

Female careers, underrepresentation of women, and social identity:
Evidence from the field

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1 Introduction

Despite the increasing number of women working in organizations during the last three decades and their contribution to productivity and organizational success, there are still barriers that prevent women from reaching executive positions within organizations (see e.g. DUGUIT/LOYD/TOLBERT 2012; KHALID/SEKIGUCHI 2019). For example, in the S&P 1500 firms, women hold about 9% of the top management positions (see BONET/CAPPELLI/HAMORI 2020). As a result, women still account for a very small part of upper echelons and thus are numerically underrepresented (see DUGUIT/LOYD/TOLBERT 2012).

The literature has investigated various reasons that contribute to the underrepresentation of women in top-level positions. Among them are stereotypes that lead men to perceive women as less qualified for leadership positions (see e.g. DUGUIT/LOYD/TOLBERT 2012; KHALID/SEKIGUCHI 2019). Further reasons are that women are (too) less competitive than men (see e.g. NIEDERLE/VESTERLUND 2007) or that their performance is evaluated lower than the performance of men and consequently, women are not considered for leadership positions (see e.g. MOSS-RACUSIN et al. 2012).

The behaviour and decisions of individuals who are underrepresented is also a core part of social identity theory. According to social identity theory individuals disidentify with a group of demographically similar others when they have outside options that provide them with a higher status (see DUGUIT/LOYD/TOLBERT 2012). This is especially the case when a negative event threatens the outside external perception of the group or organization the individual is part of (see e.g. ELLEMERS/SPEARS/DOOSJE 2002; PIAZZA/JOURDAN 2018). As a consequence, the individual will decide to leave the group or organization as it does not want to identify with it anymore (see e.g. O'REILLY/CHATMAN 1986; PONTIKES/NEGRO/RAO 2010; PRYOR/READER/MONROE 2012; PIAZZA/JOURDAN 2018).

This doctoral thesis aims at investigating female careers under the aspects of stereotypes, competitiveness, and performance evaluation as well as social identity. Chapters 2, 3, and 4 focus on female careers and underrepresentation of women,

chapter 5 focuses on social identity. In chapter 2 the implementation of a gender quota on corporate boards as an effective method to increase the female share on corporate boards and the effects on financial and market performance is investigated. This chapter is based on upper echelons theory and on gender stereotyping. The aspect of female competitiveness and its impact on career duration is examined in chapter 3. By analyzing data from skiing competitions, career duration of male and female athletes in highly competitive surroundings is investigated. While qualification and competitiveness of women play a crucial role for obtaining leadership roles, also the evaluation of performance decides over promotions. However, the evaluator's decision over the performance of a ratee again influences the career of the evaluator. Thus, in chapter 4 career concerns of male and female judges are investigated with data from ski jumping competitions. It is especially analyzed how judges make their subjective decisions dependent on objective measures observed and how men and women differ regarding concerns on their careers. The aspect of social identity is investigated in chapter 5 by analyzing the effect of scandals on exit rates from the Catholic and Protestant Church in Germany. It is examined how individuals react to events that threaten their social identity within an organization.

In the literature, appointing consciously qualified individuals of underrepresented groups to top level positions has shown to be an effective way to increase not only diversity but also to overcome stereotypes (see DUGUIT/LOYD/TOLBERT 2012). As during the past decade, the need for social justice and equality with respect to gender diversity has emerged, gender diversity also became a matter of corporate governance when introducing gender quota for corporate boards (see KLETTNER et al. 2020). In chapter 2, joint work with PHILIP YANG, KERSTIN PULL and SIRI TERJESEN, the effect of the implementation of a gender quota on corporate boards on financial and market outcomes is investigated. There is mixed evidence concerning the performance of quota targeted firms. In this chapter firm performance in Norway (as Norway was the first country to legislate gender quotas for boards of publicly traded firms) is compared to other Scandinavian countries with non-binding recommendations on gender equality like Finland, Sweden, and Denmark before and after the introduction of the quota. The research question that is asked in this chapter is the following: *Do firms that are targeted by a binding board gender quota differ in their accounting and market-based performance measures following the quota, compared to the pre-quota*

and post-quota situations in neighboring countries which do not have a binding quota? Upper echelons (HAMBRICK 2007) and gender stereotyping theories (e.g. EAGLY/KARAU 2002) are developed to hypothesize that binding board gender quotas improve targeted firms' accounting performance i.e. ROA (return on assets) and OI/assets (operating income divided by assets) but decrease market performance. With a difference-in-differences approach the hypotheses are tested on a sample of 622 yearly firm observations from 2002-2008 in Norway, Sweden, Finland, and Denmark. Results show that Norwegian quota-targeted firms' accounting performance does not improve relative to Swedish, Danish, and Finnish firms, but rather the coefficient becomes significantly negative. There is no significant effect on market-based performance.

In chapter 3, joint work with BERND FRICK, the determinants of men's and women's career durations in Alpine and Nordic skiing are investigated. Assuming that both, male and female athletes have self-selected in this highly competitive field and thus are equally competitive, this chapter analyzes different aspects that impact career length of male and female athletes. The research question that is investigated in this chapter is the following: *What are the determinants of men's and women's career durations when both compete under similar conditions?* The data set includes each individual that ever won at least one World Cup point over the period 1967 (Alpine) respectively 1982 (Nordic) thru 2018, yielding a data set with 4,151 individuals (1,835 women and 2,316 men) and 18,776 athlete-year-observations. By running a survival analysis with data from Nordic and Alpine skiing over 52 and 37 years respectively an individual's performance is identified as the most important determinant for career length, and career length of men and women is virtually identical.

In chapter 4 career concerns of judges in ski jumping are investigated. In ski jumping, five judges evaluate the jump of single athletes by giving them a score from 1-20 (with 20 being the highest score). For the overall evaluation of an athlete's performance also the actual meters jumped account for, thus the total score consists of a subjective and an objective measure. The aim of this chapter is to investigate whether judges have career concerns. Career concerns theory (SCHARFSTEIN/STEIN 1990) assumes that evaluators take decisions that are beneficial for their own career instead of evaluating the true performance of the ratee. I hypothesize that judges make their subjective

evaluation dependent on the distance points achieved. Further, as only since 2011 women officially have participated in World Cup competitions and ski jumping still is male-dominated, I assume that career concerns are more pronounced for women. Therefore, the two research questions asked in this chapter are: *Do career concerns lead to judges being influenced by the objective measure when subjectively evaluating an athlete's performance? Are there differences between male and female judges regarding career concerns?* These questions are investigated with data from FIS ski jumping events (World Cup, Championship, Olympic Winter Games and Continental Cup) that took place between 2011 and 2019. The dataset consists of a total of 740 competitions for men and 276 competitions for women. By running regression analyses I find evidence that judges have career concerns as they make their decisions for subjective points dependent on the distance points. This effect is more pronounced for female judges, who make their decisions even more dependent on distance points than male judges do.

In chapter 5, joint work with BERND FRICK, the effect of scandals and external shocks on member's exit from the Church in Germany is investigated. The motivation of an individual to exit from church is based on utility-maximization, i.e. that an individual leaves an organization as soon as the expected costs of membership rise above the expected benefits. Based on social identity theory (e.g. ELLEMERS/SPEARS/DOOSJE 2002) members are expected to leave an organization if the organization behaves or performs in a way the members cannot identify with anymore. Specifically, we are interested in the effects of the abuse scandal of minors in Regensburg that became public in 2010 and the financial scandal which relates to misallocation of funds of the bishop in Limburg that occurred in 2014. Further, we control for different events like the election of Popes, the announcement of the encyclical *Humanae Vitae* as well as political events like the fall of the Berlin wall or changes in the tax system. Further, the question arises if such shocks in the Catholic Church also influence exit rates in the Protestant Church i.e. whether there is a spillover effect. Therefore, the research questions that are investigated in this chapter are the following: *Can we explain the observable variation in the annual exit rate of Catholics in Germany? Are there any spillover effects to the Protestant Church?* To analyze these questions, we have collected data on Church exits in the Catholic and Protestant Church in Germany from 1947-2017 resulting in a balanced panel of 1220 diocese-year-observations. By using

Fixed Effects estimations and Arellano-Bond estimations we find that the financial scandal has a strong impact on people exiting from Church in both the Catholic and the Protestant Church. Consequently, we find evidence for a spillover effect and for decreasing social identity of members with Church.

Chapter 6 concludes by presenting a summary of the results of the four chapters on these different research areas. Furthermore, practical implications, limitations of the four studies as well as future research suggestions are provided.

2 Board Gender Quota Effectiveness and Firm Financial Performance: A Difference-in-differences Approach¹

2.1 Introduction

Facing the ethical concerns that women were not sufficiently represented in the highest echelon of corporations, fifteen countries established quotas for women on boards by the end of 2019 (DE CABO et al. 2019). The first gender quota for corporate boards was legislated in Norway on December 19, 2003, and required that by January 1, 2006, 40% of corporate board members of public limited firms must be women. Subsequently, several other countries ratified board gender quotas, and policymakers from many countries, including neighboring countries Denmark and Sweden seriously considered creating similar corporate governance laws. While Norway implemented “hard law” in the sense of a fixed gender quota with stiff penalties for noncompliance, Sweden and Denmark opted for “soft law” recommendations on the gender distribution on corporate boards (see DE CABO et al. 2019; GREGORIC et al. 2017; TERJESEN/SEALY 2016). In Finland a quota law was introduced for public-owned companies in 2004 and for private companies recommendations concerning gender representation on corporate boards apply since 2003 (see FAGAN 2013: 5).

Despite significant attention from policymakers (see e.g. EUROPEAN COMMISSION 2012; REDING 2012), media (see e.g. ECONOMIST 2014), special interests (see e.g. CATALYST 2013; FOUST-CUMMINGS 2013), and scholars in fields as diverse as management, finance, law, and sociology (see e.g. BUEHRMANN 2013; IANNOTTA/HUSE 2014; MACHOLD 2013; MACHOLD/HANSEN 2013; MACHOLD/HUSE/BROGI 2013), we know little about the effectiveness of countries’ quota policies on firm performance.

Empirical evidence on the link between increased female board representations on firm performance is mixed (see e.g. JOECKS/PULL/VETTER 2013; KIRSCH 2018;

¹ An earlier version of this paper has been submitted to *The Leadership Quarterly* as joint work with PHILIP YANG, KERSTIN PULL and SIRI TERJESEN and has received an invitation to be revised and resubmitted. Within the revision process, the paper’s contribution has been changed towards a rather methodological contribution and a further coauthor has been added: JAN RIEPE. The paper presented in this chapter is based on the original submission to *Leadership Quarterly* and has been further developed by KATHARINA MOSER for the sake of this thesis.

POST/BYRON 2015; TERJESEN/SEALY/SINGH 2009). Some studies find that firms with more female directors perform better financially (see e.g. CAMPBELL/MINGUEZ-VERA 2010; NGUYEN/FAFF 2012; POST/BYRON 2015; SINGH/VINNICOMBE/JOHNSON 2001) while other report lower performance outcomes (see e.g. DARMADI 2011; MINGUEZ-VERA/MARTIN 2011; POST/BYRON 2015). Still others do not find a link between female board representation and firm financial performance (see e.g. CARTER et al. 2010; ROSE 2007; SHRADER/BLACKBURN/ILES 1997).

These inconsistent findings led to a greater exploration of potential mediators and moderators of the relationship between women directors and firm financial performance (see MILLER/TRIANA 2009) and to increased efforts to address endogeneity issues (see ADAMS 2016). To address endogeneity issues of corporate board composition, among others, studies exploit the enactment of the Norwegian board gender quota as a natural experiment, again albeit with inconclusive results. AHERN/DITTMAR's (2012) panel study of 166 Norwegian public limited firms from 2001-2008 reveals a negative relationship between the appointment of women and firm value as measured by Tobin's Q. MATSA/MILLER (2013) find that profitability fell after the introduction of a gender quota on Norwegian corporate boards while the employment on the other hand rose. In their extension of AHERN/DITTMAR (2012), ECKBO/NYGAARD/THORBURN (2015) do not find a significant performance effect of the Norwegian quota. Examining stock returns to Norwegian firms when the quota was enacted, NYGAARD (2011) finds positive returns among only those firms with low information asymmetry - that is, with publicly available information to effectively monitor outside directors. DALE-OLSEN/SCHØNE/VERNER (2013) report no differences in return on assets (ROA) due to the quota; however, after the quota, targeted firms accumulated more capital, which is financed by debt or a combination of debt and firm capital.

There is an ample body of research (see e.g. AGUILERA/CUERVO-CAZURRA 2004; AGUILERA/JACKSON 2003) and tremendous interest from a variety of stakeholders on the outcomes of corporate governance policy interventions, however, there are few comparative studies of policy outcomes. One notable exception is the study by SOJO/WOOD/GENAT (2016) who explore the effectiveness of different types of policy interventions (i.e. reporting requirements, targets, and quotas) on female directors in

public companies across 91 countries. The present study extends Norway-only research by examining Norway relative to neighboring Sweden, Finland, and Denmark with otherwise very similar institutions. Using a sample of 662 yearly firm observations from 2002-2008 in Norway, Sweden, Finland, and Denmark, we employ a difference-in-differences methodology to examine a potential causal relationship between women directors and firm financial performance. Our work extends earlier research on effects of the Norwegian gender quota by including a considerably longer time period, and a control group consisting of non-treated, but otherwise comparable firms in Sweden, Finland, and Denmark. We follow HASLAM et al. (2010) and include both accounting and market-based measures of firm performance. Specifically, we examine: *Do firms that are targeted by a binding board gender quota differ in their accounting and market-based performance measures following the quota, compared to the pre-quota and post-quota situations in neighboring countries which do not have a binding quota?*

Our study makes several contributions to theory, practice, and policy. From a theory perspective, we combine upper echelons theory and gender stereotyping to argue that a greater presence of women directors may enhance accounting-based financial performance but decrease market-based financial performance. Further, we provide a rationale for why firms do not tend to select a gender-balanced board on their own, and thus a binding quota is needed to achieve the desired gender representation. From a policy perspective, our longitudinal study extends earlier studies of just a few years and finds that the Norwegian gender quota is tremendously effective in reaching the desired 40% threshold for women on boards. By contrast, non-binding quotas are less effective, at best resulting in small organic increases in our control countries of around 23% over the same period. From a practice perspective, we find that increased female board representation leads to worse accounting-based financial performance but is not rewarded by the market. That is, quota-exposed Norwegian firms have inferior accounting-based financial performance as compared to both the pre-quota and post-quota situations of firms in Sweden, Finland, and Denmark that were exposed to non-binding laws. By contrast, binding quota-exposed firms' market-based financial performance is inferior which may be why firms do not "voluntarily" choose more gender-balanced boards.

2.2 Context and theoretical development

2.2.1 Corporate governance and gender quota regulations in Norway, Denmark, Sweden, and Finland

The corporate governance systems and board gender quota regulations vary in Norway, Denmark, Sweden, and Finland as depicted in Table 1.

