causes. However, our study points out the importance of considering different ownership types and thus organizational dynamics, as seen in the very different results when we differentiate between family and non-family firms.

7 Future Outlook

This paper contributes to the literature by analyzing the effect of firm performance on the appointment and replacement, as well as tenure of female CEOs among all firms, family firms and non-family firms in Denmark. Previous studies in this under-researched academic field have mainly focused on publicly listed firms in the United States and the United Kingdom. While our research provides interesting insights for corporate decision-makers, policy makers, and future leaders, by identifying and presenting current structures but not the underlying causes we have only scratched the surface and suggest that future research looks to explain *why* gender is a factor in the appointment of and length of tenure for CEOs. In the following, we first emphasize how our findings relate to *under what conditions* females are appointed CEO and their subsequent leadership experience, and how this can contribute to the public debate about gender equality and equal opportunities. This is followed by specific suggestions for future research.

7.1 Contribution to the Public Debate

As pointed out in the beginning of this study, a mere 69 of the CEOs in Denmark's 1,000 largest firms were female in 2020, a decline of 6 female CEOs from the previous year (Dalgaard, 2020). Since the publication of the article, which initially drew our attention to gender equality among CEOs in Denmark, the World Economic Forum has released their yearly report on gender equality (Andersen, 2021). The report shows that Denmark ranks 29th globally in 2021 compared to 14th in 2020 (Andersen, 2021; World Economic Forum, 2021). The United Kingdom ranks 23rd (21st in 2020) and the United States ranks 30th (53rd in 2020), just one position below Denmark, and thus the differences between Denmark, the United Kingdom, and the United States are not as substantial as they were in the World Economic Forum's report from 2020. One of the reasons why Denmark ranks lower this year is due to the large gender difference among top management and on corporate boards; for example, among the 50 largest firms in Denmark, only three CEOs are female – and all of them are foreigners (Andersen, 2021). According to the World Economic Forum, the global gender gap is not expected to close for 136 years, which is longer than the 2020 projections as the COVID crisis has further increased gender inequality (World Economic Forum, 2021).

Our study demonstrates the existence of a glass cliff in non-family firms in Denmark and that for half of the CEO transitions from male to female in family firms, the woman is the wife of an owner or the daughter of the departing CEO. Therefore, this paper contributes to the public debate by making it clear that the conditions under which females are promoted CEO in Denmark differs substantially from the conditions under which men are promoted CEO, due to financial performance in non-family firms and familial ties in family firms. However, future research is needed to examine why this is the case.

In examining the post-promotion experience of female CEOs, this study fails to demonstrate that a change in financial performance increases the likelihood of female over male CEO replacement. Neither do the analyses find proof that CEO tenure differs significantly between males and females, except when exclusively considering definable start-to-end tenure for non-family firms. This is a very insightful finding for the public debate, as it indicates that women can demonstrate their leadership skills in the same way as men, and thus shows that to improve gender equality among CEOs in Denmark, the focus should be on the conditions under which women are appointed CEO, rather than on their ability to perform as CEOs.

7.2 Suggestions for Future Research

A logical next step in light of this paper's findings is for future research to explore *why* gender is a factor in the appointment of CEOs in non-family firms with the ultimate aim of reaching a point where specific recommendations can be made to corporate decision-makers and policymakers.

The research should include under what conditions a CEO change took place, e.g. whether the CEO decided to leave or was fired, and the underlying reasons in both situations; for example, the desire to spend more time with family or financial underperformance. Being able to test for possible reasons why women were appointed CEO or left the CEO position would enrich the discussion on gender equality among CEOs considerably. Additionally, future research should examine what role corporate board diversity plays in deciding the gender of the CEO. Moreover, investigating wage differences among female and male CEOs will further add to the research on the female leadership experience and thus the gender equality discussion and can be combined with other sociodemographic characteristics such as religion, education, nationality, belonging to the LGBTQ+ community, and number of children.

In addition to the above, this study encourages future research to investigate the underlying causes of changes in firms' financial performance more precisely. As such, it is important to clarify whether increasing and even more so decreasing firm performance is due to internal or external events, such as market and industry shocks, and whether the nature of the financial downturn impacts the choice of the gender of the CEO. Broadening the scope of this paper, future research could not only control for economic instability by controlling for the year of the CEO transition but investigate whether times of crisis have a positive or negative influence on gender discrimination among CEOs. As such, comparing the financial crisis with the COVID crisis could yield interesting results because of the very different economic trajectories of the two crises.

We do not compare the 198 female to female CEO transitions in our dataset to transitions where a female CEO is followed by a male CEO. Such a study would nuance our analysis and potentially add new perspectives to the gendered view on CEO appointment and length of tenure. Likewise, conducting the glass cliff and tenure analyses dividing between different industries and dividing between different firm sizes would yield interesting insights to potential differences between female and male CEOs in Denmark.

As Cook and Glass (2014b) have done in their peer reviewed study, we decided to both include performance trends prior to CEO appointment and after without the use of instrumental variables. From a methodological perspective, a study relating post appointment performance to the gender of the CEO may raise strong endogeneity concerns with reverse causality as a severe problem (Bechtoldt et al., 2019). Our tenure analyses tried to deal with endogeneity by employing nearest neighbor matching, and as such, we believe our study delivers valuable insights, both regarding content and methodology. However, future research could design a similar study addressing endogeneity concerns with an instrumental variable approach.

Finally, despite the difficulties of cross-border comparative studies, this study could be replicated in other countries to examine whether the ownership structure influences the gender choice and extension of opportunity to lead among corporate decision-makers. This is not least valuable in the United States and the United Kingdom to compare the findings to the studies previously conducted for publicly listed firms in the two countries. Although we did not find evidence of the glass cliff among family firms nor clear proof of differences in CEO tenure among men and women in Denmark, we cannot preclude the possibility that these unfavorable conditions exist in other countries. Therefore, and due to the extensive data available in Denmark, we have paved the way for new approaches of studying the glass cliff, and we call on other researchers to make use of this opportunity to study the female leadership experience in other institutional contexts.

8 Conclusion

This paper studies how firm performance impacts the likelihood of female CEO appointment and replacement, and how length of tenure compares to male CEOs within both family and non-family firms in Denmark, and how these findings contribute to the discourse on gender equality. By relying on a unique dataset constructed by using data from the Central Business Register (CVR) combined with information from the Danish Civil Registration System (CPR) including familial ties and gender, we find that in non-family firms, female CEOs are more likely to be appointed CEO in firms experiencing declining profitability. Results related to the tenure of female CEOs in non-family firms are inconclusive as mean comparisons between females and males show a clear difference in tenure with females experiencing a mean tenure that is 15 months shorter than male CEOs, while regressions including control variables point towards no difference in tenure.

Comparing family and non-family firms, we find that 38% of CEO transitions from a male are to a female in family firms, whereas only 13% of CEO transitions in non-family firms from a male are to a female, a difference significant at the 1%-level. Furthermore, for family firms with a male

CEO, the ROA *level* one, two, and three years before a CEO transition, is significantly larger when a female CEO is appointed than when a male CEO is appointed, indicating the opposite of a glass cliff at the level in family firms. Building on these two findings, this paper shows that 50% of females appointed CEO in family firms are either the wife of an owner or the daughter of the departing CEO and discusses the implications of these findings for the family firm literature. Specifically, 9% of CEO transitions from males to females are from a father to a daughter whereas 18% are from a father to a son. Regarding the female leadership experience post appointment in family firms, we cannot conclude that females face a higher probability of replacement by a traditional leader and generally, females do not face a higher risk of turnover post assignment. We find that if the ultimate reason for job loss is retirement, tenure is longer.

Our findings have broad implications for the family firm literature and research on gender equality among CEOs, as it is the first study of its kind to investigate firms in Denmark and the first study to distinguish between and compare the ownership types of family-owned and non-family-owned firms internationally. Furthermore, to the best of our knowledge, this is the first study of its kind that can go beyond t-tests when examining traditional leader replacement due to the large dataset, and thus supplementing t-tests with logistic and conditional logistic regressions to include and control for other factors that influence female CEOs' likelihood of job-loss. Finally, we call on future research to investigate *why* gender is a factor related to performance in the appointment of CEOs in non-family firms, and for this study to be replicated in other countries.