Table 1: Corporate governance systems and gender quota regulations overview

Country	Corporate governance system	Gender quota regulations
Norway	Two-tier system <ul style="list-style-type: none"> - Executive board - Supervisory board 	Binding: <ul style="list-style-type: none"> - Fixed 40% quota of both genders on supervisory boards of public limited companies; - Stiff penalties for non-compliance including delisting from the Oslo Stock Exchange, refusal to register the firm, and fines until compliance
Denmark	Semi-two-tier system <ul style="list-style-type: none"> - Executive board - Supervisory board Members of executive board are allowed to occupy half of the seats in the supervisory board	Non-binding: <p>“Danish Model” of self-set targets, binding for the 1,100 largest public and private firms</p>
Sweden	Hybrid system: between one- and two-tier system <ul style="list-style-type: none"> - CEO - Supervisory board CEO nominates and appoints supervisory board members	Non-binding: <p>Recommendation of a 40% share of both genders on supervisory boards of public limited companies</p>
Finland	One-tier system (for most of the listed firms)	Non-binding: <p>Recommendation for listed firms to communicate gender equality goals</p> <p>Quota law only for public sector companies</p>

Norway’s two-tier corporate board structure consists of an executive board chaired by the CEO and a supervisory board including outside directors and some employee representatives, depending on firm size. There are two types of limited liability stock companies: public limited liability companies *allmennaksjeselskap* (ASA) and private limited liability companies *aksjeselskap* (AS) (see SKOG/SJÖMAN 2014;

AHERN/DITTMAR 2012). In December 2003, led by then Minister of Trade and Industry ANSGAR GABRIELSEN, Norway passed a law that required all public limited firms (ASAs) to have 40% representation of each gender on the supervisory board by July 2005. As voluntary compliance failed, the law became compulsory (AHERN/DITTMAR 2012: 138), and a gender quota was mandated in December 2005. In detail, the law stipulates the following number of board members: in supervisory boards with two or three members, both genders must be represented. In supervisory boards with four or five members, both genders must have at least two representatives. Supervisory boards with six to eight members must have three representatives from each gender. Supervisory boards with nine members require four representatives of each gender, and in boards with more than nine members, 40% of each gender must be represented (see AHERN/DITTMAR 2012: 144). Any company registered after January 1, 2006, must comply with the new law immediately. Already existing companies had to comply by January 1, 2008, and firms that did not comply after three months faced stiff penalties including delisting from the Oslo Stock Exchange, refusal to register the firm, and fines until compliance (see BØHREN/STAUBO 2014; WANG/KELAN 2013). Official records from Norway indicate that all firms complied by April 2008 (see MATSA/MILLER 2013: 140).

In Denmark, limited liability companies also consist of public limited liability companies *aktieselskaber* (A/S) and private limited liability companies *anpartsselskaber* (ApS). This distinction was introduced in 1973 when Denmark joined the European Economic Community (HANSEN/LØNFELDT 2014: 119-120). The two-tier system became mandatory for all public limited companies but is optional for private companies. The Danish two-tier system (also called “semi-two-tier system”) differs from a “pure” two-tier system since managing directors are allowed to occupy half of the supervisory board seats (see ROSE 2005: 692). In 2011, Danish officials seriously debated a gender quota for corporate boards of private and public companies but met resistance from firms. As a result, the Danish government presented the so-called “Danish Model,” consisting of a statement of goals and policies aiming at increasing female representation on corporate boards. Adopted in Parliament in December 2012 and coming into full force in April 2013, the Danish Model requires the 1,100 largest public and private firms to set their own targets for gender representation on their boards (see e.g. AGUSTÍN/SIIM 2015; EUROPEAN COMMISSION

2013). Compared to the Norwegian quota, the Danish Model is a “non-binding” law, which recommends but does not mandate more equal gender representation.

Similar to Denmark and Norway, Sweden’s limited liability companies are divided into private limited liability companies and public limited liability companies (see SKOG/SJÖMAN 2014: 247). Swedish corporate governance uses a hybrid system between a one-tier and a two-tier system with a CEO and a supervisory board of non-executive directors (see SKOG/SJÖMAN 2014: 254). In 1999, the Swedish Minister for Gender Equality set a five-year deadline for listed companies to improve their gender balance on the supervisory board and threatened to introduce a gender quota if balance did not improve within this timeframe. Three years later, the minister specified the target as a 25% share of women on supervisory boards by 2004. Subsequently, Swedish firms’ share of women on supervisory boards rose from 5.8% to 17.9% between 2002 and 2006 (NILSSON 2009, qtd. in FREIDENVALL 2015: 7). The Gender Equality Minister’s final report in 2006 proposed that at least 40% of each gender should be represented in the supervisory boards of public limited companies (see FREIDENVALL 2015: 7). Sweden does not have penalties in cases of non-compliance, and thus, like Denmark, represents a “non-binding law.”

In Finland, nearly all listed companies have a one-tier board structure. A two-tier structure is the exception among listed companies (see SECURITIES MARKET ASSOCIATION 2015: 12). In 2003, the relevance of gender distribution at corporate board level on listed firms was included into the Finnish Corporate Governance Code for listed firms. In 2008, a recommendation that required both genders to be represented on corporate boards, was added to the Code, which was again modified in 2015. It requires companies to specifically communicate their goals on gender equality on boards and how these goals are measured (see FINNCHAM 2017: 20). A quota law only applies for public sector companies (see GREGORIC et al. 2017: 274).

2.2.2 Upper echelons theory: Female board representation and financial performance

Upper echelons theory describes how firms’ strategic choices can be explained by their top managers’ demographic characteristics (see HAMBRICK/MASON 1984: 204). Following HAMBRICK (2007), a director’s experiences, values, and personality

substantially affect his or her cognitive frames, and thus the way he or she interprets situations. These “cognitive frames” affect board decisions, decision-making processes, and, ultimately, firm financial performance. Observable characteristics such as age, education, socioeconomic origins, financial position, tenure in the organization, and functional background indicate differing experiences, knowledge, and values (see HAMBRICK/MASON 1984: 196).

A growing literature posits that gender plays a role in that women bring different cognitive frames to the board as their experience and knowledge differ from their male counterparts (see e.g. POST/BYRON 2015). For instance, women’s paths to the boardroom differ from their male colleagues as women are less likely to have been a CEO or COO before and are more likely to have non-business backgrounds (see e.g. DAILY/DALTON 2003). Furthermore, women often bring different values which may affect the decisions that are taken as well as how these decisions are reached. For instance, more gender diverse boards discuss more intensely and base their decisions on a broader set of information (see e.g. LOYD et al. 2013; POST/BYRON 2015; VAN GINKEL/VAN KNIPPENBERG 2008).

Female directors’ distinct cognitive frames might improve board decision making, boardroom culture, and board independence (see TERJESSEN et al. 2009). For example, BROWN/BROWN/ANASTASOPOULOS (2002) report that boards with two or more women take consultancy more seriously, employ a more transparent selection process when hiring a consultant, and thus reduce the influence of the “old boys” networks. Furthermore, boards with two or more women have higher levels of board accountability and communicate more effectively among board members and with stakeholders. Also, boards with more women introduce more non-financial measures such as customer satisfaction and employee satisfaction, gender representation, corporate social responsibility, and innovation (see BROWN/BROWN/ANASTASOPOULOS 2002: 13). Regarding board decision making, ZELECHOWSKI/BILIMORIA (2004) argue that women’s differing experiences lead them to bring innovative and distinct perspectives to debates which can improve boardroom decision making. The presence of women on the board leads to a more “civilized” boardroom culture and helps develop a sensitivity for other perspectives (see SINGH 2001: 207). Also, male directors report that women’s presence on boards changes

men's language and behavior towards more "moderated masculinity" (SINGH 2008: 62). With respect to board independence, women directors more conscientiously prepare for board meetings (see HUSE/SOLBERG 2006: 119), and decisions are less like to be "nodded through" as women directors tend to ask more questions (see KONRAD/KRAMER/ERKUT 2008: 155).

In sum, upper echelons theory suggests that a gender-balanced board may be characterized by improved corporate governance performance, more reflective decision-making processes, a more open boardroom culture, and a larger degree of independence, all of which might positively affect firm financial performance. But: If a gender-balanced board is associated with an improved financial performance, then why do firms – absent a quota – fail to appoint gender-balanced boards? A second theoretical lens, gender stereotyping, suggests that firms may not be fully aware of the potential benefits of a gender balanced board.

2.2.3 Gender stereotyping: Differences in market-based and accounting performance

Gender stereotyping refers to the persistent and learned stereotypes for men and women resulting in sex-typed social behavior and in socially shared descriptive and prescriptive norms. One of the most stereotyped traits is that women are more likely than their male counterparts to display sympathy, understanding, gratefulness, tactfulness, and a passive approach, and men are more likely to be aggressive, decisive, dominant, and hide emotions. EAGLY/KARAU (2002) argue that women are perceived as less qualified for leadership positions because they are less "agentic," where "agentic" refers to traits like assertiveness, ambitiousness, aggressiveness, independence, self-confidence, competitiveness, and daringness. Rather, women focus more on persons other than themselves, and display affection, helpfulness, kindness, sympathy, and gentleness (see NIELSEN/HUSE 2010: 138).

Consequently, gender stereotypes affect women's career opportunities as successful leaders are more often associated with male stereotypes (see ELLEMERS et al. 2004: 318). These stereotypes lead to a preference for promoting a man instead of a woman, even if both are otherwise equally qualified. Women are perceived as having attitudes which are not beneficial for leadership or executive roles; consequently, women face

more obstacles when obtaining a leadership position. Women experience disadvantages because they do not receive the same rewards as men: for women, receiving a reward depends much more on how others perceive their performance while male managers' competences tend to be directly linked to firm performance (see KULICH/RYAN/HASLAM 2007). They therefore conclude that "men's successes seemed to be acknowledged without needing to scrutinize their leadership abilities, whereas women's abilities were subjected to greater interrogation before conclusions about their leadership were inferred from company performance" (KULICH/RYAN/HASLAM 2007: 595). Women tend to be promoted over equally qualified men when the organization is in trouble and facing performance declines - the so-called "glass cliff" phenomenon (see e.g. HASLAM/RYAN 2008; RYAN et al. 2016). For women, it is not enough to be a "star performer" or even to perform better than men to break through the glass ceiling; the most important point mentioned by 96% of female executive respondents is adopting a more masculine professional style that male managers feel comfortable with (see RAGINS/TOWNSEND/MATTIS 1998: 30). As a result, women whose leadership style is perceived as too feminine risk being seen as not effective in their role as managers. However, women who adopt a style that is "too masculine", are often judged as not feminine anymore, which also does not help them in their careers. Similarly, VIAL/NAPIER/BRESCOLL (2016) argue that women who hold powerful positions often have more difficulties in gaining respect from their subordinates and are viewed as being less legitimate in their position as compared to men in powerful positions.

Another key factor refers to prejudices against women's competencies. A survey among male CEOs finds that they critically perceive and assess women's lack of experience in general management and/or in line functions with profit and loss responsibilities, which they consider critical for getting promoted (see RAGINS/TOWNSEND/MATTIS 1998: 34). Further, male respondents answered that, in their opinion, women are often not long enough in the career pipeline which is problematic for career advancement. Managers' different stereotypes and perceptions might result in systematically underestimating the benefits of a more gender-balanced board and not being ready to actively search for more women directors. In such a situation, a binding gender quota that forces firms to overcome their gender stereotypes will increase female board representation.

Just as individuals in firms may hold gender stereotypes, so may investors and analysts. For example, stock markets may react more negatively to the appointment of a female CEO than to a male CEO, which is attributed to investors' stereotypical beliefs about women's lack of competencies and unsuitability for leadership. LEE/JAMES (2007) establish such a negative effect; BRINKHUIS/SCHOLTENS (2017) find that investors do not value the appointment of women CEOs or CFOs differently from that of men. In the context of a binding quota, however, investors' may have stronger concerns as many positions must be filled with females within a relatively short time frame, especially given the perception that there are not enough qualified women to fill those positions. Indeed, research from Norway and Spain reports that immediately after a board gender quota, some women are appointed to multiple boards, potentially indicating that these "golden skirt" directors are busier than their male counterparts (see TERJESEN/SEALY 2016: 24).

In sum, we expect a binding gender quota to improve accounting based measures, but not market-based measures of firm financial performance:

H1: Compared to a pre-board gender quota environment, firms targeted by a binding gender quota are more likely to improve in accounting performance after the quota, and also to have higher post-quota accounting performance than firms that are in countries without binding gender quotas.

H2: Compared to a pre-board gender quota environment, firms targeted by a binding gender quota are less likely to improve in stock market performance after the quota, and also to have lower post-quota stock market performance than firms that are in countries without binding gender quotas.

2.3 Method

We test the hypotheses using data on corporate boards of Norway, Denmark, Finland, and Sweden from BoardEx, complemented by financial performance measures from the Thomson Reuter EIKON database. As the implementation of a gender quota in Norway was first announced in 2003, post 2003 years in Norway is the treatment variable in our estimations. During the observation period, Norway implemented a binding quota. To analyze the relevance of this binding law for board structure and firm performance, we use the difference-in-differences approach.

2.3.1 Sample and Data

We construct our analytical sample using BoardEx, a leading database on board representation and structure of 800,000 listed global organizations (BoardEx, 2017). BoardEx contains detailed information on tenure, income, age, education, experience and nationality of non-executive and executive directors. As mentioned above, we use Norway (binding) as the treatment group and Denmark, Finland, and Sweden (non-binding) as the control group. Our sample includes the years from 2002 to 2008 as different effects in performance before 2003 might still result from the bust of the Dotcom-bubble in 2000 and effects after 2008 might already be affected by the global financial crisis in 2007. Therefore, a common trend regarding performance is only met for the time frame between 2003 and 2008 in both, the treatment and the control group. Since BoardEx does not include information on financial firm performance, we connected our data set to the Thomson Reuter EIKON database which contains financial data. We merge the datasets using ISIN codes. Our final sample is in line with MATSA/MILLER (2013) as we exclude firms operating in the financial and petroleum sector and further keep only companies on which we have the entire information regarding all board level and performance variables. This results in a dataset that contains 662 yearly board observations between 2002 and 2008.

2.3.2 Dependent Variables

Financial firm performance includes both accounting and market measures. **Accounting-based measures** as ROA, ROE, and return on invested capital (ROIC) are self-reported by the company according to legally enforceable accounting principles (see e.g. COMBS/CROOK/SHOOK 2005; HASLAM et al. 2010; POST/BYRON 2015). Our analysis uses ROA and operating income divided by assets (OI/assets). We calculate ROA using the ratio of earnings before interests and taxes (EBIT) to total assets, and winsorize data at 1% and 99% levels.

Market-based measures of firm performance include market-to-book ratio, Tobin's Q, stock performance, and shareholder returns (see POST/BYRON 2015: 22). While accounting-based measures are based on "objective" financial realities and are rather backward looking, market-based measures result from "subjective" investor perceptions and investor behavior (see HASLAM et al. 2010: 485). Market-based measures are shaped by market sentiment (see e.g. AKERLOF/SHILLER 2009;

BARBERIS/THALER 2003; HASLAM et al. 2010), behaviors, and beliefs of investors (see e.g. KEYNES 1937; HASLAM et al. 2010) as well as analysts' view on the future company's earnings potential (see DECHOW/SLOAN 1997; HASLAM et al. 2010). Our analysis uses market-to-book value (MTBV) and Tobin's Q (the ratio of the total assets plus the market value of equity minus the book value of equity to total assets). We use Thomson Reuter EIKON data and winsorize the data at 1% and 99% levels.

2.3.3 Board structure variables

We consider the board's size as well as the share of female directors, directors' education and nationality mix, and average age of the firms' non-executive directors. *Female share* measures the ratio of female non-executive directors to all non-executive directors for each firm in every year. *Board size* indicates the overall number of non-executive directors for each firm in the specific year. *Education* is measured based on directors' average number of educational degrees above bachelor level. *Nationality mix* approximates the national composition of the board and indicates the average number of different nationalities divided by the overall number of non-executive board members. *Mean age* is the non-executive directors' average age. *Tenure* measures the firm specific knowledge by taking the average years the non-executive board member is operating on the board. *Experience quoted* and *experience private* measures the overall experience a non-executive board director has gained through his or her function as director in the board of a quoted company and accordingly in the board of a private company.

2.4 Analysis

The difference-in-differences approach estimates causal relations in natural experimental settings by using an event such as e.g. the passage of a law as the treatment (see BERTRAND/DUFLO/MULLAINATHAN 2004: 249). The differences regarding the outcome after a certain event – i.e., the introduction of a board gender quota – is compared to the situation before this event within the treatment group and also to a control group which is not affected by this event. The causal effect of the reform (β_1) is estimated by:

$$Y_{ijt} = \beta_1 Treat_j * Post2003_t + \lambda_i Year_t + X_{ijt} + \alpha_j + \tau_t + \epsilon_{ijt}$$

Y_{ijt} denotes the firm level outcome for firm j in the sector i during the period t . The firm level outcome is explained by the mandated female board representation $Treat_j * Post2003_t$ while firm Fixed Effects α_j , industry specific time trends λ_i and year effects τ_t are held constant.