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10 Appendices

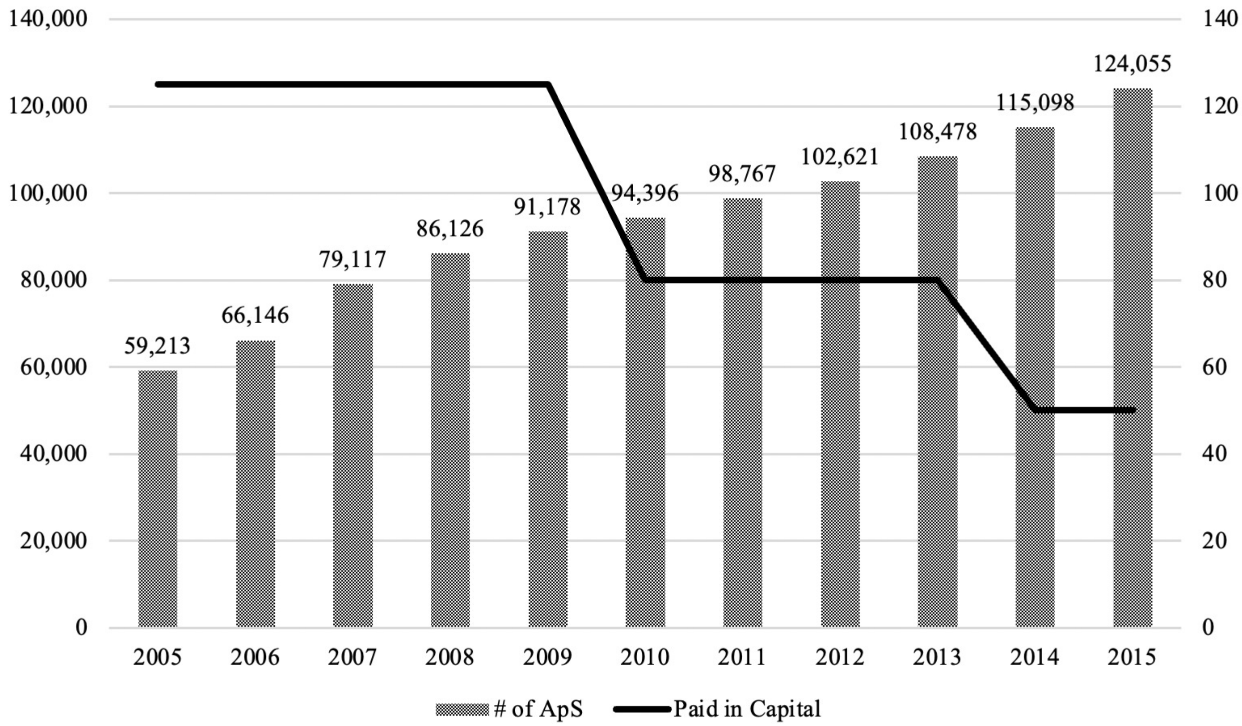
10.1 CEO Transitions by Month

The table shows the number of CEO appointments per month for the years 2005-2015. A CEO appointment is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.

Month of CEO transition	All I	Male Follows Male II	Female Follows Male III	Male Follows Female IV	Female Follows Female V
January	580	344	142	80	14
		(0.59)	(0.24)	(0.14)	(0.02)
February	469	244	113	95	17
		(0.52)	(0.24)	(0.20)	(0.04)
March	568	313	151	85	19
		(0.55)	(0.27)	(0.15)	(0.03)
April	480	251	119	97	13
		(0.52)	(0.25)	(0.20)	(0.03)
May	647	362	188	84	13
		(0.56)	(0.29)	(0.13)	(0.02)
June	707	391	194	100	22
		(0.55)	(0.27)	(0.14)	(0.03)
July	446	273	95	61	17
		(0.61)	(0.21)	(0.14)	(0.04)
August	402	225	104	54	19
		(0.56)	(0.26)	(0.13)	(0.05)
September	516	283	141	76	16
		(0.55)	(0.27)	(0.15)	(0.03)
October	600	325	151	103	21
		(0.54)	(0.25)	(0.17)	(0.04)
November	541	293	151	87	10
		(0.54)	(0.28)	(0.16)	(0.02)
December	536	293	147	79	17
		(0.55)	(0.27)	(0.15)	(0.03)
Total	**6,492**	**3,597**	**1,696**	**1,001**	**198**

10.2 Increase of ApS after Decrease in Capital Requirements

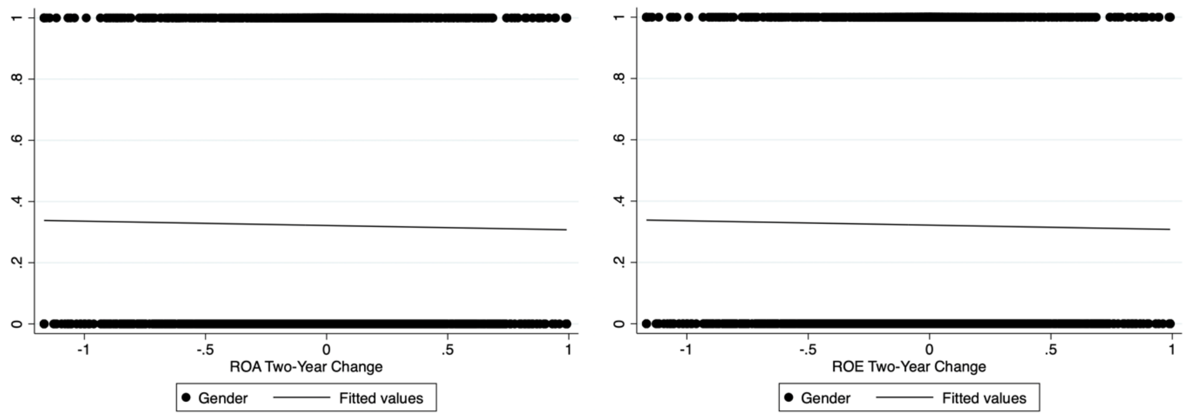
The figure illustrates the number of registered Aps in Denmark from 2005 to 2015, and the paid in capital requirements for registering an Aps within this period. The y-axis to the right is in DKK thousands.



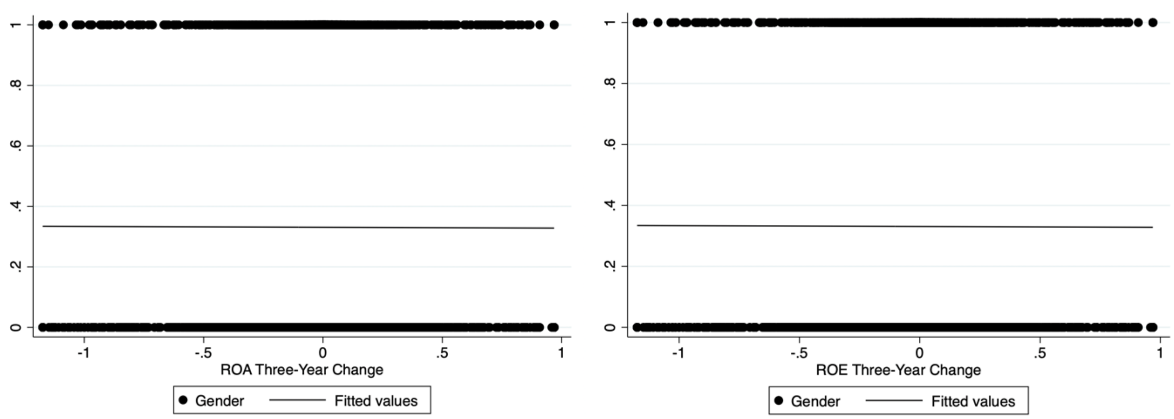
10.3 Scatterplots from the Linear Probability Model to Test for the Glass Cliff

Female CEO appointment given the percentage-point change in ROA and ROE.

a) The Two-Year Percentage-Point Change in ROA and ROE



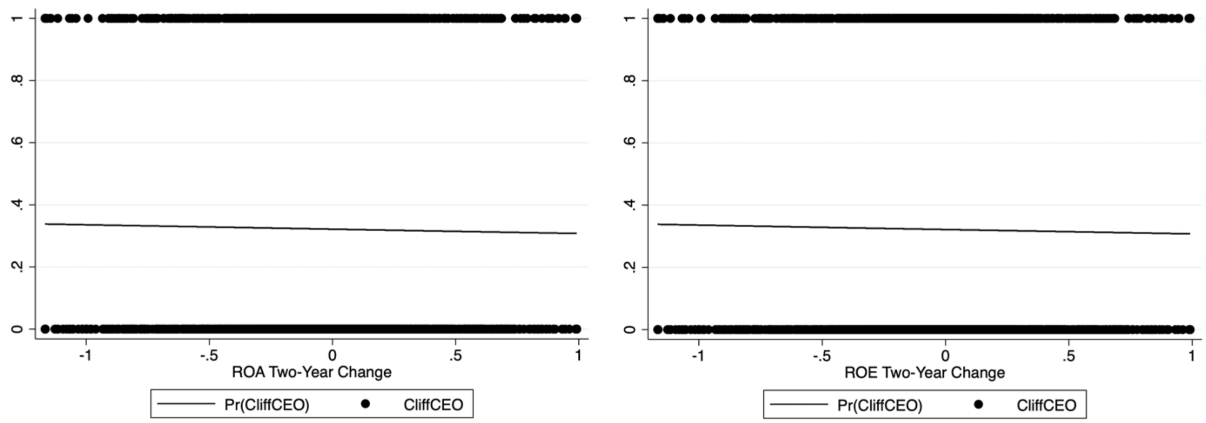
b) The Three-Year Percentage-Point Change in ROA and ROE



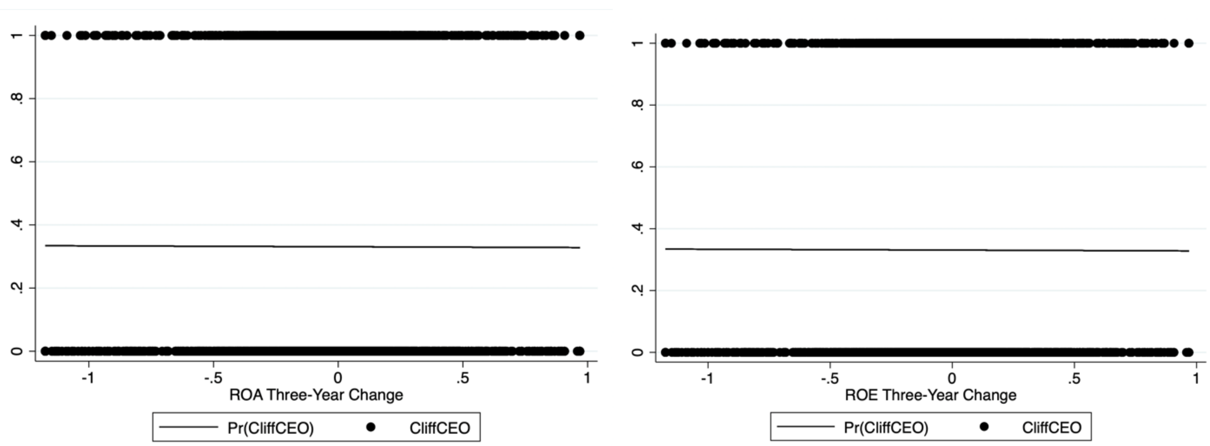
10.4 Scatterplot from the Logistic Model to Test for the Glass Cliff

Female CEO appointment given the percentage-point change in ROA and ROE.

a) The Two-Year Percentage-Point Change in ROA and ROE



b) The Three-Year Percentage-Point Change in ROA and ROE



10.5 Linear Probability Model to Test for the Glass Cliff on Percentage-Point Change

This table presents estimates of the effects of the gender of the newly appointed CEO. The coefficients are estimated using the linear probability model. Financial performance variables are the two- and three-year percentage-point change in ROA and ROE. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change in ROA and ROE

	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variables								
1. ROA 2-Year, pp Change	-0.01	-0.34						
	(0.02)							
2. ROE 2-Year, pp Change			-0.01	-0.34				
			(0.02)					
3. ROA 3-Year, pp Change					0.00	0.01		
					(0.02)			
4. ROE 3-Year, pp Change							0.00	0.01
							(0.02)	
Control Variables								
5. Family	0.25	19.84***	0.25	19.84***	0.25	18.56***	0.25	18.56***
	(0.01)		(0.01)		(0.01)		(0.01)	
6. Total Assets	-0.00	-3.75***	-0.00	-3.75***	-0.00	-3.78***	-0.00	-3.78***
	(0.00)		(0.00)		(0.00)		(0.00)	
7. Industry	0.02	7.72***	0.02	7.72***	0.02	7.43***	0.02	7.43***
	(0.00)		(0.00)		(0.00)		(0.00)	
8. Year	0.00	2.44**	0.00	2.44**	0.00	2.01**	0.00	2.01**
	(0.00)		(0.00)		(0.00)		(0.00)	
9. Observations	5,180		5,180		4,567		4,567	
10. # Appointments	1,669		1,669		1,513		1,513	

10.6 Linear Probability Model to Test for the Glass Cliff on Percentage-Point Change as Dummy Variable

This table presents estimates of the effects of the gender of the newly appointed CEO. The coefficients are estimated using the linear probability model. Financial performance variables are the two- and three-year percentage-point change in ROA and ROE converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Dummy Variable for Increase or Decrease in ROA and ROE

	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic	Coef.	t-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variables								
1. ROA 2-Year, Change	-0.00	-0.12						
	(0.01)							
2. ROE 2-Year, Change			-0.00	-0.12				
			(0.01)					
3. ROA 3-Year, Change					0.00	0.27		
					(0.01)			
4. ROE 3-Year, Change							0.00	0.27
							(0.01)	
Control Variables								
5. Family	0.25	19.61***	0.25	19.61***	0.25	18.48***	0.25	18.48***
	(0.01)		(0.01)		(0.01)		(0.01)	
6. Total Assets	-0.00	-3.73***	-0.00	-3.73***	-0.00	-3.78***	-0.00	-3.78***
	(0.00)		(0.00)		(0.00)		(0.00)	
7. Industry	0.02	7.88***	0.02	7.88***	0.02	7.60***	0.02	7.60***
	(0.00)		(0.00)		(0.00)		(0.00)	
8. Year	0.01	2.48**	0.01	2.48**	0.00	2.08**	0.00	2.08**
	(0.00)		(0.00)		(0.00)		(0.00)	
9. Observations	5,101		5,101		4,514		4,514	
10. # Appointments	1,658		1,658		1,508		1,508	

10.7 Logistic Regressions to Test for the Glass Cliff on the Percentage-Point Change in ROE

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change in ROE												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, pp Change	0.98	-0.28			1.05	0.58			0.46	-2.66***		
	(0.09)				(0.10)				(0.13)			
2. ROE 3-Year, pp Change			1.00	-0.02			1.03	0.28			0.78	-0.83
			(0.09)				(0.10)				(0.23)	
Control Variables												
3. Family	4.05	15.10***	4.03	14.12***								
	(0.38)		(0.40)									
4. Total Assets	1.00	-2.09**	1.00	-2.06**	1.00	-1.76*	1.00	-1.76*	1.00	-2.27**	1.00	-2.11**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
5. Industry	1.11	7.61***	1.12	7.32***	1.12	7.77***	1.13	7.63***	1.04	1.07	1.02	0.47
	(0.02)		(0.02)		(0.02)		(0.02)		(0.04)		(0.04)	
6. Year	1.02	2.49**	1.02	2.07**	1.03	2.73***	1.03	2.34**	0.99	-0.29	0.99	-0.43
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.03)	
7. Observations	5,180		4,567		3,977		3,534		1,203		1,033	
8. # Appointments	1,669		1,513		1,511		1,373		158		140	
9. Chi-Square	284.1***		249.13***		71.97***		67.42***		12.58**		5.43	
10. Difference in Predicted Probability of Female CEO Appointment - ROE	-0.51%		-0.04%		1.23%		0.62%		-8.18%		-2.64%	

10.8 Intercorrelations of Variables for the Glass Cliff Analysis on Change as Dummy Variable

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Female	1.00								
2. Family	0.22	1.00							
3. Total Assets	-0.03	-0.03	1.00						
4. Industry	0.11	0.02	-0.00	1.00					
5. Year	0.03	0.00	0.01	0.03	1.00				
6. ROA 2-Year	0.00	0.01	0.02	0.02	-0.02	1.00			
7. ROE 2-Year	0.00	0.01	0.02	0.02	-0.02	1.00	1.00		
8. ROA 3-Year	0.01	0.00	0.02	0.02	-0.01	0.40	0.40	1.00	
9. ROE 3-Year	0.01	0.00	0.02	0.02	-0.01	0.40	0.40	1.00	1.00

10.9 Logistic Regressions to Test for the Glass Cliff on ROE as Dummy Variable

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Dummy Variable for Increase or Decrease in ROE

	All Firms				**Family Firms**				**Non-Family Firms**			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, Change	0.99	-0.15			1.03	0.47			0.76	-1.60		
	(0.06)				(0.07)				(0.13)			
2. ROE 3-Year, Change			1.01	0.17			1.05	0.74			0.77	-1.43
			(0.07)				(0.07)				(0.14)	
Control Variables												
3. Family	4.03	14.93***	4.04	14.04***								
	(0.38)		(0.40)									
4. Total Assets	1.00	-2.11**	1.00	-2.08**	1.00	-1.78*	1.00	-1.77*	1.00	-2.25**	1.00	-2.11**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
5. Industry	1.12	7.77***	1.12	7.48***	1.13	7.92***	1.13	7.80***	1.04	1.08	1.02	0.51
	(0.02)		(0.02)		(0.02)		(0.02)		(0.04)		(0.04)	
6. Year	1.03	2.54**	1.02	2.15**	1.03	2.76***	1.03	2.43**	0.99	-0.29	0.99	-0.48
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.03)	
7. Observations	5,101		4,514		3,929		3,502		1,172		1,012	
8. # Appointments	1,669		1,513		1,502		1,370		156		138	
9. Chi-Square	280.36***		248.92***		74.17***		70.76***		8.84*		6.56	
10. Difference in Predicted Probability of Female CEO Appointment - ROE	-0.19%		0.24%		0.73%		1.23%		-2.97%		-2.87%	