2.5 Results

Tables 2 and 3 report summary statistics of the main variables by treatment and reform status, respectively.

Table 2: Summary statistics by treatment

	Treatment group (N=199)		Control group (N=463)	
	Mean	Std. Dev.	Mean	Std. Dev.
Board structure				
Female share	0.227	0.172	0.182	0.143
Board size	7.025	2.284	9.210	3.253
Education	1.386	0.445	1.467	0.535
Nationality mix	0.116	0.185	0.144	0.213
Mean age	51.472	4.627	54.919	3.760
Tenure	3.468	1.923	4.653	2.008
Experience quoted	2.230	1.014	3.418	1.664
Experience private	5.367	4.284	7.819	3.543
Firm performance				
OI/assets	0.050	0.093	0.065	0.107
ROA	0.060	0.088	0.075	0.113
MTBV	0.020	0.013	0.032	0.070
Tobin	1.410	0.640	1.824	1.672

Table 3: Summary statistics by pre- and post-reform

	Pre-reform (N=191)		Post-reform (N=471)	
	Mean	Std. Dev.	Mean	Std. Dev.
Board structure				
Female share	0.121	0.125	0.225	0.154
Board size	8.791	3.427	8.456	3.038
Education	1.284	0.510	1.507	0.498
Nationality mix	0.114	0.180	0.145	0.214
Mean age	53.677	4.279	53.966	4.360
Tenure	4.135	2.051	4.363	2.054
Experience quoted	2.886	1.556	3.132	1.609
Experience private	6.668	3.729	7.250	4.017
Firm performance				
OI/assets	0.036	0.107	0.071	0.100
ROA	0.044	0.104	0.081	0.105
MTBV	0.019	0.013	0.032	0.070
Tobin	1.416	0.834	1.814	1.627

Table 2 shows a higher share of female directors in Norway (treatment group), which is on average 22.7% compared to the control group (Sweden, Denmark, and Finland), which is only 18.2%. The control group boards are slightly larger with around seven board members in Norway compared to nine members in Sweden, Denmark, and Finland. The educational level and the nationality mix of the non-executive directors do not differ significantly between treatment and control group. Norwegian directors' mean age is 51 years compared to 55 in Denmark, Sweden, and Finland. Tenure as well as experience on quoted boards are more than one year higher in the control group and the experience on private boards is even 2.5 years longer in the control group. With respect to firm performance, the control group's OI/assets and ROA are slightly higher than in the Norwegian treatment group. Both, the market-to-book-value and Tobin's Q are higher in the control group.

Comparing the aggregate of firms in all four countries' board structures before and after the quota (reference year = 2003) in Table 3, we find a substantial increase in female board representation following the quota: female share pre-quota is 12.1% and post-quota the share reaches 22.5%. Average board size remains about the same with around eight non-executive directors on average before and after the quota. Following the quota, directors' educational levels and board level nationality mix are slightly higher. Directors' mean age stays the same around 53 years. Tenure increases slightly as well as experience on quoted and on private firms, while it is higher on private firms.

OI/assets and ROA increased after the quota as compared to before. Also, the market-to-book value and Tobin's Q have increased following the reform.

Table 4: Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) Treated	-													
(2) Post-reform	0.003	-												
(3) Female share	0.134***	0.309***	-											
(4) Board size	-0.318***	-0.048	0.171***	-										
(5) Education	-0.072	0.198***	0.092*	-0.198***	-									
(6) Nationality mix	-0.063	0.069	0.055	0.080*	0.302***	-								
(7) Tenure	-0.265***	0.050	-0.033	0.172***	-0.061	-0.121*	-							
(8) Experience quoted	-0.342***	0.070	-0.010	-0.039	0.572***	0.283***	0.089*	-						
(9) Experience private	-0.286***	0.067	-0.115*	0.011	0.151***	-0.057	0.072	0.239***	-					
(10) Age	-0.365***	0.030	-0.214***	0.033	0.214***	0.187***	0.246***	0.276***	0.083*	-				
(11) OI/assets	-0.068	0.155***	0.107	0.181***	-0.048	-0.083*	0.166***	0.057	0.008	0.066	-			
(12) ROA	-0.066	0.160***	0.090*	0.166***	-0.054	-0.095*	0.194***	0.027	-0.018	0.079*	0.916***	-		
(13) MTBV	-0.092*	0.101**	0.077*	-0.111**	-0.012	0.009	0.022	0.140***	0.032	-0.071	0.131***	0.140***	-	
(14) Tobin	-0.131***	0.124**	0.169***	-0.094*	0.014	0.122**	0.024	-0.010	0.058	-0.027	0.087	0.112**	0.393***	-

The correlation matrix (Table 4) shows a positive correlation between treatment status and female share ($r= 0.134^{***}$). Board size ($r= -0.318^{***}$), tenure ($r= -0.265^{***}$), experience quoted ($r= -0.342^{***}$) and experience private ($r= -0.286^{***}$), age ($r=-0.365^{***}$) as well as market-to-book-value ($r= -0.092^*$) and Tobin ($r= -0.131^{***}$) are all significantly negative correlated with treatment. Post-quota status and female share ($r= 0.309^{***}$) are positively correlated. Educational level is also higher post-quota ($r= 0.198^{***}$) as well as accounting (OI/assets with $r= 0.155^{***}$ and ROA with $r= 0.160^{***}$) and market-based measures (MTBV with $r= 0.101^{**}$ and Tobin with $r= 0.124^{**}$). Board size ($r= 0.171^{***}$) and education ($r= 0.092^*$) are positively correlated with female share while experience private ($r= -0.115^*$) as well as age ($r= -0.214^{***}$) are negatively correlated with female share. The accounting-based measure ROA ($r= 0.090^*$) and market-based measures MTBV ($r= 0.077^*$) and Tobin ($r= 0.169^{***}$) are positively correlated with female share. Board size is negatively correlated with education ($r= -0.198^{***}$) while it is positively correlated with nationality ($r= 0.080^*$) and tenure ($r= 0.172^{***}$). Both accounting based measures are positively correlated with board size (OI/assets with $r= 0.181^{***}$ and ROA with $r= 0.166^{***}$) while both market-based measures are negatively correlated with board size (MTBV with $r= -0.111^{**}$ and Tobin with $r= -0.094^*$). Education is positively correlated with nationality mix ($r= 0.302^{***}$), experience quoted ($r= 0.572^{***}$), experience private ($r= 0.151^{***}$) and age ($r= 0.214^{***}$). Nationality mix is negatively correlated with tenure ($r= -0.121^*$) while experience quoted ($r= 0.283^{***}$) and age ($r= 0.187^{***}$) are positively correlated. With regard to accounting-based measures, OI/assets ($r= -0.083^*$) and ROA ($r= -0.095^*$) are negatively correlated while the marked-based measure Tobin ($r= 0.122^{**}$) is positively correlated with nationality mix. Tenure is positively correlated with experience quoted ($r= 0.089^*$) and age ($r= 0.246^{***}$) as well as with the accounting-based measures OI/assets ($r= 0.166^{***}$) and ROA ($r= 0.194^{***}$). Experience quoted is positively correlated with experience private ($r= 0.239^{***}$) and age ($r= 0.276^{***}$) as well as the marked-based measure MTBV ($r= 0.140^{***}$). Experience private is positively correlated with age ($r= 0.083^*$) and also ROA and age are positively correlated ($r= 0.079^*$). OI/assets is positively correlated with ROA ($r= 0.916^{***}$) as well as with MTBV ($r= 0.131^{***}$). Further, ROA is positively correlated with MTBV ($r= 0.140^{***}$) and Tobin ($r= 0.112^{**}$). Also, Tobin and MTBV are positively correlated ($r= 0.393^{***}$).

2.5.1 Female representation and board structure

We analyze the relationship between female board representation and other board characteristics as well as the effect of the reform on board structure by estimating the causal effect of the reform on boards using the difference-in-differences approach. Figures 1-8 report the corresponding graphs for each board structure variable over time. The regressions include firm and industry-by-year Fixed Effects.

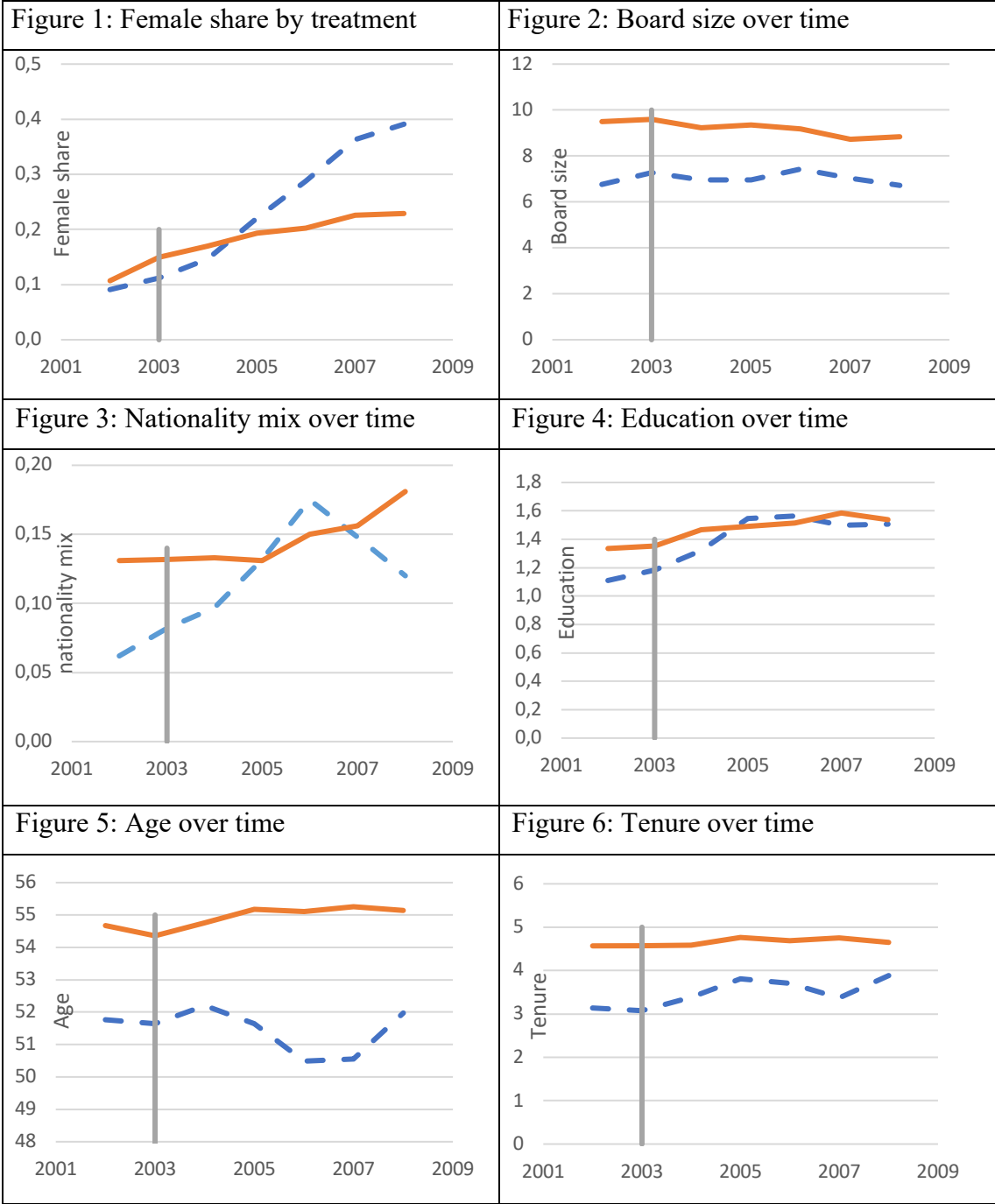


Figure 7: Experience on quoted company boards over time

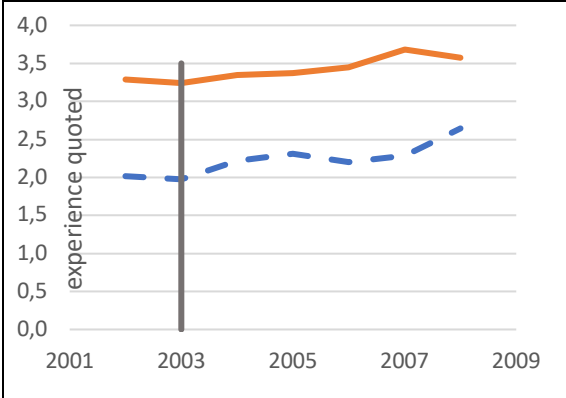
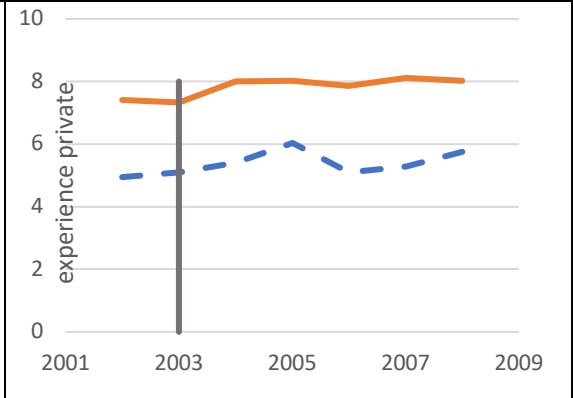


Figure 8: Experience on private company boards over time



--- Treated — Control

Table 5: The causal effect of the reform on board structure

	Female Share	Board Size	Tenure	Age	Nationality	Education	Experience quoted	Experience private
DiDtreated*postreform2003	0.078*** (0.027)	0.305 (0.336)	0.355 (0.333)	-0.252 (0.635)	0.039 (0.031)	0.139* (0.075)	-0.028 (0.210)	-0.189 (0.526)
Constant	0.103*** (0.009)	8.451*** (0.128)	4.066*** (0.135)	53.730*** (0.230)	0.101*** (0.013)	1.275*** (0.027)	2.888*** (0.066)	6.655*** (0.159)
Firm & industry-by-year FE	yes	yes	yes	yes	yes	yes	yes	yes
Observation	662	662	662	662	662	662	662	662
R-squared	0.464	0.105	0.110	0.138	0.128	0.273	0.168	0.156
Number of company id	109	109	109	109	109	109	109	109

Robust standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Table 5 shows that the female share increased significantly for the treatment group after the reform ($\beta= 0.078, p= 0.01$). This shows clearly that the implementation of a binding law is very effective when the aim of the reform is to improve female representation in non-executive functions. We find a barely significant effect for average education level ($\beta= 0.139, p= 0.1$) which slightly increases with more women on boards. Our results are consistent with findings by HILLMAN/CANELLA/HARRIS (2002), SINGH/TERJESEN/VINNICOMBE (2008), and STORVIK/TEIGEN (2010). There is no causal effect of the reform on board size, tenure, age and nationality mix as well as on experience in neither private nor quoted firms.

2.5.2 Female representation and firm performance

We follow the same techniques as with board structure to examine the effect of the binding gender law on firm financial performance. Figures 9-12 report the corresponding graphs.