10.10 Conditional Logistic Regressions to Test for the Glass Cliff on the Percentage-Point Change in ROE by Family and Non-Family Firms

This table presents estimates of the effects of the gender of the newly appointed CEO. The odds ratios are estimated using the conditional logistic regression model, where treatment firms (female follows male) are optimally matched 1:1 nearest neighbor with control firms (male follows male) according to year of appointment, industry, ownership type, and total assets. Financial performance variables are the two- and three-year percentage-point change in ROE. Standard errors are clustered on the firm level and reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Glass Cliff on Percentage-Point Change in ROE by Family and Non-Family Firms

	Family Firms				**Non-Family Firms**			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variables								
1. ROE 2-Year, pp Change	1.14	0.95			0.61	-1.06		
	(0.16)				(0.28)			
2. ROE 3-Year, pp Change			1.11	0.74			0.72	-0.83
			(0.15)				(0.29)	
3. Observations	1,688		1,688		244		244	
4. # Appointments	844		844		122		122	
5. Chi-Square	0.90		0.55		1.12		0.68	
6. Difference in Predicted Probability of Female CEO Appointment - ROE	3.26%		2.55%		-12.24%		-8.33%	

10.11 Share of Family Firms in Traditional Leader Replacement Analysis

	Male follows Female	Male Follows Male	Total
Non-Family Firms			
Frequency	106	1,058	1,164
Expected Frequency	*253.2*	*910.8*	*1,164*
Chi-Square Contribution	*85.60*	*23.80*	*109.40*
Cell Percentage	*2.31*	*23.04*	*25.35*
Family Firms			
Frequency	893	2,535	3,428
Expected Frequency	*745.8*	*2682.2*	*3,428*
Chi-Square Contribution	*29.10*	*8.10*	*37.20*
Cell Percentage	*19.45*	*55.20*	*74.65*
Total			
Frequency	999	3,593	4,592
Expected Frequency	*999*	3,593	*4,592*
Chi-Square Contribution	*114.70*	31.90	*146.60*
Cell Percentage	*21.76*	78.24	*100.00*

Pearson's Chi-Square Value = 146.55
P-Value = 0.00

10.12 T-Tests Analyses to Test for Traditional Leadership Replacement on Percentage-Point Change in ROE

The table reports summary statistics for the percentage-point change in ROE for the two- and three-years leading up to a CEO transition. Before finding the percentage-point change, ROE has been industry adjusted. Industries are classified using DB07's division into ten different industries excluding an "other" industry category. The percentage-point change in ROE is winsorized at the 2.5^{th} and 97.5^{th} percentile. Column I and II concern CEO transitions where a male CEO follows a female CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Percentage-Point Change in ROE

	Male Follows Female		Male Follows Male		
Variable	Mean	s.d.	Mean	s.d.	t-statistic
	I	II	III	IV	V
All Firms					
1. ROE 2-Year, pp Change	-0.02	0.37	-0.02	0.34	0.11
2. ROE 3-Year, pp Change	-0.02	0.36	-0.02	0.35	0.35
Family Firms					
3. ROE 2-Year, pp Change	-0.02	0.36	-0.03	0.36	-0.24
4. ROE 3-Year, pp Change	-0.02	0.36	-0.02	0.37	-0.10
Non-Family Firms					
5. ROE 2-Year, pp Change	0.02	0.40	0.01	0.28	-0.55
6. ROE 3-Year, pp Change	-0.04	0.37	-0.01	0.31	0.94

10.13 Chi-Square Analyses to Test for Traditional Leader Replacement on Change as Dummy Variable

The table reports summary statistics for the chi-square analyses on a decrease or increase in the percentage-point change of ROA and ROE as a dummy variable, and gender. Column I and II concern CEO transitions where a male CEO follows a female CEO, and column III and IV concern CEO transitions where a male CEO follows a male CEO. Column V provides the chi-square value. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Traditional Leader Replacement on Dummy Variable						
		Male Follows Female		Male Follows Male		
Variable		Frequency	Expected Frequency	Frequency	Expected Frequency	Chi-Square Value
		I	II	III	IV	V
All Firms						
1. ROA 2-Year Change	Decrease	484	494	1,784	1,774	0.54
	Increase	475	465	1,659	1,669	
2. ROE 2-Year Change	Decrease	484	494	1,784	1,774	0.54
	Increase	475	465	1,659	1,669	
3. ROA 3-Year Change	Decrease	430	439	1,541	1,533	0.43
	Increase	430	422	1,465	1,474	
4. ROE 3-Year Change	Decrease	430	439	1,541	1,533	0.43
	Increase	430	422	1,465	1,474	
Family Firms						
5. ROA 2-Year Change	Decrease	441	450	1,263	1,255	0.46
	Increase	428	420	1,162	1,171	
6. ROE 2-Year Change	Decrease	441	450	1,263	1,255	0.46
	Increase	428	420	1,162	1,171	
7. ROA 3-Year Change	Decrease	393	400	1,097	1,090	0.32
	Increase	388	381	1,033	1,040	
8. ROE 3-Year Change	Decrease	393	400	1,097	1,090	0.32
	Increase	388	381	1,033	1,040	
Non-Family Firms						
9. ROA 2-Year Change	Decrease	43	46	521	518	0.38
	Increase	47	44	497	500	
10. ROE 2-Year Change	Decrease	43	46	521	518	0.38
	Increase	47	44	497	500	
11. ROA 3-Year Change	Decrease	37	40	444	441	0.43
	Increase	42	39	432	435	
12. ROE 3-Year Change	Decrease	37	40	444	441	0.43
	Increase	42	39	432	435	

10.14 Intercorrelations of Variables for Traditional Leader Replacement Analysis on Percentage-Point Change

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Female	1.00										
2. Tenure	-0.02	1.00									
3. Family	0.18	0.09	1.00								
4. Total Assets	-0.09	0.06	-0.09	1.00							
5. Industry	0.07	-0.10	-0.02	-0.01	1.00						
6. Year	0.00	0.07	-0.01	0.01	0.04	1.00					
7. Retirement	-0.04	0.13	0.06	0.07	-0.02	0.01	1.00				
8. ROA 2-Year, pp Change	0.01	0.00	-0.02	0.01	0.03	0.00	-0.01	1.00			
9. ROE 2-Year, pp Change	0.01	0.00	-0.02	0.01	0.03	0.00	-0.01	1.00	1.00		
10. ROA 3-Year, pp Change	-0.01	-0.01	-0.02	0.00	0.03	-0.02	-0.01	0.60	0.60	1.00	
11. ROE 3-Year, pp Change	-0.01	-0.01	-0.02	0.00	0.03	-0.02	-0.01	0.60	0.60	1.00	1.00

10.15 Intercorrelations of Variables for Traditional Leader Replacement on Change as Dummy Variable

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Female	1.00										
2. Tenure	-0.02	1.00									
3. Family	0.19	0.08	1.00								
4. Total Assets	-0.09	0.05	-0.10	1.00							
5. Industry	0.07	-0.09	-0.02	0.00	1.00						
6. Year	0.00	0.07	0.00	0.02	0.04	1.00					
7. Retirement	-0.04	0.13	0.06	0.06	-0.02	0.01	1.00				
8. ROA 2-Year, pp Change	0.03	0.00	0.01	0.01	0.02	-0.01	0.00	1.00			
9. ROE 2-Year, pp Change	0.03	0.00	0.01	0.01	0.02	-0.01	0.00	1.00	1.00		
10. ROA 3-Year, pp Change	0.01	0.01	-0.01	0.00	0.01	-0.01	0.00	0.41	0.41	1.00	
11. ROE 3-Year, pp Change	0.01	0.01	-0.01	0.00	0.01	-0.01	0.00	0.41	0.41	1.00	1.00

10.16 Logistic Regressions to Test for Traditional Leader Replacement on the Percentage-Point Change in ROE

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE prior to the CEO replacement. Tenure is the male or female predecessor's tenure and reported in months. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measure the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Percentage-Point Change in ROE

	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, pp Change	1.04	0.35			1.03	0.25			1.05	0.11		
	(0.11)				(0.11)				(0.45)			
2. ROE 3-Year, pp Change			0.97	-0.30			1.00	0.04			0.69	-1.05
			(0.10)				(0.11)				(0.25)	
3. Tenure	1.00	-0.34	1.00	-1.09	1.00	0.49	1.00	-0.37	0.99	-2.66***	0.99	-2.55**
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Family	3.66	11.67***	3.76	11.05***								
	(0.41)		(0.45)									
5. Total Assets	0.99	-4.7***	0.99	-4.50***	0.99	-4.21***	0.99	-4.10***	0.99	-1.86*	0.99	-1.71*
	(0.00)		(0.00)		(0.00)		(0.00)		(0.01)		(0.01)	
6. Industry	1.08	4.42***	1.08	4.42***	1.06	3.57***	1.07	3.48***	1.15	2.87***	1.20	3.18***
	(0.02)		(0.02)		(0.02)		(0.02)		(0.06)		(0.07)	
7. Retirement	0.83	-1.99**	0.79	-2.33**	0.81	-2.10**	0.77	-2.45**	1.00	0.00	1.00	-0.01
	(0.08)		(0.08)		(0.08)		(0.08)		(0.31)		(0.32)	
8. Year	1.01	0.48	1.00	0.17	1.01	0.90	1.01	0.78	0.96	-1.03	0.94	-1.55
	(0.01)		(0.01)		(0.01)		(0.01)		(0.04)		(0.04)	
9. Observations	4,482		3,920		3,335		2,940		1,147		980	
10. # Appointments	977		871		875		784		102		87	
11. Chi-Square	191.93***		179.1***		37.66***		38.5***		25.71***		28.63***	
12. Difference in Pred. Probability of Female Replacement - ROE	0.59%		-0.51%		0.51%		0.08%		0.32%		-2.61%	
13. Difference in Pred. Probability of Female Replacement - Tenure	0.00%		-0.01%		0.01%		-0.01%		-0.05%		-0.05%	

10.17 Logistic Regressions to Test for Traditional Leader Replacement with ROA as Dummy Variable

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Tenure is the male or female predecessor's tenure and reported in months. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Dummy Variable for Increase or Decrease in ROA												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROA 2-Year, Change	1.07	0.90			1.06	0.77			1.03	0.14		
	(0.08)				(0.08)				(0.23)			
2. ROA 3-Year, Change			1.07	0.84			1.06	0.69			1.13	0.50
			(0.09)				(0.09)				(0.27)	
3. Tenure	1.00	-0.14	1.00	-0.99	1.00	0.33	1.00	-0.52	1.00	-1.67*	0.99	-1.81*
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Family	4.05	11.94***	4.09	11.26***								
	(0.47)		(0.51)									
5. Total Assets	0.99	--4.65***	0.99	-4.48***	0.99	-4.28***	0.99	-4.18***	0.99	-1.71*	0.99	-1.56
	(0.00)		(0.00)		(0.00)		(0.00)		(0.01)		(0.01)	
6. Industry	1.07	4.29***	1.08	4.36***	1.06	3.48***	1.07	3.44***	1.21	3.11***	1.14	2.60***
	(0.02)		(0.02)		(0.02)		(0.02)		(0.07)		(0.06)	
7. Retirement	0.81	-2.15**	0.77	-2.52**	0.79	-2.33**	0.75	-2.71***	1.05	0.15	1.02	0.07
	(0.08)		(0.08)		(0.08)		(0.08)		(0.33)		(0.33)	
8. Year	1.00	0.00	1.00	-0.11	1.01	0.99	1.01	0.91	0.90	-2.77***	0.89	-2.83***
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.04)	
9. Observations	4,397		3,861		3,291		2,908		1,106		953	
10. # Appointments	959		959		869		781		90		79	
11. Chi-Square	195.4***		182.36***		38.99***		41.17***		23.77***		25.14***	
12. Difference in Predicted Probability of Female Replacement - ROA	1.07%		1.08%		1.19%		1.14%		0.21%		0.77%	
13. Difference in Predicted Probability of Female Replacement - Tenure	0.00%		-0.01%		0.00%		-0.01%		-0.03%		-0.03%	

10.18 Logistic Regressions to Test for Traditional Leader Replacement with ROE as Dummy Variable

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Tenure is the male or female predecessor's tenure and reported in months. Family is a dummy variable equal to 1 if the firm is a family firm and 0 otherwise. Total assets are in mDKK and measures the firm size. The firm's industry is identified through the division in DB07. The year of the appointment is coded as a trend variable. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Traditional Leader Replacement on Dummy Variable for Increase or Decrease in ROE												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, Change	1.07	0.90			1.06	0.77			1.03	0.14		
	(0.08)				(0.08)				(0.23)			
2. ROE 3-Year, Change			1.07	0.84			1.06	0.69			1.13	0.50
			(0.09)				(0.09)				(0.27)	
3. Tenure	1.00	-0.14	1.00	-0.99	1.00	0.33	1.00	-0.52	1.00	-1.67*	0.99	-1.81*
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Family	4.05	11.94***	4.09	11.26***								
	(0.47)		(0.51)									
5. Total Assets	0.99	--4.65***	0.99	-4.48***	0.99	-4.28***	0.99	-4.18***	0.99	-1.71*	0.99	-1.56
	(0.00)		(0.00)		(0.00)		(0.00)		(0.01)		(0.01)	
6. Industry	1.07	4.29***	1.08	4.36***	1.06	3.48***	1.07	3.44***	1.21	3.11***	1.14	2.60***
	(0.02)		(0.02)		(0.02)		(0.02)		(0.07)		(0.06)	
7. Retirement	0.81	-2.15**	0.77	-2.52**	0.79	-2.33**	0.75	-2.71***	1.05	0.15	1.02	0.07
	(0.08)		(0.08)		(0.08)		(0.08)		(0.33)		(0.33)	
8. Year	1.00	0.00	1.00	-0.11	1.01	0.99	1.01	0.91	0.90	-2.77***	0.89	-2.83***
	(0.01)		(0.01)		(0.01)		(0.01)		(0.03)		(0.04)	
9. Observations	4,397		3,861		3,291		2,908		1,106		953	
10. # Appointments	959		959		869		781		90		79	
11. Chi-Square	195.4***		182.36***		38.99***		41.17***		23.77***		25.14***	
12. Difference in Predicted Probability of Female Replacement - ROE	1.07%		1.08%		1.19%		1.14%		0.21%		0.77%	
13. Difference in Predicted Probability of Female Replacement - Tenure	0.00%		-0.01%		0.00%		-0.01%		-0.03%		-0.03%	

10.19 T-Test Analyses to Test for Traditional Leader Replacement

The table reports summary statistics for continuous variables of interest surrounding traditional leader replacement. CEO tenure is reported in months. CEO age is reported in years. Column I and II concern incoming female CEOs and column III and IV concern incoming male CEOs between 2005 and 2015. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

T-Tests of Continuous Variables for Matched Traditional Leader Replacement

	Female CEO		Male CEO		
Variable	Mean	s.d.	Mean	s.d.	t-statistic
	I	II	III	IV	V
All Firms					
1. Tenure	95	53	97	52	0.86
2. CEO Age	53	13	55	13	1.73*
Family Firms					
3. Tenure	96	54	100	52	1.16
4. CEO Age	53	13	55	13	2.04**
Non-Family Firms					
5. Tenure	81	40	74	43	-0.96
6. CEO Age	52	12	51	12	-0.69

10.20 Conditional Logistic Regressions on the Percentage-Point Change in ROA

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the conditional logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA prior to the CEO replacement. Tenure is the male or female predecessor's tenure. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test of Traditional Leader Replacement on the Percentage-Point Change in ROA				
	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV
Predictor Variables				
1. ROA 2-Year, pp Change	0.99	-0.07		
	(0.15)			
2. ROA 3-Year, pp Change			0.95	-0.36
			(0.15)	
3. Tenure	1.00	-0.61	1.00	-0.61
	(0.00)		(0.00)	
Control Variables				
4. Retirement	0.72	-2.35**	0.72	-2.36**
	(0.14)		(0.14)	
5. Observations	1,320		1,320	
6. # Appointments	660		660	
7. Chi-Square	6.31*		6.46*	
8. Difference in Pred. Probability of Female Replacement - ROA	-0.25%		-1.35%	
9. Difference in Pred. Probability of Female Replacement - Tenure	-0.02%		-0.02%	

10.21 Conditional Logistic Regressions on the Percentage-Point Change in ROE

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the conditional logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE prior to the CEO replacement. Tenure is the male or female predecessor's tenure and reported in months. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test of Traditional Leader Replacement on Percentage-Point Change in ROE												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, pp Change	0.99	-0.07			1.00	-0.02			1.20	0.38		
	(0.15)				(0.16)				(0.47)			
2. ROE 3-Year, pp Change			0.95	-0.36			1.01	0.06			0.69	-0.85
			(0.15)				(0.16)				(0.44)	
3. Tenure	1.00	-0.61	1.00	-0.61	1.00	-0.86	1.00	-0.86	1.00	0.98	1.00	0.70
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Retirement	0.72	-2.35**	0.72	-2.36**	0.68	-2.62***	0.68	-2.62***	1.45	0.72	1.40	0.68
	(0.14)		(0.14)		(0.15)		(0.15)		(0.51)		(0.50)	
5. Observations	1,320		1,320		1,180		1,180		140		140	
6. # Appointments	660		660		590		590		70		70	
7. Chi-Square	6.31*		6.46*		8.22**		8.22**		1.38		2.41	
8. Difference in Pred. Probability of Female Replacement - ROE	-0.25%		-1.35%		-0.07%		0.24%		17.84%		4.30%	
9. Difference in Pred. Probability of Female Replacement - Tenure	-0.02%		-0.02%		-0.02%		-0.02%		0.44%		0.11%	