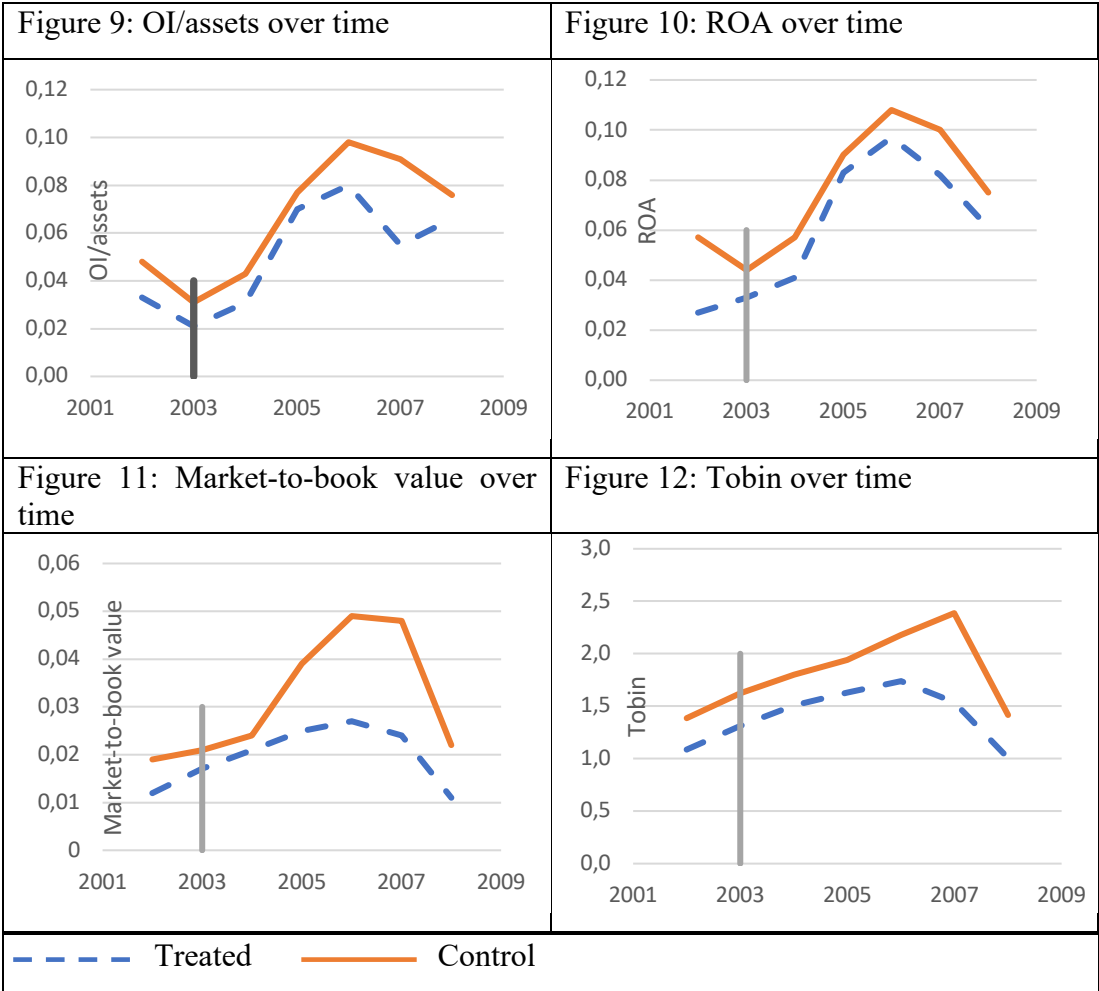


Table 6: The causal effect of the reform on firm performance

	Financial performance		Market performance	
	OI/assets	ROA	MTBV	Tobin
DiD treated*postreform2003	-0.038*** (0.012)	-0.026** (0.012)	-0.010 (0.006)	-0.210 (0.204)
Board size	-0.005 (0.003)	-0.006* (0.003)	-0.001 (0.001)	0.013 (0.025)
Education	0.004 (0.016)	0.002 (0.018)	-0.005 (0.007)	0.047 (0.183)
Nationality	-0.002 (0.031)	-0.004 (0.031)	0.013 (0.011)	0.313 (0.481)
Age	0.000 (0.002)	0.002 (0.002)	-0.001 (0.001)	0.024 (0.016)
Tenure	0.003 (0.003)	0.002 (0.003)	0.001 (0.002)	-0.036 (0.024)
Experience quoted	-0.009 (0.006)	-0.016* (0.008)	0.010 (0.011)	-0.087 (0.074)
Experience private	0.000 (0.002)	0.000 (0.030)	-0.004 (0.004)	0.028 (0.036)
Constant	0.083 (0.097)	0.018 (0.107)	0.052 (0.054)	0.024 (1.021)
Firm & industry-by-year FE	yes	yes	yes	yes
Observations	662	662	662	662
R-squared	0.213	0.209	0.110	0.156
Number of firms	109	109	109	109

Robust standard errors in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Table 6 reports regression coefficients of the causal effect of the binding law on accounting-based performance and market performance. Table 6 indicates a negative effect of the law on accounting-based performance. The coefficients for OI/assets ($\beta = -0.038$; $p = 0.01$) and ROA ($\beta = -0.026$; $p = 0.01$) are negative and highly significant meaning that an increased female representation through the law diminishes accounting-based performance. The finding for OI/assets is in line with MATSA/MILLER (2013). Compared to the control group the coefficient of market-based performance is negative but not significant after the reform. With respect to market performance, we find no significant effect of the reform for both the market-to-book value and for Tobin's Q. That is, we find no support for H2.

2.6 Discussion

Our study makes contributions to policy, theory, and practice. From a policy standpoint, the reform can be considered as a very effective method to improve gender equality as the share of women on corporate boards in Norway significantly increases.

From a theoretical standpoint, we find support for upper echelons theory arguments that top managers' gender may explain firm decisions and outcomes, even though the coefficients of the accounting-based measures become significantly negative in our study. This can be interpreted as more gender diverse boards make different choices than male dominated boards. However, we do not find support for gender stereotyping. Even though firms that are mandated to increase the number of female directors show lower market-based performance than before and compared to the control group, this result is not significant. Investors do not consider aspects mentioned by e.g. EAGLY/KARAU (2002) that women are too less "agentic" or that women show less leadership capabilities than men as ELLEMERS et al. (2004) suggest. In this study, we find that accounting-based measures are reduced through the increase of female representation on Norwegian corporate boards. This finding is in line with a study by DARMADI (2011) who found similar results in an Indonesian context for ROA but contrary to POST/BYRON (2015) who found a positive effect of a higher female share on accounting-based performance in their meta study. With regard to market-based performance however, the findings of POST/BYRON (2015) and AHERN/DITTMAR (2012) are similar to our study: A higher female share does not uniformly contribute to better market-based performance. The result for market-based performance might suggest that investors are not necessarily biased against the capability of women as they do not adapt their decisions downwards for the future even though the coefficients of accounting-based measures become significantly negative. According to POST/BYRON (2015) this result can be explained by the investors' perceptions and expectations they have about the company's value in the long term, independent of gender compositions on the boards. As we consider only a short time frame from 2002 to 2008 for our analysis the long-term effects are not clear.

On the practical front, our study offers insights for individuals, boards, firms, and investors. As mandatory quotas often have to be implemented in a short period, there are immediate opportunities for top female managers to seek board appointments. These women have greater levels of education than their pre-quota counterparts. This result is consistent with findings by HILLMAN/CANELLA/HARRIS (2002), SINGH/TERJESEN/VINNICOMBE (2008), and STORVIK/TEIGEN (2010).

Before concluding, we acknowledge two limitations of our study, which offer suggestions for future research. First, although we utilize data from Norway's three most proximate countries, both geographically and institutionally, we might have compared our findings to other countries. Second, we acknowledge that we do not directly measure upper echelons and gender stereotypes of how directors interact. Future research could include more direct measures. In addition to these suggestions stemming from limitations, we offer several other research directions. Future research could more closely examine board interactions. This line of inquiry could include direct observations of board meetings as well as post-board interviews with directors.

2.7 Conclusion

This chapter illustrates the distinct ways of how a reform-induced increase of female representation in boards may affect firm performance. The introduction of a quota increases the female representation on boards. Using difference-in-differences estimation, we find that the Norwegian quota increased the female share on boards without affecting age, nationality mix, tenure and experience on both private and quoted boards, but affecting average educational level. With regard to H1, we find support for upper echelons theory arguments that top managers' gender may explain firm decisions and outcomes. For H2 however, we do not find support for gender stereotyping.

Our research question was *whether firms that are targeted by a binding board gender quota differ in their accounting and market-based performance measures following the quota, compared to the pre-quota and post-quota situations in neighboring countries which do not have a binding quota*. Our results suggest that firms which are targeted by a board gender quota differ in their accounting but not in their market-based performance after the quota was introduced in the sense that accounting performance decreased while market-based performance was unaffected.

3 Are Women Really Less Competitive Than Men? Career Duration in Nordic and Alpine Skiing²

3.1 Introduction

Irrespective of an already large (and still growing) body of research, personnel and behavioral economics has not yet convincingly explained neither the persistent gender pay gap (see e.g. KUNZE 2008; 2017) nor the massive underrepresentation of women in e.g. managerial positions (see e.g. BERTRAND/HALLOCK 2001; FREDERIKSEN/HALLIDAY 2015).

Recently, gender differences in mental attitudes and dispositions – especially risk preferences and competitive orientations – have been identified as a possible reason to explain differences in the behavior of men and women. However, these differences in attitudes and dispositions (as well as in actual decision-making) have so far been primarily investigated in laboratory experiments. In her extensive review of these experiments, NIEDERLE (2014) therefore calls for field evidence complementing the available findings. Moreover, she calls for evidence that the documented differences in psychological traits do indeed account for “a significant fraction of gender differences in economic decisions relevant to (...) market (...) outcomes of women and men”, which would, in turn, document “the external relevance of gender differences in competition (...) and risk” (NIEDERLE 2014: 8). In a recent review of the literature, BUCKERT et al. (2017) discuss various factors that have been found to have an impact on self-selection into tournaments: risk preferences (see e.g. NIEDERLE/VESTERLUND 2007), personality (see e.g. MÜLLER/SCHWIEREN 2012), and self-confidence (see e.g. CROSON/GNEEZY 2009; NIEDERLE/VESTERLUND 2007).

Apart from the well-documented gender differences in risk aversion and competitive orientations, men and women have been found to differ, inter alia, in their response to feedback. While women mainly react to information on their own performance, men seem to respond more to their beliefs over the competition they will face in the future (see e.g. BERLIN/DARGNIES 2016; WOZNIAK 2012). After having lost in a competition, the responses of men and women seem to differ again: While men tend to select more

² This chapter is based on the manuscript „Are Women Really Less Competitive Than Men? Career Duration in Nordic and Alpine Skiing“, which is joint work with BERND FRICK

challenging tasks in the future, women lower their performance (see e.g. BUSER 2016; BUSER/YUAN 2019). Another important finding is that while stress (measured as salivary cortisol) increases women's probability to enter into a tournament, this effect does not exist among men (see e.g. BUSER/DREBER/MOLLERSTROM 2017; CAHLIKOVA/CINGL/LEVELY 2019). However, with increasing experience in competitive environments – such as sport – the willingness to enter in competitive systems increases for women as well as for men (see COMEIG et al. 2016: 1418). Not surprisingly, therefore, FILIPPIN/CROSETTO (2016) in their recent survey of the experimental literature and re-analyses of the available data find that gender differences in risk attitudes are largely task-specific and disappear once the idiosyncrasies of the task are adequately controlled. A similar picture emerges with respect to competitive orientations: When controlling for confidence, actual performance, beliefs about relative performance as well as the characteristics of the specific task, the gender difference completely disappears (see e.g. DREBER/VONESSEN/RANEHILL 2014; GÜNTHER et al. 2010; HARDIES/BREESCH/BRANSON 2013; KAMAS/PRESTON 2012). Moreover, FLORY et al. (2018) emphasize that gender differences in competitive orientations vary across the age distribution with older women being as competitive as observationally similar men.

In this paper, we address an issue raised by NIEDERLE/VESTERLUND (2007) that “much may be gained if we can create environments in which high-ability women are willing to compete” (NIEDERLE/VESTERLUND 2007: 1100) in that we investigate the performance of women and men in a highly competitive environment into which both, men and women, have self-selected. We contribute to the discussion on the impact of tasks on gender differences in competitive orientations in a particular way. Using field data from Alpine and Nordic (cross-country) skiing over an extended period of time (since the respective first World Cup season; 1967 in Alpine, and 1982 in Nordic skiing) until the season 2018, we identify the determinants of career length of observationally similar men and women in a particular competitive environment. In general, the careers of professional athletes appear skewed towards early exit (see WITNAUER/ROGERS/SAINT ONGE 2007: 371). We interpret career length (i.e. the time between entry in and exit from the Ski World Cup) as a measure of risk preferences and competitive orientations of men and women as exit decisions that are unrelated to injuries reflect how professional athletes cope with individual success as well as

failure. If women were more risk averse and/or less competitive, their careers should be shorter than those of equally (un-)successful men as they would be particularly discouraged by poor performance. Longer careers, in turn, would suggest that female athletes are less risk averse and have a stronger competitive orientation than men. Unless in lab experiments, where mostly students compete in low-stakes environments (for recent example see JUNG/CHOE/OAXACA 2018), professional athletes – be they male or female – have deliberately chosen to pursue a career in a highly competitive environment with payoffs that are typical for a winner-take-all situation. Since we control for self-selection into this highly competitive environment, we do not expect to observe any differences in career duration of male and female athletes whom we thus assume not to differ with respect to risk preferences and competitive orientations. By comparing the career lengths of both genders in Alpine and Nordic skiing, we address the following research question: What are the determinants of men’s and women’s career durations when both compete under similar conditions?

Thus, the goal of our paper is to compare career length of men and women and their reactions to success and failure under virtually identical conditions. In the environment we study, men and women compete under identical rules (in the same type of competitions) and have identical returns to performance in terms of prize money³ as well as World Cup points⁴. Moreover, the physical requirements like e.g. slope or distance are similar (admittedly not identical) for men and women and the opportunity costs of quitting are more or less the same. Finally, professional male and female skiers represent a highly self-selected population of particularly talented and motivated individuals who are unlikely to differ in their motivations and dispositions suggesting that their response to success and failure should be more or less identical. Since we study individuals who have self-selected into a highly competitive environment, we do not expect to find statistically significant differences in the length of these athletes’ careers.

³ See Table A1 in the Appendix for a list of the top earners in Alpine and Nordic skiing in the 2017-18 season

⁴ Although there are considerable differences in the amount of prize money that is allocated among the athletes, Alpine (including slalom, giant slalom, super G, downhill and combined) and Nordic skiing (sprint as well as endurance cross-country events on various distances) use the same distribution of prize money and World Cup points. The current scoring system has been used since the 1991-92 season (see Table A2 in the Appendix for the distribution of World Cup points and prize money).

Research on (the determinants of) career length in individual professional sport is still in its infancy. Most of the existing research has so far used data from team sports. The few papers that have analyzed career length of athletes in individual sports have looked at male athletes only and none of these have used data from winter sports. To the best of our knowledge, data from FIS World Cup events have so far only been used by FEES/JOST/MÜLLER (2016) to investigate whether ability, rank and gender have an impact on risk-taking behavior in sequential tournaments and by CHE/HUMPHREYS (2013) who analyze data from FIS Alpine Skiing World Cup events to test whether women respond in a similar way to tournament incentives than men.

The remainder of the paper is organized as follows: In the next section, we summarize the literature we consider particularly relevant in our context to address the research questions outlined above. Section 3 includes a description of the data and provides some descriptive statistics. In section 4, we present the results of our econometric analyses. Section 5 summarizes our main findings and concludes with implications for management as well as future research.

3.2 Related literature

Before starting the review of the literature we consider relevant in our context we emphasize that we are familiar with the already large (and still growing) body of literature using lab experiments to analyze e.g. the impact of personality characteristics on risk preferences and competitive orientations among men and women and boys and girls, respectively. However, we refrain from including this literature in our review as these mostly commendable studies typically take great care in randomly allocating participants to the various treatments, while failing to recognize that the labor market is hardly random (for reviews of the literature see e.g. CROSON/GNEEZY 2009; NIEDERLE/VESTERLUND 2011; DECHENAUX/KOVENOCK/SHEREMETA 2015). Summarizing the available – mostly experimental – evidence, CROSON/GNEEZY (2009) conclude that “women are more reluctant than men to engage in competitive interactions like tournaments, bargaining, and auctions. Additionally, men’s performance, relative to women’s, is improved under competition. Thus, as the competitiveness of an environment increases, the performance and participation of men increase relative to that of women” (CROSON/GNEEZY 2009: 464). The females’ reluctance is usually explained by their more pronounced risk aversion. However, most

experimental studies seem to suggest that the observable pattern of gender differences in competitiveness is associated with excess entry of men due to overconfidence rather than due to differences in risk aversion. Moreover, the available evidence seems to suggest that women “choke under pressure” more than men do (see NIEDERLE/VESTERLUND 2009: 9). Finally, some evidence – again mainly experimental – emphasizes the importance of the socio-cultural context as a factor influencing competitive orientations of men and women.