10.22 Conditional Logistic Regressions with ROA as Dummy Variable

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the conditional logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROA prior to the CEO replacement converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Tenure is the male or female predecessor's tenure and reported in months. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test of Traditional Leader Replacement on Dummy Variable for Increase or Decrease in ROA

	All Firms				**Family Firms**				**Non-Family Firms**			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROA 2-Year, Change	0.99	-0.08			0.99	-0.06			1.10	0.28		
	(0.11)				(0.12)				(0.35)			
2. ROA 3-Year, Change			0.99	-0.06			1.03	0.23			0.77	-0.70
			(0.12)				(0.12)				(0.38)	
3. Tenure	1.00	-0.61	1.00	-0.61	1.00	-0.85	1.00	-0.86	1.00	0.94	1.00	0.77
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Retirement	0.72	-2.35**	0.72	-2.35**	0.68	-2.62***	0.68	-2.60***	1.43	0.70	1.42	0.73
	(0.10)		(0.14)		(0.15)		(0.15)		(0.51)		(0.48)	
5. Observations	1,320		1,320		1,180		1,180		140		140	
6. # Appointments	660		660		590		590		70		70	
7. Chi-Square	6.32*		6.31*		8.23**		8.28**		1.32		2.03	
8. Difference in Predicted Probability of Female Replacement - ROA	-0.21%		-0.18%		-0.16%		0.71%		2.33%		-6.62%	
9. Difference in Predicted Probability of Female Replacement - Tenure	-0.02%		-0.02%		-0.02%		-0.02%		0.10%		0.08%	

10.23 Conditional Logistic Regressions with ROE as Dummy Variable

This table presents estimates of the effects of the gender of the predecessor. The odds ratios are estimated using the conditional logistic regression model. Financial performance variables are the two- and three-year percentage-point change in ROE prior to the CEO replacement converted to a dummy variable, where 1 indicates an increase in in firm profitability and 0 indicates a decrease in firm profitability. Tenure is the male or female predecessor's tenure and reported in months. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test of Traditional Leader Replacement on Dummy Variable for Increase or Decrease in ROE												
	All Firms				Family Firms				Non-Family Firms			
	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic	Odds Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variables												
1. ROE 2-Year, Change	0.99	-0.08			0.99	-0.06			1.10	0.28		
	(0.11)				(0.12)				(0.35)			
2. ROE 3-Year, Change			0.99	-0.06			1.03	0.23			0.77	-0.70
			(0.12)				(0.12)				(0.38)	
3. Tenure	1.00	-0.61	1.00	-0.61	1.00	-0.85	1.00	-0.86	1.00	0.94	1.00	0.77
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Control Variables												
4. Retirement	0.72	-2.35**	0.72	-2.35**	0.68	-2.62***	0.68	-2.60***	1.43	0.70	1.42	0.73
	(0.10)		(0.14)		(0.15)		(0.15)		(0.51)		(0.48)	
5. Observations	1,320		1,320		1,180		1,180		140		140	
6. # Appointments	660		660		590		590		70		70	
7. Chi-Square	6.32*		6.31*		8.23**		8.28**		1.32		2.03	
8. Difference in Predicted Probability of Female Replacement - ROE	-0.21%		-0.18%		-0.16%		0.71%		2.33%		-6.62%	
9. Difference in Predicted Probability of Female Replacement - Tenure	-0.02%		-0.02%		-0.02%		-0.02%		0.10%		0.08%	

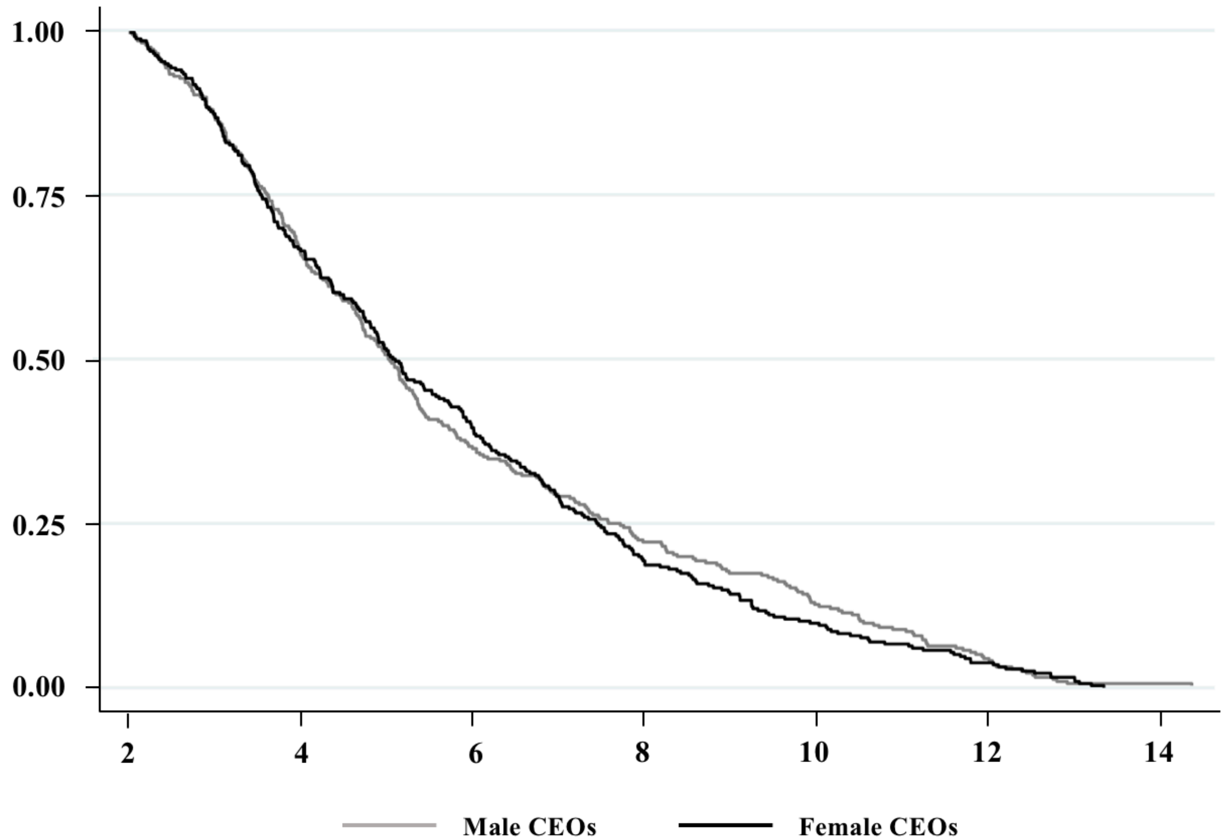
10.24 Chi-Square Analyses to Test for Turnover Gender Sensitivity Excluding Survivors

The table reports summary statistics for the chi-square analyses on a decrease or increase in the change of ROE as a dummy variable, and gender. Column I and II concern female CEOs appointed, and column III and IV concern male CEOs appointed. Column V provides the chi-square value. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for Turnover Gender Sensitivity on Dummy Variable for ROE Change						
		Female CEO		**Male CEO**		
Variable		Frequency	Expected Frequency	Frequency	Expected Frequency	Chi-Square Value
		I	II	III	IV	V
All Firms						
1. ROE 2-Year Change	Decrease	171	171	171	171	0.00
	Increase	145	145	145	145	
2. ROE 3-Year Change	Decrease	177	175	173	175	0.10
	Increase	139	141	143	141	
Family Firms						
3. ROE 2-Year Change	Decrease	142	144	146	144	0.12
	Increase	123	121	119	121	
4. ROE 3-Year Change	Decrease	153	148	143	148	0.77
	Increase	112	117	122	117	
Non-Family Firms						
5. ROE 2-Year Change	Decrease	29	27	25	27	0.63
	Increase	22	24	26	24	
6. ROE 3-Year Change	Decrease	24	27	30	27	1.42
	Increase	27	24	21	24	

10.25 Kaplan-Meier of All Firms by Gender Excluding Survivors

The graph below depicts two Kaplan-Meier curves, one illustrating survival estimates for female CEOs and one illustrating survival estimates for male CEOs. The x-axis is tenure in years shown in serial time. The y-axis models the cumulative probability of survival at the beginning and throughout each interval, by multiplying the interval survival rates up until that interval. Interval survival rate is the likelihood of outlasting the interval. The first survival rate begins at two years, as we conditioned that CEOs need a minimum of two-year tenure to be considered for our analysis.