While the laboratory experiments are carefully designed, they have difficulties in distinguishing between the most likely sources of gender differences in competitiveness – the incentive effects of tournaments on the one hand and self-selection of persons with a “competitive motivation” on the other hand. Professional athletes – similar to top managers – have self-selected into activities for which they are particularly talented, qualified and motivated. Thus, the literature we consider in this section comes from two different strands of research: First, papers analyzing gender differences in performance due to *self-selection, pressure, choice of strategy* as well as *response to incentives* and, second, studies looking at *career length* in professional sports. With respect to the latter, little to nothing is available that compares the behavior of men and women.

3.2.1 Gender Differences in Self-Selection in Professional Sport⁵

Until the 1960s, far more men than women chose to become professional athletes in the Western world, i.e. self-selected into a highly competitive environment. However, in the last 50 years this gender gap in self-selection has decreased considerably due to the gradual erosion of social barriers allowing women to become professional athletes and to train as hard as comparably talented men. More recently, a similar development has occurred in many African and Asian countries with the consequence that today in e.g. track and field as well as in road running athletes from East African countries dominate among men as well as women (women were not allowed to participate in marathons before 1973). This is not surprising as the incentives to train properly

⁵ Since we concentrate on findings from professional sport, we exclude here the “running studies” based on field experiments mostly in elementary schools by e.g. GNEEZY/NIEDERLE/RUSTICHINI 2003, GNEEZY/RUSTICHINI 2004, DREBER/VONESSEN/RANEHILL 2011, CARDENAS et al. 2012, KHACHATRYAN et al. 2015 as well as SUTTER/GLÄTZLE-RÜTZLER 2015.

nowadays are similar for male and female athletes because the “returns to winning” are identical since the early 1980s.

Using data from ultramarathons, FRICK (2011b) finds that initially, that is around the year 2005, the pool of female runners was far more heterogeneous than the pool of male runners. However, over time the performance differential between men and women declined rapidly. Particularly interesting in this context is that this decline is much larger on the 100 km, that is, the race where incentives to perform well are particularly high (due to, e.g., the existence of a World Cup). Thus, the presence of monetary as well as non-monetary incentives induced a gradual process of self-selection into professional athletics, slowly leading to the emergence of a competitive field. Since the returns to self-selection are considerably higher on the 100 km than on the 50 km, the performance differential between the top male and female athletes on the former distance is far smaller than on the latter and increases significantly more on the 50 km distance as one moves up higher in the ranking (see FRICK 2011b: 389).

In a companion paper using longitudinal data from middle- and long-distance foot races FRICK (2011a) reveals that the rank corrected percentage difference in finishing times between male and female athletes is particularly small on the 3000 m outdoor track, the 5000 m outdoor track, the 10,000 m outdoor track and the marathon. These track races are equally attractive to men and women because they are part of the International Association of Athletics Federation's (IAAF) championships and/or the annual “Golden League” meetings (the most lucrative events in track and field athletics apart from the city marathons). Marathons, in turn, are also equally attractive to male and female athletes as the prize purses have increased considerably in the recent past and are equal for men and women. Thus, it appears that in the race types where prize money and/or prestige is particularly high, the gender difference in competitiveness is significantly lower than in races that are – for various reasons – considered less attractive (see FRICK 2011a: 333). FRICK (2011a) also finds that the rank corrected time difference between male and female athletes has declined considerably over the last 40 years and is narrowing by about 2% per year. This suggests that women are catching up rapidly and that the gender gap in competitiveness that has been documented in most previous studies will have disappeared soon in this (admittedly

idiosyncratic) context. Thus, social change and economic incentives induce similar numbers of men and women to self-select into athletic careers.

Potential differences in self-selection across genders are analyzed by NEKBY/SKOGMAN THOURSIE/VAHTRIK (2008), who use data from the 2005 and 2006 editions of the “Midnight Race” held in Stockholm every year in June. In 2005, runners were allocated into start groups based on their previous or expected performance by the race organizers. In 2006, runners were given the opportunity to self-select into a start group based on their individual assessment. The authors find that women who self-select into a start group with faster runners tend to be over-confident, i.e. their finish time is slower than expected. Using data from seven editions of the „Santa Barbara State Street Mile” in the years 2002 to 2008, GARRATT/WEINBERGER/JOHNSON (2013) find that not only women, but also older men try to avoid competitive pressures by self-selecting into slower start groups, suggesting that over-confidence is particularly widespread among younger men.

3.2.2 Gender Differences in Performance “Under Pressure”

An already large number of studies using data from different individual sports have analyzed the behavior of male and female professional as well as recreational athletes during competition i.e. *under pressure*. Using data on expert chess players, GRÄNSMARK (2012) finds that women perform worse under time pressure, i.e. when the amount of time available for the next move decreases as time progresses. The quality of the moves of women is better in the first half of the game, whereas men’s performance is better in the second half.

Using data from high jump and pole vault competitions, BÖHEIM/LACKNER (2015) find that although competitive pressure induces men and women to take more risky decisions (i.e. to skip attempts and move to the next height), this change in behavior is more pronounced among men than among women.

Using data from the New York City Marathon events in the years 2007 thru 2014, BIRK/LEE/WADDELL (2016) show that when elite-female athletes are exposed to the presence of men, their performance is negatively affected with the effect being larger among lower-ability runners. More precisely, the pace of a female elite runner

decreases by about 0.9 percent when being overtaken by men, a finding that the authors attribute to the “psychological effects” of competition. BOOTH/YAMAMURA (2016) use a sample of more than 400,000 person-race-observations from Japanese speedboat racing in the period April 2014 to October 2015 and find that in gender-mixed races, women’s performance is slower than in women-only races. Men, however, are faster in gender-mixed races compared to men-only races. Moreover, men behave more aggressively in gender-mixed races. Women, in contrast, are less aggressive in gender-mixed races than in women-only races. Aggressive behavior can be considered a choice variable in contests as well as in everyday life. Therefore, the next section focuses on (possible) differences in choice of strategy among men and women.

3.2.3 Gender Differences in the Choice of Strategy

Recently, a number of studies using large samples on expert chess players have documented statistically significant differences between men and women in terms of choice of strategy: First, GERDES/GRÄNSMARK (2010) find that men choose more aggressive opening strategies when playing against women. Women, in turn, choose aggressive strategies only when playing against better-ranked women. Second, DREBER/GERDES/GRÄNSMARK (2013) find that men choose significantly riskier strategies when playing against a physically attractive female opponent although this choice of strategy increases the probability of losing the match. Similar differences in strategy choice between men and women have been found in professional tennis. Using data from Grand Slam Tournaments, PASERMAN (2010) finds that women commit significantly more unforced errors at crucial junctures of the match. Moreover, men and women choose a more conservative and less aggressive style of play as points become more important (as measured by serve speed, first serve percentages and rally length), but this change in behavior is more pronounced among women. Analyzing gender differences in line-call challenges in major tennis tournaments all over the world, ANBARCI/LEE/ULKER (2016) find that male players’ challenges are more likely to be a response to their opponents’ behavior. At tiebreaks, women display a higher probability than men to reverse an umpire’s unfavorable call. Men, however, make relatively more unsuccessful challenges. Finally, JETTER/WALKER (2015) provide strong evidence for corrupt behavior on the men's tour, where “bubble players” are found to be substantially more likely to beat better ranked opponents when a win is desperately needed. No such evidence can be found on the women's tour, suggesting

considerable gender differences with respect to corrupt and unethical as well as collusive behavior.

3.2.4 Gender Differences in the Response to Incentives

Apart from gender differences in performance under pressure and in the choice of strategy, differences between men and women can also be observed in the response to *incentives*. GILSDORF/SUKHATME (2013) use data from the 2009 Professional Golf Association and Ladies Professional Golf Association Tour and find that, when looking at total scores, men and women respond similarly to (changes in) incentives. However, looking specifically at final round scores they find that female golfers respond more strongly to incentives in the sense of improving their performance than male golfers. MARIKOVA LEEDS/LEEDS (2013), in turn, use data from figure skating contests in the 2009-10 season and also find that women respond more strongly to incentives than men. Moreover, female figure skaters display a more resilient behavior when confronted with negative feedback and do not avoid competition with other elite skaters.

3.2.5 Career Length in Professional Sport

Much of the existing literature on career length in professional sports focuses on *team sports*. ATKINSON/TSCHIRHART (1986) analyzed career length data on 260 National Football League (NFL) players active from 1971 to 1980 using hazard models. The average career length in this population was 4.5 seasons. First year NFL players experienced increasing hazard early in their career but players who survived this early career “shakeout” experienced a falling hazard rate for the remainder of their careers. Team and individual performance had a positive effect on career length. STAW/HOANG (1995) investigated career length data for NBA players picked in the first two rounds of the drafts held from 1980 through 1986. 275 players from this population played at least one season in the NBA of whom 184 had exited by the 1990-91 season. The average career length was just under 8 seasons in this population. Results suggested that scoring performance and the total number of rebounds and blocks were associated with longer career lengths, and draft position and the number of times a player was traded were associated with shorter career lengths. FRICK/PIETZNER/PRINZ (2007; 2009) analyzed career length data for 4,116 players who appeared in at least one match

in the top league of professional soccer in Germany, the Bundesliga, over the 1963-64 to 2002-03 seasons. The average career length was less than 4 seasons in this population. Results suggested that defenders, midfielders and forwards had shorter careers and goalkeepers longer careers. The total number of games played and goals scored per season were associated with longer careers and yellow and red cards per season had no impact on career length.

Few studies have analyzed career length in *individual professional sports*. Two of these focused on professional tennis. GEYER (2010) analyzed career length data for 614 male professional tennis players who participated in Grand Slam tournaments, Association of Tennis Professionals (ATP) tournaments, and International Series tournaments over the 1985 through 2007 seasons. The average career length in this population was 6 seasons. Player performance, in terms of tournaments won and percentage of games won, were associated with longer career lengths while lower world ranking was associated with shorter careers. FRICK/SCHEEL (2014) analyzed career length data for 698 male professional ski jumpers competing in more than 750 different tournaments over the 1979-80 thru 2010-11 seasons. The average career length in this population was four seasons. Athletic performance, in terms of World Cup points accumulated over a season and winning World Championships, was strongly associated with longer career lengths. In addition, FRICK/HUMPHREYS/SCHEEL (2015) analyzed career duration in American stock car racing and in professional golf using information on career length and performance of 740 male professional automobile racers from NASCAR between 1975 and 2010 as well as 1,639 male professional golfers from the 1980/81 to 2012/13 season who played on the PGA Tour for at least one year. They find that career length was significantly different with nearly seven seasons for the latter and less than 5 seasons for the former, suggesting that differences in physical requirements may also have an impact on the duration of an athlete's career.

To the best of our knowledge only one study exists so far that compares career length of men and women in professional sport. COATE/ROBBINS (2001) analyzed career length data for 236 male and 216 female tennis players who were ranked in the world top 50 in singles at least once between 1979 and 1994. The average career length was about nine seasons in this population. The results suggest that there was no difference

between the career length of males and females, despite significantly lower prizes for women. No performance measure was included in the empirical models. This study, however, suffers from a major problem: The physical requirements for male and female tennis players are significantly different as women play up to three sets to determine the winner of a match while men play up to five sets. We avoid this problem by comparing career length of men and women competing under similar, yet not completely identical conditions in Nordic and in Alpine skiing, to determine the winner of a tournament to rule out potential biases that may result from differences in physical requirements, levels of fatigue, injury risks, etc.

3.2.6 The Economics of Career Length

In general, career duration in professional sport can be analyzed from several theoretical perspectives. Participating in professional sport over a period of time can be viewed as a labor supply decision and analyzed in the context of standard dynamic lifecycle labor supply decisions (see MITCHELL/FIELDS 1984: 104). In this context, the end of the athlete's playing career represents a decision to retire from the sport. Retirement is typically a voluntary decision made by employees based on their current and expected earnings and other factors like the value of leisure time and life expectancy. The annual earnings of professional athletes can be large, and some participants in professional sport may view their employment as a way of earning large sums in a short period of time in order to retire early.

Alternatively, the end of an athlete's career can be viewed as a dismissal from the sport. In dynamic models of employee dismissal, inefficient employees are systematically eliminated from employment (see FLINN 1997: 222). This approach to employee dismissals is related to labor market search models and employee-firm matching (see MORTENSEN 1978: 572). The end of a career is involuntary in this case, and represents a profit maximizing decision on the part of the employer based on the contribution of the employee and the availability of alternative employees. A spell of employment ending with a dismissal can also be interpreted as an outcome of a promotion tournament (see SZYMANSKI 2003: 1174). The organizers of professional sports contests want to attract the most talented athletes in order to maximize profits; when an athlete becomes less productive due to age or injury, contest organizers will

replace that athlete with a more productive competitor, leading to an end of the spell of employment.

A spell of employment in a professional sport can also be viewed from the perspective of occupational tenure (see KLEE 2013). This approach emphasizes the idea that a career in professional sports is one of several occupations that professional athletes might pursue and focuses on matching between employer and employee and the role played by occupation-specific human capital (see KLEE 2013: 1). The end of a professional sports career may or may not be voluntary in this context, but the occupational tenure approach emphasizes the importance of other related occupations, like coaching, scouting, or providing media commentary on events, when an athlete's human capital might be useful, as well as the earnings in these related, and perhaps other unrelated occupations.

All these models imply that current performance, expected future performance, the presence of other employees that can perform the same job, and the value of leisure time affect the exit from employment. These models differ in whether or not the quit is voluntary or forced on the employee by the employer. In practice, econometricians have limited information about why a professional athlete's career comes to an end. It could be voluntary, as explained by lifecycle labor supply models, or involuntary, as explained by models of employee dismissal and tournament theory models. Models of occupational tenure can include both voluntary and involuntary career terminations. In addition, athletes may experience career-ending injuries that may or may not be observable to the econometrician. These factors make a complete understanding of the reason for the end of the employment spell difficult to determine, and also make it difficult to determine which model to apply to the econometric analysis of career duration in professional sport.

Summarizing the evidence discussed above together with the notion of career length as a plausible measure of risk preferences and competitive orientations we derive (and subsequently test) the following hypotheses:

H3: Career length of male and female professional athletes is not significantly different in neither Alpine nor in Nordic Skiing.

As we want to identify the determinants of individual career length, we analyze the impact of various measures of absolute and relative performance. Since the most obvious measure of individual performance is the number of World Cup points an athlete accumulates over the course of a season, our second hypothesis is as follows:

H4: The more World Cup points an athlete accumulates during a season, the longer his/her career will last in both, Alpine and Nordic Skiing.

Further, since each national federation is guaranteed a limited number of starting slots only, each athlete's performance is benchmarked against that of his/her compatriots. This suggests that the same number of World Cup points is of less value for a member of a strong nation (such as Austria in Alpine skiing or Sweden in Nordic skiing) than for a member of a weak nation (such as e.g. Germany in Alpine or France in Nordic skiing). Thus, we hypothesize:

H5: The higher the number of competitors within a national federation, the shorter the careers of both, male and female athletes in Alpine and Nordic Skiing.

In some seasons, a small number of athletes dominate most of the contests and accumulate disproportionately large shares of World Cup points, leading to disappointment and frustration among the remaining athletes. Therefore, we formulate our fourth hypothesis as follows:

H6: A higher concentration of World Cup points leads to shorter careers of male and female athletes in Alpine and Nordic Skiing.

An athlete who performs well compared to his/her compatriots in the sense that he or she assembles a large fraction of World Cup points for his/her national federation is likely to survive longer. Thus, our fifth hypothesis reads:

H7: A higher percentage of World Cup points leads to longer careers of male and female athletes in Alpine and Nordic Skiing.

Finally, since prize money (as well as the monetary value of endorsement contracts, the content of which remains usually private and confidential) has increased over time, the opportunity costs of quitting have also increased. Consequently, our sixth hypothesis is as follows:

H8: Over time career length increases for both, men and women, in Alpine and in Nordic Skiing⁶.

3.3 Data and Descriptive Statistics

Our approach is similar to the one adopted by the studies on exit discrimination in professional team sports (see e.g. HOANG/RASCHER 1999) in the sense that we compare career length of male and female athletes in two so far completely neglected winter sports holding individual productivity constant. However, in our study we use career length as a measure of risk preference and competitive orientations. We collected data on career length and performance of male and female Alpine as well as Nordic skiers from the websites of “FÉDÉRATION INTERNATIONALE DE SKI” (FIS) for all seasons since the implementation of that particular sport’s World Cup (1967 for the former and 1982 for the latter). Our final data set includes each individual that ever won at least one World Cup point over the period 1967 (1982) thru 2018, yielding a data set with 4,151 individuals (1,835 women and 2,316 men) and 18,776 athlete-year-observations.

Table 7: Descriptive Statistics I

Gender and Sport	Individuals	Observations	Exits	Average Career Length¹
Men, Nordic	1,108	4,404	953	3.97
Women, Nordic	804	3,274	696	4.07
Men, Alpine	1,208	6,136	1,048	5.08
Women, Alpine	1,031	4,962	896	4.81
Total	4,151	18,776	3,593	4.48

¹Column 3/Column 2

⁶ Apart from the increase in prize money and endorsement contract revenues, other factors such as improvements in training and conditioning methods, advances in the treatment of injuries and in diet may play an important role too. These effects, however, are difficult, if not impossible to separate from each other.

Table 8: Descriptive Statistics II

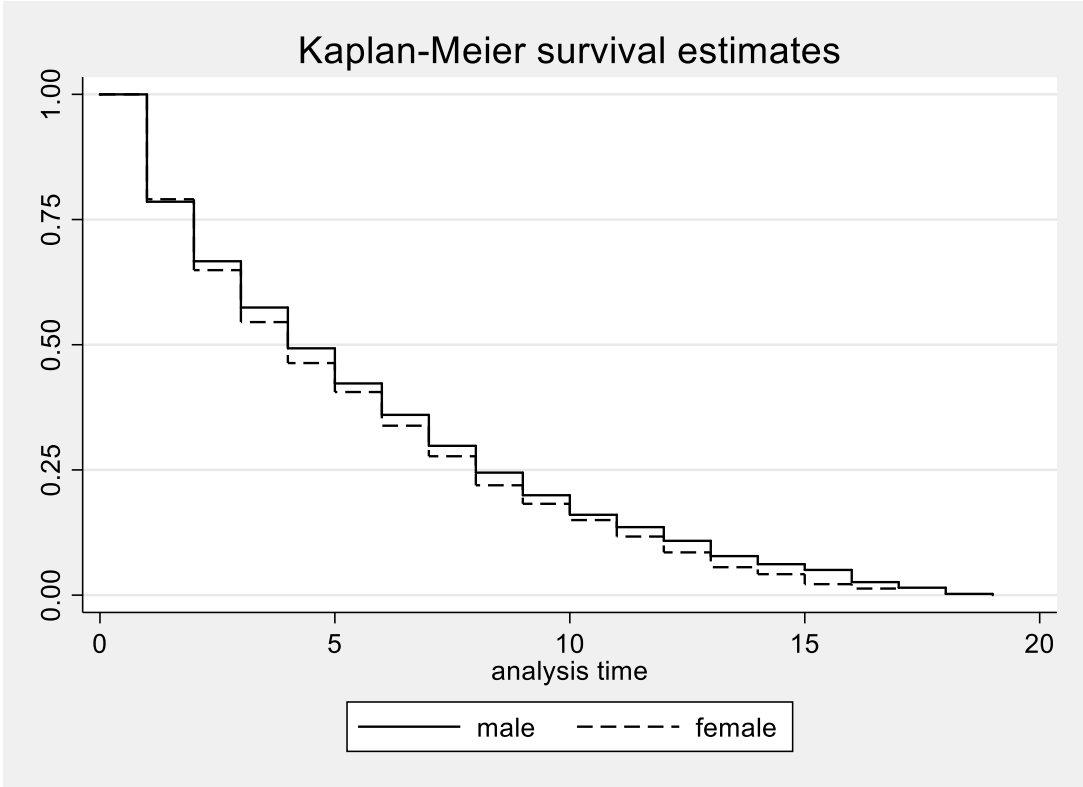
Gender and Sport	Individuals with Gap	Percent of Individuals¹	Time on Gap (Years)	Average Time on Gap²
Men, Nordic	286	25.8	403	1.41
Women, Nordic	237	29.5	299	1.26
Men, Alpine	391	32.4	478	1.22
Women, Alpine	275	26.7	306	1.11
Total	1189	28.6	1,486	1.25

¹(Column 2/Column 2, Table 7) * 100

²Column 4/Column 2

It appears from Table 7 above that average career length of men and women in both sports is between 4 and 5 years and differs only slightly (by 0.3 years in Alpine and 0.1 years in Nordic skiing). Moreover, career interruptions – which may be due to injuries, degradation to the regional cup competitions (such as the European Cup) or doping bans – are rather frequent events for both, men and women (see Table 8).

Figure 13: Kaplan-Meier Estimation of Career Length in Alpine Skiing by Gender

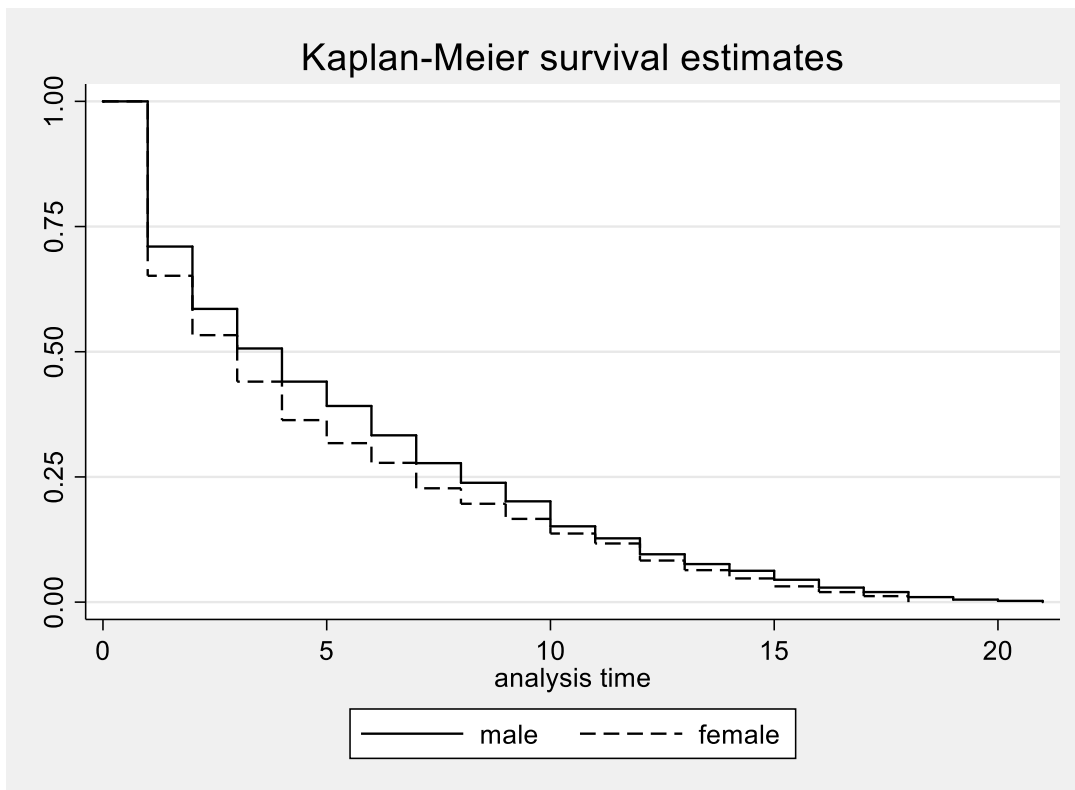


Log-Rank Test for Equality of Survivor Function

Gender	Events Observed	Events Expected
Men	1,048	1,082.02
Women	896	861.98
Total	1,944	1,944
Chi2	2.97, p<.10	

However, the Kaplan-Meier survival estimates seem to suggest that the conditional probability of women to exit is higher than the respective probability of men (Figure 13 for Alpine and Figure 14 for Nordic skiing). This impression is supported by the results of the log rank test for equality of the respective survivor functions that turns out to be highly significant ($p < .01$) in the case of Nordic skiing and marginally significant ($p < .10$) in the case of Alpine skiing, suggesting that men seem to survive (slightly) longer in their sport.

Figure 14: Kaplan-Meier Estimation of Career Length in Nordic Skiing by Gender



Log-Rank Test for Equality of Survivor Function

Gender	Events Observed	Events Expected
Men	953	949.68
Women	696	699.32
Total	1,649	1,649
Chi2	0.04, $p < .01$	

Note that the distribution of the survivor functions in both sports is similar in the first year of male and female athletes' careers in Alpine, but not in Nordic skiing. About 20 percent of male as well as female athletes in the former sport have a career of only one season, shown as the first step down at the left-hand side of Figure 13. After the first season, the career lengths begin to differ between male and female athletes with the probability for male athletes to remain on the tour always being slightly higher than for women. However, the difference in the survival probabilities never exceeds two percentage points. For Nordic skiing the picture is completely different (Figure 14). Here about 30 percent of the male but 40 percent of the female athletes exit the tour after their first season already. This difference in the survival probabilities continues

to grow for the next four seasons before decreasing again after the fifth year on the tour.

3.4 Variables and Method

While this unconditional, non-parametric analysis of career length uncovers some interesting patterns, most research on career length performs conditional, parametric or semi-parametric analyses of the performance of athletes to better understand the determinants of career length. Parametric and semi-parametric methods can condition observed career length on other observable factors like performance that are known to affect career length systematically in other settings. In this conditional analysis of career length, we use two different data sets – one for each sport – because we assume that the baseline hazard function varies systematically across sports and we therefore need to estimate sport-specific models.

First, we explain observed career length using covariates that reflect the performance of the athletes because the previous literature on career length in sport surveyed above finds performance to be closely linked to career length theoretically and empirically. The performance measure is the annual number of World Cup points assembled by each Alpine or Nordic skier. Since this system is the same for men and women, we only have to control for changes in that system that have occurred over time. We can do this by either including in the estimations a vector of dummy variables representing the different “point regimes” or by standardizing the World Cup points across the different regimes of both disciplines and both genders (mean=zero; Std. Dev. =1).

Second, we control in our estimations for an athlete’s individual performance compared to his or her compatriots as well as relative to their immediate competitors in the World Cup tournaments. Since each national federation is guaranteed a limited number of slots only, athletes from strong federations (e.g. Austria in Alpine and Norway in Nordic skiing) face a substantially higher risk of exit (or relegation) than observationally similar athletes from weak federations (e.g. Germany). Thus, an athlete’s career length is not only affected by his/her individual performance but also by the performance of his/her compatriots. Strong athletes from nations with a particular tradition in Alpine or Nordic skiing are, therefore, always threatened by relegation while even rather weak athletes from weak nations may be able to survive

in their sport for quite a while. We measure an athlete's performance relative to his/her compatriots by the percentage of World Cup points accumulated by athlete i in season j for national association k , reflecting the different nations' level of competitiveness⁷.

Third, the higher the number of competitors, the lower an individual's success probability and the more a sport is dominated by a single athlete winning most of the contests, the shorter will – on average – be the remaining athletes' careers. To control for these effects, we include in our estimations the number of athletes winning World Cup points in a particular season as well as the concentration of World Cup points, measured by the Gini coefficient calculated separately year by year for men and women in each of the two sports.

Fourth, to proxy for the increase in prize money and in (presumably lucrative) endorsement contracts (on which only anecdotal evidence is available) we include in our estimation a linear time trend.

Finally, we interact each of our explanatory variables (World Cup points, percentage of World Cup points assembled by a particular athlete for his/her national association, number of competitors winning at least one World Cup point, concentration of World Cup points and time trend) with a dummy for gender to check whether women respond in a similar or different way than men to changes in competitive pressures. Table 9 displays the descriptive statistics.

⁷ Hence, similar to, for example, the U.S. and Jamaican sprint trials or the domestic qualifying events for marathon runners in Ethiopia and Kenya, a nomination for the Austrian Alpine or the Norwegian Nordic World Cup team is presumably more difficult to achieve than a spot among the Top 30 in a given World Cup competition.

Table 9: Descriptive Statistics for Alpine and Nordic Skiing

Variables	Mean	Std. Dev.	Min.	Max.
Alpine Skiing (N=11,098 observations)				
Female (1=yes)	0.447	---	0	1
Standardized world cup points (z_wcp)	0.000	0.995	-0.976	7.175
Number of competitors (competitors)	118	31	35	161
Concentration of world cup points (concentration)	0.615	0.031	0.493	0.668
Percentage of world cup points (perc_wcp)	0.074	0.174	0.000	1.000
Time trend (trend)	31	14	1	52
Nordic Skiing (N=7,678 observations)				
Female (1=yes)	0.426	---	0	1
Standardized world cup points (z_wcp)	0.000	0.995	-1.051	7.387
Number of competitors (competitors)	119	41	35	186
Concentration of world cup points (concentration)	0.646	0.056	0.475	0.735
Percentage of world cup points (perc_wcp)	0.059	0.149	0.000	1.000
Time trend (trend)	22	10	1	37

The Cox proportional hazard Model is the standard econometric method used to analyze duration data containing right-censored and time-dependent observations. This semi-parametric model has two advantages over other proportional hazard models: First, it can be applied to right-censored data, which is important here since about 10 percent of the skiers analyzed are still active at the end of the sample period. For these competitors, their exit from the competition has not yet occurred, leading to right-censored observations. Second, the Cox Model makes no assumptions about the underlying survival distribution and can incorporate time-dependent variables and also deal with left-truncation. Left truncation occurs when athletes in the sample have careers that began before the start of the sample period (i.e. before 1967 in Alpine and 1982 in Nordic skiing). In addition to a Cox hazard Model, we estimate a parametric hazard Model. Parametric hazard Models exploit the information about career length differently than Cox hazard Models and can be interpreted as regression models (see CLEVES/GOULD/GUTIERREZ 2008). The specific form of parametric hazard models depends on the distribution of the dependent variable, career length. In this setting, the

Akaike Information Criterion (see AKAIKE 1974) indicates that in the case of Nordic skiing a Weibull Model and in the case of Alpine skiing a Gamma Model is preferable to other parametric models like the log-logistic model.

3.5 Econometric Findings

Table 10: The impact of gender on career length in Nordic and Alpine Skiing

	Alpine Skiing		Nordic Skiing	
	Model 1.1 Cox	Model 1.2 Gamma	Model 2.1 Cox	Model 2.2 Weibull
female	-2.166** (0.961)	1.388** (0.589)	-1.656** (0.705)	-1.123 (0.712)
z_wcp	-1.528*** (0.090)	1.044*** (0.056)	-1.159*** (0.089)	-1.448*** (0.095)
z_wcp*female	0.384*** (0.118)	-0.223*** (0.076)	0.065 (0.133)	0.052 (0.144)
competitors	0.002 (0.002)	-0.001 (0.001)	-0.000 (0.002)	-0.001 (0.002)
comp*female	0.002 (0.003)	-0.002 (0.002)	0.012*** (0.004)	0.017*** (0.004)
concentration	0.844 (1.177)	-1.057 (0.716)	-6.594*** (1.004)	-6.089*** (1.007)
conc*female	3.914** (1.649)	-2.425** (1.019)	5.250*** (1.427)	4.535*** (1.426)
percent_wcp	0.133 (0.161)	-0.118 (0.096)	-0.250 (0.257)	-0.191 (0.264)
percent_wcp*female	-0.157 (0.260)	0.136 (0.157)	-0.187 (0.417)	-0.342 (0.428)
trend	-0.031*** (0.005)	0.021*** (0.003)	0.040*** (0.008)	0.038*** (0.008)
trend*female	-0.002 (0.007)	0.003 (0.005)	-0.075*** (0.011)	-0.090*** (0.011)
constant	---	2.255*** (0.409)	---	-0.063 (0.500)
Insigma	---	-0.5071734*** (0.021)	---	---
kappa	---	1.012953*** (0.061)	---	---
ln_p	---	---	---	0.3269195*** (0.174)
LL Null Model	-13,337.57	-2,842.983	-11,070.08	-2,561.685
LL Full Model	-12,845.37	-2,227.55	-10,783.68	-2,128.746
N of Observations	11,098		7,678	
N of Individuals	2,239		1,912	
N of Exits	1,944		1,649	

Robust standard errors (clustered at athlete id) in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

Our most important findings are as follows:

First, career length of women in both, Alpine and Nordic skiing exceeds career length of men, i.e. female athletes exit later than observationally similar male athletes (the respective coefficient in the Cox Model is negative). For Alpine skiing this is further supported by the significantly positive coefficient in the Gamma Model. For Nordic skiing, however, the respective coefficient turned out to be insignificant in the Weibull Model.