10.26 Family and Non-Family Firms Excluding Survivors with CEOs with a Tenure Above X Number of Years

a) Family Firms

The table illustrates the amount of family firms with CEOs that have a CEO with a tenure above X number of years. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	530	362	207	113	61	24	2

b) Non-Family Firms

The table illustrates the amount of non-family firms with CEOs that have a CEO with a tenure above X number of years. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	102	59	34	18	10	2	0

10.27 Cox Model Excluding Survivors on Percentage-Point Change in ROE

The table reports the estimated hazard rates by running the Cox model excluding survivors on all firms, family firms only, and non-family firms only. The female variable is a dummy variable equaling 0 for male and 1 for female CEOs. Financial performance variables are the dummy variable for two- and three-year percentage-point changes in ROE. Retirement equals 1 if the CEO was 65 and above years old at the time of job loss and takes on a value of 0 otherwise. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Test for the Cox Proportional Hazard Model on Dummy Variable for Increase or Decrease in ROE

	All Firms				**Family Firms**				**Non-Family Firms**			
	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Predictor Variable												
1. Female	1.05	0.61	1.05	0.62	1.00	0.00	1.00	0.05	1.40	1.66*	1.47	1.90*
	(0.08)		(0.08)		(0.09)		(0.09)		(0.28)		(0.30)	
Control Variables												
2. ROE 2-Year, Change	1.08	1.00			1.11	1.22			0.91	-0.46		
	(0.09)				(0.10)				(0.19)			
3. ROE 3-Year, Change			0.99	-0.12			1.03	0.31			0.71	-1.67*
			(0.08)				(0.09)				(0.15)	
4. Retirement	0.84	-1.94 *	0.84	-1.91*	0.85	-1.70*	0.86	-1.61	0.86	-0.48	0.82	-0.62
	(0.07)		(0.08)		(0.08)		(0.08)		(0.27)		(0.26)	
5. Observations	632		632		530		530		102		102	
6. # Appointments	316		316		265		265		51		51	
7. Chi-Square	4.97		3.99		4.21		2.83		3.11		5.69	

10.28 T-Test Analyses to Test for Turnover Gender Sensitivity

The table reports summary statistics for continuous variables of interest surrounding turnover gender sensitivity. CEO tenure is reported in months, and CEO age is reported in years. Column I and II concern incoming female CEOs and column III and IV concern incoming male CEOs between 2005 and 2015. Column V provides the t-statistic. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

T-Tests of Continuous Variable Means for Cox Hazard Analysis

	Female CEO		Male CEO		
Variable	Mean	s.d.	Mean	s.d.	t-statistic
	I	II	III	IV	V
All Firms					
1. Tenure	98	41	99	41	0.53
2. CEO Age	54	14	49	13	-8.50***
Family Firms					
3. Tenure	99	40	100	41	0.51
4. CEO Age	54	13	49	13	-8.69***
Non-Family Firms					
5. Tenure	93	43	94	42	0.15
6. CEO Age	48	12	47	10	-0.68

10.29 Chi-Square Analyses to Test for Turnover Gender Sensitivity

The table reports summary statistics for the chi-square analyses on a decrease or increase in the percentage-point change of ROA and ROE as a dummy variable, and gender. Column I and II concern CEO transitions with a female incoming CEO, and column III and IV concern CEO transitions with a male incoming CEO. Column V provides the chi-square value. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

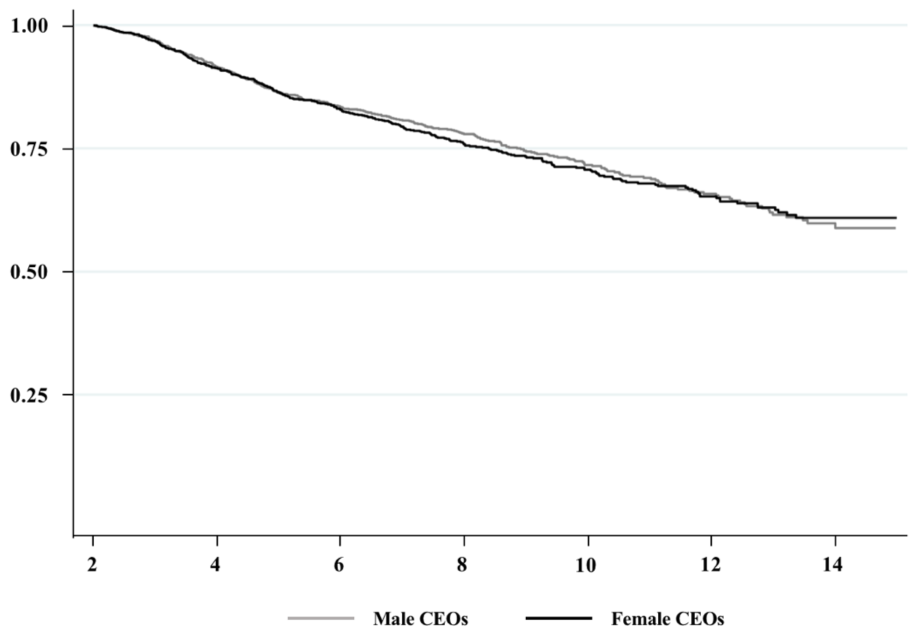
Test for Turnover Gender Sensitivity on Dummy Variable

Variable		Female CEO		Male CEO		
		Frequency	Expected Frequency	Frequency	Expected Frequency	Chi-Square Value
		I	II	III	IV	V
All Firms						
1. ROA 2-Year Change	Decrease	614	601	588	601	1.17
	Increase	545	558	571	558	
2. ROE 2-Year Change	Decrease	614	601	588	601	1.17
	Increase	545	558	571	558	
3. ROA 3-Year Change	Decrease	619	616	613	616	0.06
	Increase	540	543	546	543	
4. ROE 3-Year Change	Decrease	619	616	613	616	0.06
	Increase	540	543	546	543	
Family Firms						
5. ROA 2-Year Change	Decrease	552	543	533	543	0.70
	Increase	482	492	501	492	
6. ROE 2-Year Change	Decrease	552	543	533	543	0.70
	Increase	482	492	501	492	
7. ROA 3-Year Change	Decrease	561	553	545	553	0.50
	Increase	473	481	489	481	
8. ROE 3-Year Change	Decrease	561	553	545	553	0.50
	Increase	473	481	489	481	
Non-Family Firms						
9. ROA 2-Year Change	Decrease	62	59	55	59	0.79
	Increase	63	67	70	67	
10. ROE 2-Year Change	Decrease	62	59	55	59	0.79
	Increase	63	67	70	67	
11. ROA 3-Year Change	Decrease	58	63	68	63	1.60
	Increase	67	62	57	62	
12. ROE 3-Year Change	Decrease	58	63	68	63	1.60
	Increase	67	62	57	62	

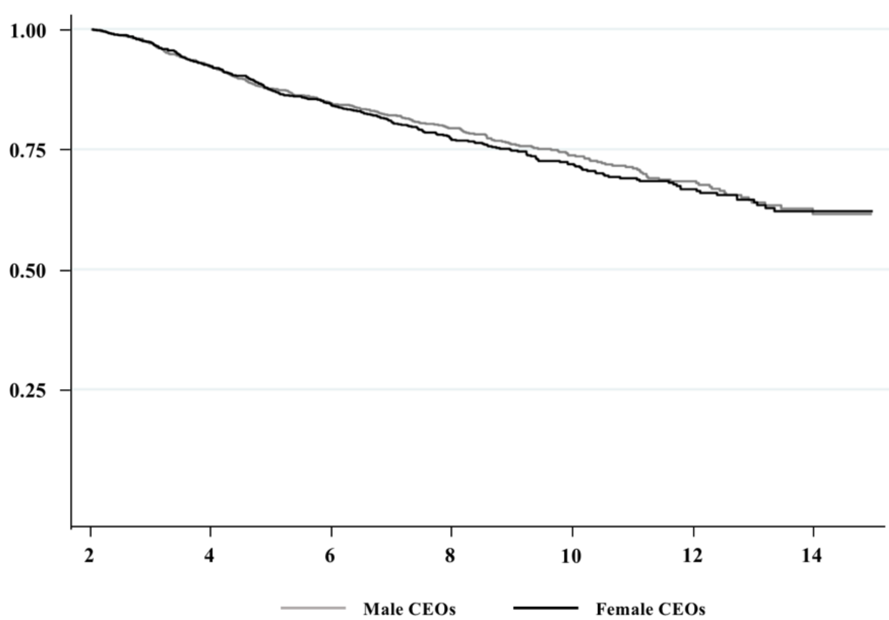
10.30 Kaplan-Meier of All, Family and Non-Family Firms by Gender Including Survivors

The graphs below depict three graphs, one for all, one for family, and one for non-family firms with each two Kaplan-Meier curves, one illustrating survival estimates for female CEOs and one illustrating survival estimates for male CEOs. The x-axis is tenure in years shown in serial time. The y-axis models the cumulative probability of survival at the beginning and throughout each interval, by multiplying the interval survival rates up until that interval. Interval survival rate is the likelihood of outlasting the interval. The first survival rate begins at two years, as we conditioned that CEOs need a minimum of two-year tenure to be considered for our analysis.