Second, World Cup points have the expected statistically significant and positive impact on career length in both sports in all four models: Other things equal, each additional World Cup points reduces the probability of exit. However, the statistically significant coefficient of the respective interaction term suggests that additional World Cup points reduce the exit probability of women less than they reduce the exit probability of men in Alpine skiing, while in Nordic skiing the coefficients of the interaction terms are not significant.

Third, the number of contestants each athlete competes against is not statistically significant, suggesting that it does not influence the career length in neither Alpine nor Nordic skiing in general. In Nordic skiing, however, it is statistically significant for women, meaning that they have a higher risk of exiting if the number of competitors increases.

Fourth, an increase in the concentration of World Cup points is not statistically significant for Alpine, but for Nordic skiing, as it reduces the probability to exit. However, the interaction effect is statistically significant in both, Alpine and Nordic skiing, suggesting that women's careers are shorter in case that few athletes dominate during a season.

Fifth, neither the coefficient of the percentage of World Cup points nor the interaction with the female dummy are statistically significant, implying that the share of World Cup points an athlete has assembled for his/her national federation in the previous season does not influence the probability to exit, neither in Nordic nor in Alpine skiing.

Sixth, over time career duration increases in Alpine, but not in Nordic skiing (the coefficient of the linear time trend is statistically significant in all models, but is negative in the Cox Model in Alpine and positive in Nordic skiing, while in the Gamma and Weibull Models they are both positive). Thus, in Nordic skiing career length decreases. Since the coefficient of the interaction term is statistically significant in Nordic skiing only, women's career length has increased in this sport over time.

3.6 Discussion

Summarizing, our findings suggest that women in general have longer careers than men in both, Alpine and Nordic skiing. However, the length of their careers is slightly lower than that of comparable men in case they are particularly successful (i.e. have assembled more World Cup points in Alpine skiing) or in case they have more competitors (in Nordic skiing). Moreover, the negative career length effect of a high points concentration is statistically significant only for women (both, in Alpine and Nordic skiing). Thus, we have to partially reject H4 as the returns to World Cup points in terms of career duration are lower for women than for men and we also find only partial support for H5 as career length is negatively affected by the number of competitors only in the case of female athletes. Further, we find only partial support for H6 as a higher concentration of World Cup points only affects career length of women, but not of men. As the percentage of World Cup points does not have any significant effect, we also have to reject H7. Finally, since over time, career duration is increasing only for women in Nordic skiing, we find again partial support for H8.

Apart from these minor differences, it appears that once self-selection is taken into account, women are at least as competitive as men, i.e. career duration in a highly competitive environment is independent of gender. Thus, we find support for H3, stating that there is no systematic difference in career length of men and women, neither in Alpine nor in Nordic skiing. This suggests that men and women are equally good in coping with success as well as failure. Surprising is the fact that we do not observe shorter careers among less successful women, suggesting that these women are not discouraged faster than equally unsuccessful men. On the contrary, all we find is that the top female athletes have shorter careers in both Nordic and Alpine skiing, suggesting the availability of (financially) lucrative alternatives (as e.g. TV commentators and/or models). With regard to our research question, we find that an

individual's performance is the most important determinant of career length. The number of competitors as well as the concentration of sporting success has only a small, yet in some specifications statistically significant, effect on individual career length.

3.7 Conclusion

Our findings are not completely consistent when looking at the impact of competitive pressure on career length across the two different sports. Why are women's careers adversely affected by the presence of more competitors in Nordic, but not in Alpine skiing? Why are women's careers getting shorter over time in Nordic, but not in Alpine skiing? These questions clearly need to be addressed in future research.

Thus, the results of previous studies finding significant differences between men and women with respect to competitive orientations are likely to be biased due to inadequate controls for self-selection. One of the few exceptions in this context is AZMAT/FERRER (2015) who implicitly control for self-selection into a particularly competitive environment by comparing the performance of young female and male lawyers. They find large gender differences in productivity and argue that these are due to significant differences in weekly working hours rather than differences in these individuals' mental dispositions and attitudes. Another interesting approach adequately addressing the issue of self-selection is APICELLA et al. (2017) who fail to find any statistically significant difference between men and women when competing against their own previous performance instead of competing against other people, which is mostly in line with our findings reported above.

The managerial implications of our findings are straightforward: Controlling for self-selection is crucial when analyzing career duration of men and women particularly in highly competitive environments. Hence, we would expect not to find statistically significant differences in career length of male and female consultants, investment bankers or lawyers, although in all these jobs women continue to be massively underrepresented. However, women who self-select into one of these occupations are likely to have similar, if not identical aspirations, motivations, and mental dispositions than observationally similar men.

4 The Influence of Career Concerns of Judges on Subjective Evaluation of Athletes: The Case of Ski Jumping

4.1 Introduction

The evaluation of individual performance is part of the game in many professional contexts: managers evaluate employees' performance, recruiters assess applicants' performance in recruiting processes and hiring decisions, teachers or professors grade their students' exams, and in sports athletes depend on the decision of judges or referees (see SCHNEEMANN/SCHOLTEN/DEUTSCHER 2018: 2). Performance evaluation thus often depends on the partly subjective opinion of the evaluator or judge. However, subjective performance evaluation bears the risk of biased outcomes, e.g. as rates received evaluations that are too compressed relative to the true performance (see KAMPKÖTTER/SLIWKA 2018: 512).

In sports, athletes or teams might experience biased evaluations or decisions on their performance due to cognitive biases of the judges or referees if they favour a certain team, athlete or nationality (see EMERSON/SELTZER/LIN 2009: 124). Thus, their true performance is not evaluated objectively. While there are many studies on judging biases in sports that find nationality biases as a very common criteria for favoring a team or athlete who shares the same nationality as the referee or judge (see e.g. EMERSON/SELTZER/LIN (2009); ZITZEWITZ (2006); SANDBERG (2018); POPE/POPE (2015); PRICE/WOLFERS (2010); SCHNEEMANN/SCHOLTEN/DEUTSCHER (2018)) another critical source of bias in sports has not been investigated much in a sports context, namely career concerns of judges or referees. Career concerns describes a phenomenon when evaluators have to assess the "same piece of a truth" independently but tend to make their decision dependent on how the other evaluators might judge as a deviating behaviour might harm their reputation (see SCHARFSTEIN/STEIN 1990). Thus, career concerns of judges might influence the subjective evaluation of an athlete's performance. In ski jumping, there are subjective and objective components for evaluating an athlete's performance. However, the subjective part of the evaluation might be affected by a judge's career concerns in the sense that the judges rather focus on the objective measure i.e. how far the athlete jumped than on assessing the actual performance on how the athlete conducted the flight. In doing so, the judge wants to prevent to give deviating evaluations from colleagues which would be harmful for his

or her career if evaluations deviate too much. Thus, the research question of this paper is the following: Do career concerns lead to judges being influenced by the objective measure when subjectively evaluating an athlete's performance?

In a first step, this paper investigates this question on a general level. However, as there are less female judges than male judges in ski jumping, I want to shed light on gender aspects in a second step. Women are underrepresented in ski jumping and build a numeric minority. Numeric representation of women and its consequences for the perception of women by the majority is one aspect of the Value Threat Theory by DUGUID/LOYD/TOLBERT (2012). In this study I will combine numeric representation with the concept of career concerns to investigate how women react when they are confronted by underrepresentation and career concerns at the same time. Thus, this study examines whether career concerns are more pronounced for women. Therefore, I ask a second question: Are there differences between male and female judges regarding career concerns?

Using field data from FIS ski jumping events (World Cup, Championship, Olympic Winter Games and Continental Cup) this study analyzes these research questions. The data contains detailed information on the subjective points (i.e. style points) given to each athlete by each judge as well as the gender and nationality of the judges and the athletes. Apart from that - as the total points consist of subjective and objective components - the objective evaluation (i.e. points based on the meters jumped) is available. In ski jumping there are subjective and objective components that contribute to the overall assessment of an athlete's performance. However, due to career concerns judges might adjust the subjective points they give to the distance jumped instead of giving the points they actually would have given for the jump. They do it out of concerns about their own career instead of assessing the true performance of an athlete.

The goal of this paper is to provide evidence whether there are career concerns of judges in ski jumping and if male and female judges make their decisions equally dependent on the distance jumped i.e. the objective measure. This is in so far relevant as judges should be fair towards the evaluation of athletes' performance.

While favoritism by judges for a certain team or athlete e.g. by the same nationality has been investigated in various sports (see EMERSON/SELTZER/LIN 2009: 124), this paper contributes to the literature on disadvantages for athletes resulting from career concerns of judges.

The paper is structured as follows: it starts with a review of the relevant literature on career concerns of referees in sports and gender biases in subjective performance evaluation. Next, the theory on career concerns and one aspect of the Value Threat Theory, Numeric Representation, is presented and hypotheses are developed. These hypotheses are tested in the empirical analysis. In the discussion, I summarize and discuss my findings. The paper ends with a conclusion.

4.2 Literature Review

There are mainly two strands of literature that are relevant to consider in the context of this paper: career concerns of referees in sports and gender biases in subjective evaluation.

4.2.1 Career Concerns of Referees in Sports

In 2006 a judicial inquiry on corruption in the Italian Football League was carried out. BOERI/SERVERGNINI (2011) investigated data on the games the corresponding referees were involved and found that referees who were involved in match rigging got promoted to top games. The fact that they were involved in match rigging did not have negative consequences for their promotion to top games. ROCHA et al. (2013) analyzed data from the first division of the Brazilian Football Championship from 2004 to 2008 to investigate career concerns of referees. As a result, they found that if monitoring is stronger, referees do not tend to favour home teams as this might have negative consequences for their career.

4.2.2 Gender Biases in Subjective Evaluation Contexts

Studies from different contexts apart from sports on the role of gender in subjective performance evaluation so far led to mixed empirical evidence. While some studies find positive effects, other studies find negative or even no significant effects.

Evidence for women giving women lower ratings was found by BRODER (1993) who studied reviews of grant proposals submitted to the Economic Program of the National Science Foundation (NSF) between 1987 and 1990. Also GRAVES/POWELL (1995) found that women receive lower rating from women by investigating outcomes of job interviews.

FURNHAM/STRINGFIELD (2001) found in a study on job performance ratings that females gave subordinate men the lowest ratings and subordinate women the highest ratings. A similar result was found by GRAVES/POWELL (1996) who investigated employment interviews. They found that female candidates were favored by female recruiters. BOOTH/LEIGH (2010) found in a field experiment that in female-dominated occupations women get significantly higher rates of callbacks for job interviews. Especially if the applicant and the recruiter were female, the rate was particularly high.

Evidence for men giving women lower ratings was found by MENGEL/SAUERMAN/ZÖLITZ (2018) who analyzed gender biases in teaching evaluations at a Dutch university. The teaching evaluations were significantly lower for women and were particularly driven by male students. Especially junior women were affected by the lower ratings compared to men.

ABREVAYA/HAMERMESH (2012) investigated with a large sample of matched author-referee pairs whether referees' recommendations are determined by the referees and authors' gender. They did not find evidence for favoritism of a certain gender nor did they find evidence for an interaction between the gender of the referee and the author. By analyzing data from peer review processes of grant proposals in Australia, JAYASINGHE/MARSH/BOND (2003) did not find significant effects for women favoring women or men favoring men.

As the studies on career concerns in sports so far did not investigate gender effects, this study contributes to the literature by analyzing not only career concerns in general but also if they are more pronounced when female judges evaluate female or male athletes. Further, as the studies so far did not consider subjective and objective evaluation at the same time, this study contributes on how much judges' decisions depend on the objective measure.

4.3 Theoretical Framework

4.3.1 Career Concerns

Career concerns is a concept based on a dynamic principal-agent-issue that describes that an agent's behaviour is based on the consequences for his or her career. The behaviour is driven by reputation and career prospects. This means that agents take unobservable actions which are beneficial for their own career but have negative consequences for the principal (see KRÄKEL 2007: 192).

As SCOPPA (2008) claims that "referees act as agents of the Soccer League [...] to impartially control and enforce the rules of the game" (see SCOPPA 2008: 124), similarly in ski jumping the judges can be seen as agents who control and enforce the rule of the FIS, that acts as the principal.

Based on the concept of career concerns SCHARFSTEIN/STEIN (1990) developed a model that investigates the behaviour of managers. The context of their study are investment decisions that have to be made by several managers simultaneously while all managers are observing the same "truth". After the managers made their decision on the investment, the labor market updates its beliefs about the managers. This is either whether the investment of the manager was profitable or whether the behaviour of the manager was similar or different from that of the other managers (see SCHARFSTEIN/STEIN 1990: 466).

In a ski jumping context this would mean that the objective measure (i.e. the distance jumped) is the same piece of the "truth" which all judges similarly like the managers (and also the "labour market" which would be the FIS) observes. The judges make their decision how many subjective points to give dependent on the objective measure (i.e. the distance jumped).

If a manager has taken a decision that is similar to the decision of other managers, he or she will be evaluated more favourable than a manager who took a decision that is divergent. Even if the decision taken is not as profitable as another decision would have been, it is not damaging the manager's reputation as long as all the other managers took the same decision. SCHARFSTEIN/STEIN (1990) call this the "sharing-the-blame" effect. Further, even if a manager has private information based on which

he or she actually would not invest as the investment has a negative expected value, he or she is doing it despite this information as the other managers who do not have this information might decide differently. Although this decision would be closer to the “truth”, the manager prefers deciding like the others will probably do in order to avoid getting a negative reputation on the labor market (see SCHARFSTEIN/STEIN 1990).

Applied to the ski jumping context this means that even if the judge actually thinks that the athlete jumped better or worse than his or her evaluation, the judges will not assess the jump with the points he or she thinks the athlete might deserve. Instead, the judge’s decision depends on the consequences for his or her own career by taking into consideration the objective result, although their task is to evaluate only the jump, independently on how far the athlete jumped.

Therefore, I hypothesize:

H9: A higher objective performance positively influences subjective judges’ evaluation.

4.3.2 Value Threat Theory – Numeric Representation

DUGUID/LOYD/TOLBERT (2012) claim that women in high prestige work groups are often minorities. In the ski jumping context, being member of the judging committee can be seen as a high prestige work group. Further, DUGUID/LOYD/TOLBERT (2012) say that such minorities often have to realize that their value to the group is called into question and their contribution is not seen equivalent to the contribution of the majority as their level competence is seen as insufficient to make effective contributions (see DUGUID/LOYD/TOLBERT 2012: 390).

As ski jumping is still a predominantly male winter sport and male ski jumping has a much longer tradition than female competitions in ski jumping (male ski jumping competitions take place since the 1920s, while female ski jumping competitions started in 2011 (see INTERNATIONAL SKI FEDERATION 2018)) there are far less female judges than male judges (the sample of this study counts 19 female judges and 247 male judges and 260 female athletes and 632 male athletes).