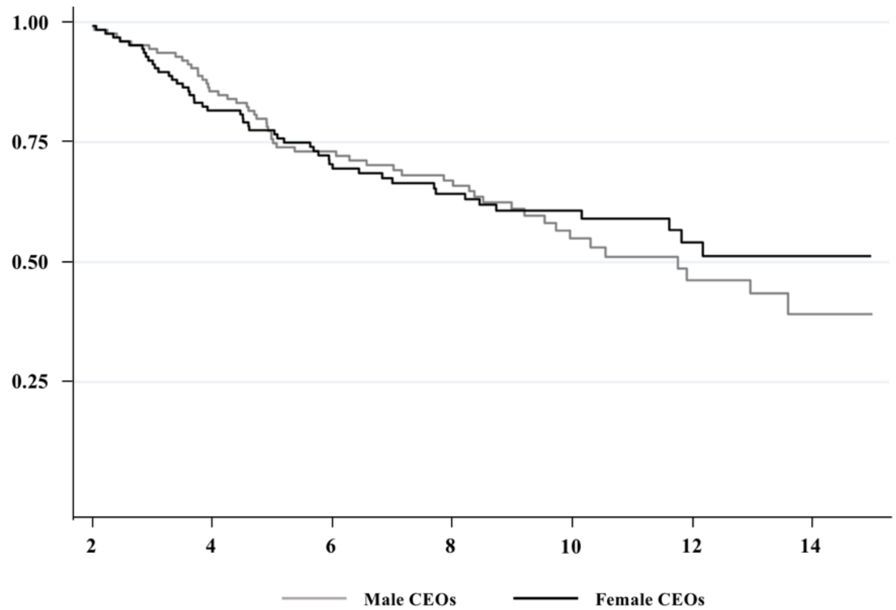
a) All firms



b) Family Firms



c) Non-Family Firms



10.31 All, Family, and Non-Family Firms Including Survivors with CEOs with a Tenure Above X Number of Years

a) All Firms

The graph illustrates the amount of non-family firms with CEOs that have a CEO with a tenure above X number of years that for the horizontal axis. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	2,318	2,119	1,577	1,135	717	403	130

b) Family Firms

The graph illustrates the amount of non-family firms with CEOs that have a CEO with a tenure above X number of years that for the horizontal axis. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	2,068	1,910	1,422	1,017	649	365	116

c) Non-Family Firms

The graph illustrates the amount of non-family firms with CEOs that have a CEO with a tenure above X number of years that for the horizontal axis. The number of CEOs with longer tenure decreases over serial time.

Tenure Above X Years	**2**	**4**	**6**	**8**	**10**	**12**	**14**
# Companies	250	209	155	118	68	38	14

10.32 Cox Model Including Survivors with ROE as Dummy Variable

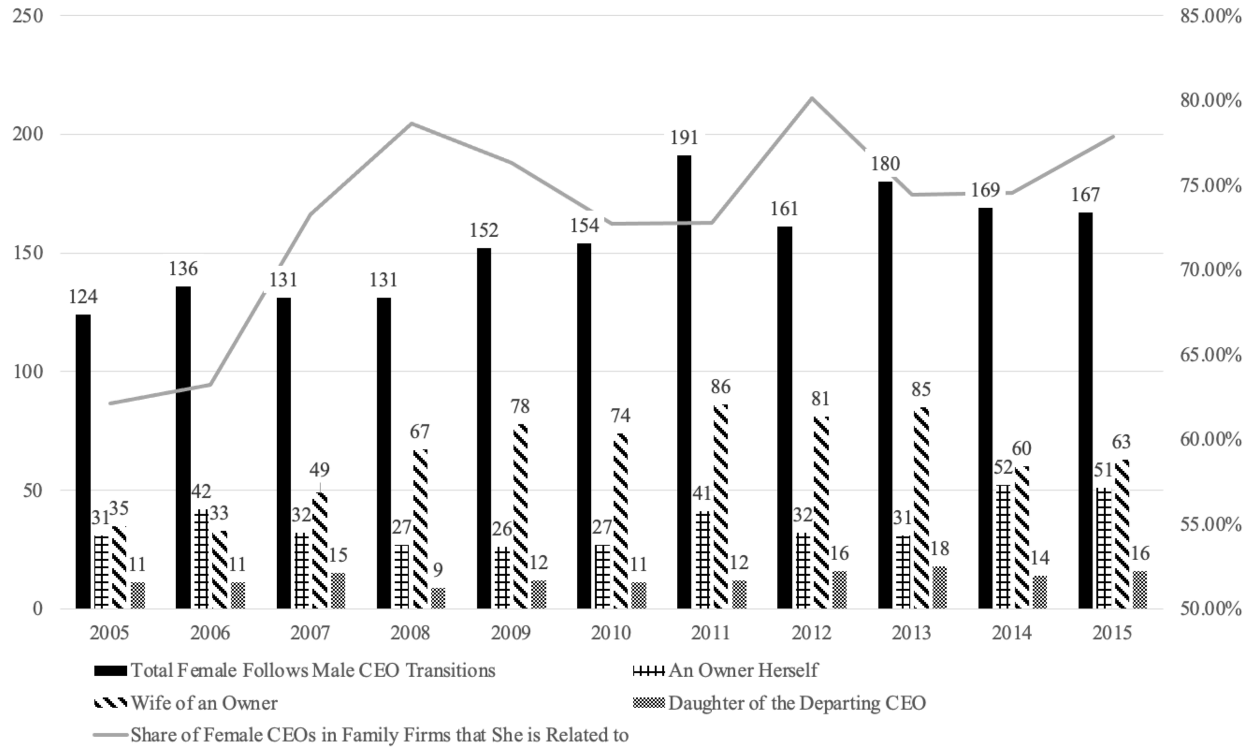
The table reports the estimated hazard rates by running the Cox model. The female variable is a dummy variable equaling 0 for male and 1 for female CEOs. Financial performance variables are the dummy variable for two- and three-year percentage-point changes in ROE. Retirement equals 1 if the CEO was 65 and above years old at the time of job loss and takes on a value of 0 otherwise. Standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10%-level, respectively.

Cox Proportional Hazard Model by Family and Non-Family Firms with Dummy Variables for ROE Change

	Family Firms				**Non-Family Firms**			
	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic	Haz. Ratio	z-statistic
Column	I	II	III	IV	V	VI	VII	VIII
Predictor Variable								
1. Female	1.09	0.95	1.09	0.96	0.95	-0.27	0.95	-0.25
	(0.10)		(0.10)		(0.19)		(0.19)	
Control Variables								
2. ROE 2-Year, Change	0.96	-0.50			0.75	-1.46		
	(0.08)				(0.15)			
3. ROE 3-Year, Change			0.93	-0.78			0.93	-0.34
			(0.08)				(0.19)	
4. Retirement	0.79	-2.52**	0.79	-2.52**	0.57	-1.81*	0.59	-1.72*
	(0.07)		(0.07)		(0.18)		(0.18)	
5. Observations	2,068		2,068		250		250	
6. # Appointments	1,034		1,034		125		125	
7. # Failures	522		522		103		103	
8. Chi-Square	7.05*		7.41*		5.70		3.68	

10.33 Share of Females Appointed CEO Related to Controlling Family or Owner

The figure shows the total number of female follows male CEO transitions for the years 2005-2015, and the number of females that within the total number of female follows male CEO transitions is the wife of an owner, the daughter of the departing CEO, or owns (part of) the firm herself. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.



Note: Females that are both an owner and wife of an owner are counted in the "wife of an owner" category, and females that are both an owner and a daughter of the departing CEO are counted in the "daughter of the departing CEO" category.

10.34 Share of Males Appointed CEO Related to Controlling Family

The figure shows the total number of male follows male CEO transitions for the years 2005-2015, and the number of males that within the total number of male follows male CEO transitions is the son of the departing CEO. A CEO transition is defined as a situation in which the departing CEO has been the CEO for at least two consecutive years prior to the CEO transition and where the incoming CEO is the CEO for at least two consecutive years following the CEO transition. The gender of the CEO is identified through the CEO's CPR-number.