The contribution in this case is the subjective performance evaluation of the athletes by the judges. Consequently, the subjective evaluation that female judges do is seen more critically than the subjective evaluations by men. With regard to career concerns this would mean that they are more pronounced for women as they have this additional burden. Taking this into consideration, I expect female judges to make their subjective evaluations of both, male and female athletes more dependent on the distance points than men do. Therefore, I further hypothesize:

H10: The relation between objective performance outcome and subjective performance evaluations is moderated by gender in such a way that the link is stronger for female evaluators than for male evaluators.

4.4 Setting

In ski jumping the performance of a jumper is judged by five judges. The judges evaluate the performance starting at the end of the take off until the jumper passes the so-called fall line in the outrun. During this phase, the following aspects are evaluated: precision (i.e. timing) and perfection (i.e. carrying out the movements, the stability of the flight position and the outrun as well as the general impression of the whole flight). The judges subjectively evaluate the following aspects: aerodynamic efficiency of the body as well as the ski, the posture of the athlete's arms, legs and ski position during the flight, succession of the movements the jumper makes during landing and outrun. There are three parts that account for the overall performance of a jumper: the flight, the landing and the outrun. More precisely for the flight the following aspects are evaluated: a bold and aggressive move at the takeoff, a rapid but smoothly proceeding in order to get an optimal flight position, and final preparing for landing at the right point of the flight. During this part, judges evaluate how actively air pressure is used, how the body and the ski is combined to create the whole flying system, reaching a stable body position with symmetrically positioned skis, legs and arms while the legs have to be fully stretched. For the landing phase, the jumper is expected to arrive from a stable flight position from the flight phase, needs to raise the head and the upper body while moving the arms on the sides forward/upward and turning at the same time the skis into a parallel position. The moment before the jumper touches the ground with the end of the skis, the legs should be split, and the knees must bend. After the ground is touched, own muscle power should be used in order to obtain a smooth landing.

Simultaneously, the distance between the legs should be increased and the back leg should be bent even more (so called telemark position) while the skis should be parallel, and the pressure should be equally distributed among both legs and the arms should be stretched horizontally and forwards upward. During this phase, the judges evaluate the following: the smoothness of the movement from the flight position to the landing while straightening the upper body, if the legs are slit and the knees are bent the moment the jumper touches the ground, if the jumper actively impacts the reduction of speed while landing, if the knees are correctly bent to achieve a smooth landing, if the legs are correctly positioned for a telemark and if the skis are parallel. In the outrun phase the jumper should first remain in the telemark position and then rise the upper body. Then the jumper should pass through the transition curve and pass the fall line in a stable and relaxed body position while the skis are parallel or in the snow plough position. The judges evaluate in this last phase the remaining in the stable telemark position (10-15 meters), the parallels of the skis with a distance not more than two ski widths, the passing of the fall line in an upright body position with the weight equally distributed on both legs and with arms and legs in a relaxed position. (See INTERNATIONAL SKI FEDERATION 2018: 62-64.)

For the total score of style points the highest and lowest scores of the five judges are eliminated. Three scores that are left then are summed up and build the total score of style points (See INTERNATIONAL SKI FEDERATION 2018: 62-64.)

While the number of style points is limited by a maximum of 20 points per judge and per jump, the number of distance points are assigned depending on the length of the jump. The jumping distance is defined from the edge of the takeoff to the point where the jumper touches the landing slope. In case the jumper falls during the landing procedure the distance measured is the point where the jumper's body first touches the landing slope. (See INTERNATIONAL SKI FEDERATION 2018: 64.) Distance points can also be negative⁸. The total points a jumper receives consist of points for the distance jumped and the style points (see INTERNATIONAL SKI FEDERATION 2018: 62). However, the share of style points depends on the distance points meaning that the

⁸ The measure of distance points depends whether the athlete reaches the so called *K point*. From this point the distance difference is calculated. The K point equals 60 points. For each hill the meter value is determined. If the distanced jumped is shorter than the K point, the m value is multiplied by the length difference. This number is the subtracted from 60. Depending on the length difference, the distance points can reach a negative value (See INTERNATIONAL SKI FEDERATION 2018: 65.)

longer the jump the lower the share of style points in relation to the total score. In effect, style points account for 40-50% of the total score (See SCHNEEMANN/SCHOLTEN/DEUTSCHER 2018: 9.) This means that the style points are highly relevant for the overall evaluation, and therefore possible biases by judges might have enormous consequences for an athlete's total score and ranking.

4.5 Data and Variables

To investigate whether there exist career concerns of judges in ski jumping evaluation, I use data on ski jumping competitions for men and women reported on the FIS webpage from World Cup competitions, Championship, Continental Cup and Olympic Winter Games.

The observation period starts in 2011 as this was the first year with official competitions in ski jumping for women. The data for the Continental Cup includes all 64 competitions for women and 322 competitions for men from 2011-2019. The data for the Olympic Winter Games contains 2 competitions for women and 2 for men for the years 2014 and 2018. The Championship taking place every two years between 2011 and 2019 contains 10 qualification competitions and 10 official competitions for men and 3 qualification competitions for women and 5 official competitions for women. The data for the World Cup Competition includes 35 competitions (official results) for women and 67 competitions (qualification) for women and 199 competitions (official results) for men and 197 competitions (qualification) for men. All together the dataset consists of a total of 740 competitions for men and 276 competitions for women. The data contain further relevant information on the five judges who evaluate each jump: their gender and their nationality and the number of points each judge gives to each athlete in each round.

The dependent variable is *subjective points* which measures the number of points given by each of the judges to each athlete. The variable was standardized for the analysis. The main explanatory variable is *distance points* i.e. the points for the distance jumped. This variable was also standardized. Control variables are – in analogy to the study by SCHNEEMANN/SCHOLTEN/DEUTSCHER (2018) - the *squared distance points* to control for long jumps that are difficult to land accurately as this might lead to a lower score in style points. Further, I control for a possible nationality bias by including the

variable *same nationality* (dummy variable with same nationality of judge and athlete ==1) which measures whether the jumper and the judge share the same nationality and *home event* (dummy variable with event taking place in the same country as the athlete’s nationality ==1) to control for a possible advantage of an athlete coming from the same country the competition takes place as he or she might have more possibilities to practice on these ski jumping hills (see SCHNEEMANN/SCHOLTEN/DEUTSCHER 2018: 11). Further, the variable *judge female* was generated in order to analyze if there are gender differences in being influenced by the objective measure.

4.6 Descriptives

The dataset contains in total 266 judges (19 women and 247 men) and 892 athletes (260 women and 632 men). The mean age of the athletes is 24.4 years for men and 21.5 years for women. For a summary of the nationality of judges and athletes see Tables A3 and A4 in the Appendix.

Table 11: Descriptive Statistics: subjective and distance points

	Observations	Mean	Std. Dev.	Min	Max
subjective points	359 445	17.01	1.15	3	20
distance points	359 445	57.31	24.07	-66	184.8
subjective points given by male judges	336 957	17.02	1.15	3	20
subjective points given by female judges	22 488	16.92	1.14	3	20
subjective points received by male athletes	281 567	17.17	1.1	3	20
subjective points received by female athletes	77 878	16.45	1.14	3	20

The subjective points given by the judges range from 3 to 20. While male athletes receive on average 17.17 points (Std. Dev. 1.1) women receive on average 16.45 points (Std. Dev. 1.14). Male judges give on average 17.02 points (Std. Dev. 1.15) and female

judges 16.92 points (Std. Dev. 1.14). Objective points i.e. distance points range from -66 to 184.8.

Table 12: Correlation matrix

	subjective points	distance points	same nationality	home event
subjective points	1.00			
distance points	0.60***	1.00		
same nationality	0.05***	0.01***	1.00	
home event	0.02***	0.00	0.48***	1.00

The correlation matrix shows that distance points and subjective points are significantly correlated ($r= 0.60$) and home event and same nationality are also significantly correlated ($r= 0.48$). Although being highly significant, same nationality and subjective points ($r= 0.05$), home event and subjective points ($r= 0.02$) and same nationality and distance points ($r= 0.01$) are not highly correlated.

4.7 Econometric Analyses

To test H9, I run a judge Fixed Effects estimation (see WOOLDRIDGE 2002). The standard errors are clustered on jump level because the conditions within one jump are the same. In Model 2 I include squared distance points to control for long jumps as they are more difficult to land accurately (see SCHNEEMANN/SCHOLTEN/DEUTSCHER 2018).

Table 13: Influence of distance points on subjective evaluation

subjective points	Model 1	Model 2
distance points	0.623*** (0.002)	0.742*** (0.002)
distance points*distance points	---	-0.143*** (0.001)
same nationality	0.128*** (0.005)	0.097*** (0.004)
home event	0.007* (0.004)	0.039*** (0.004)
Constant	-0.015*** (0.01)	0.126*** (0.001)
Observations	359,445	359,445
R ²	0.390	0.488

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model 1 shows that more distance points positively influence the number of subjective points. Thus, there is support for H9. Further, the same nationality of the athlete and the judge positively influence the subjective points given by the judges. It is also relevant whether the competition took place in the same country of the athlete's nationality.

The results for Model 2 show that distance points are concave (as the corresponding coefficient of the squared distance points is negative). While this result indicates that judges take objective measures into consideration only until a certain point, it is striking that the same nationality and home advantage are also highly statistically significant. This means that if the athlete and the judge have the same nationality, the judge gives more style points and there is also a home advantage for the athlete.

To investigate whether the gender of the judge has an influence on the subjective points given for each jump to each athlete, I run further regression analyses with a gender variable for judges (Model 3). Standard errors are again clustered on jump level. In a further analysis (Model 4) I interact the variable judge female with distance points and also judge female with the squared distance points.

Table 14: Influence of distance points on subjective evaluation: gender effects general

subjective points	Model 3	Model 4
judge female	0.053*** (0.005)	0.018*** (0.006)
distance points	0.604*** (0.02)	0.732*** (0.002)
judge female*distance points	---	0.045*** (0.011)
distance points*distance points	---	-0.147*** (0.001)
judge female*distance points*distance points	---	0.030*** (0.009)
same nationality	0.126*** (0.005)	0.091*** (0.004)
home event	0.006 (0.004)	0.041*** (0.004)
Constant	-0.018*** (0.002)	0.128*** (0.002)
Observations	359,445	359,445
R ²	0.365	0.472

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The results in Model 3 show that a female judge has a positive and highly significant impact on the subjective points given i.e. female judges give higher subjective points. Further, distance points and the same nationality positively influence the subjective points. However, there is no home advantage anymore.

The results in Model 4 indicate that female judges tend to be more influenced by distance points when evaluating athletes than male judges are. The interaction term for female judges and distance points is highly positive significant. Thus, there is support for H10.

Here I also find a concave effect for distance points as the squared term for distance points becomes significantly negative. However, interacted with female judge, the squared term does not become negative but stays significantly positive meaning that there is no concave effect for female judges. Like in Model 1 and 2, same nationality and home event are highly positive significant.

In order to further analyze whether the gender of the athlete plays a role, I estimate the influence of distance points on subjective evaluation depending on the jumper being male respectively female.

Table 15: Influence of distance points on subjective evaluation: gender effects dependent on athlete's gender

subjective points	Female jumper (Model 5)	Male jumper (Model 6)	Female jumper (Model 7)	Male jumper (Model 8)
judge female	0.068*** (0.009)	0.078*** (0.007)	0.068*** (0.012)	0.040*** (0.007)
distance points	0.932*** (0.005)	0.527*** (0.002)	0.846*** (0.010)	0.714*** (0.003)
judge female*distance points	---	---	0.070** (0.028)	0.028** (0.012)
distance points*distance points	---	---	-0.054*** (0.006)	-0.148*** (0.001)
judge female*distance points*distance points	---	---	0.046*** (0.016)	0.013 (0.010)
same nationality	0.040*** (0.010)	0.131*** (0.005)	0.041*** (0.010)	0.090*** (0.005)
home event	0.021*** (0.008)	0.015*** (0.005)	0.021*** (0.008)	0.047*** (0.004)
Constant	-0.021*** (0.004)	0.039*** (0.002)	-0.023*** (0.004)	0.169*** (0.002)
Observations	77,878	281,567	77,878	281,567
R ²	0.456	0.315	0.458	0.438

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The results of Model 5 and 6 show that female judges evaluate the performance of both male and female athletes more positive. Also, the distance points and the same nationality positively influence the subjective points obtained. Again, there is a home advantage for both, male and female athletes.

The results of Model 7 and 8 show that female judges are more influenced by distance points when evaluating both, male and female athletes. For distance points, I find again a concave effect. However, there is no such effect when female judges evaluate women, as the corresponding coefficient is positive. The effect for women evaluating men is not statistically significant.

A robustness check was done by including *wind compensation points* (see Appendix Tables A5-A8 for estimations). As wind conditions can influence a jump to the advantage but also disadvantage of the athlete, wind compensation points compensate for the effect of wind. As wind compensation points were not available for Continental Cup competitions, the dataset is smaller than for the estimations without wind compensation points. Even including wind compensation points, H9 is supported, and with regard to H10 there is evidence for women being more influenced by distance points than men, especially when evaluating male athletes.

4.8 Discussion

The results show that there are career concerns of judges in ski jumping as more distance points lead judges to give more subjective points. Thus, there is support for H9. The result support career concerns theory as the agents behave in a way that benefits their own career (see KRÄKEL 2007). According to SCHARFSTEIN/STEIN (1990) agents make their decisions dependent on the same “truth” that the principal (i.e. the FIS) can observe. Too much divergent evaluations would harm their reputation as a judge and consequently their chances to judge in prestigious competitions like the Olympics decrease. What is striking however in the estimations is the fact that the judges show biases for athletes with the same nationality as these results are highly significant. This finding is in line with KRUMER/OTTO/PAWLOWSKI (2020) who also find nationalistic biases in international ski jumping competitions. According to ZITZEWITZ (2006) they should not show nationality biases in order to appear as integer

judges. One explanation could be that judges are aware of their nationality bias but try to hide it by adopting their subjective evaluation to the objective measure.

When analyzing if there are gender differences in career concerns, I found that female judges are more influenced by the distance points when evaluating male jumpers. In this study career concerns are more pronounced for women when evaluating men. However, this might be since female judges are the minority in this data set (19 women vs. 247 men). This result can be explained with Numeric Representation, one aspect of the Value Threat Theory by DUGUID/LOYD/TOLBERT (2012). Women are underrepresented and thus are more exposed to the expectations on how they evaluate the athlete's performance. As they do not want to appear as lacking the competencies, they make their decision more dependent on what can be observed objectively i.e. the distance jumped.

Further, as female judges might be younger than male judges, mainly because female ski jumping does not have a long tradition, female judges might be more concerned about their career.

The phenomenon observed could also result from the fact that male judges might be less influenced by the distance points when evaluating men. Empirically it is not possible to separate the effect whether the results stem from women being more influenced when evaluating men or men being less influenced when evaluating men.

4.9 Conclusion

With the evidence found in this study, the first research question *Do career concerns lead to judges being influenced by the objective measure when subjectively evaluating an athlete's performance?* can be answered that there are career concerns of judges in ski jumping. The subjective evaluations are influenced by the distance points. The second research question *Are there differences between male and female judges regarding career concerns?* can be answered that female judges are more influenced by the distance points than men are. This indicates that women are more concerned about their careers.

One limitation of this study is clearly the fact that among the 266 judges only 19 are female. Future research on gender effects in ski jumping should take into consideration

that women are underrepresented in judging positions, and deeper insights might only be given when more women become judges. A second limitation lies in the (un)availability of information on judges' age. As "reputational concerns will be strongest among young managers, since there is presumably more uncertainty about their ability" (SCHARFSTEIN/STEIN 1990: 478) future research could investigate whether younger judges tend to consider the objective measure more for their subjective evaluation of the athletes' performance than older judges do.

5 Between Heaven and Hell: Spillover Effects of Exogenous Shocks on Exits from the Catholic and Protestant Churches in Germany⁹

5.1 Introduction

The annual exit rate from the Catholic Church has been increasing for decades. However, this trend is not linear, but rather marked by several intermediate peaks that might have been caused by certain events or “shocks”. Especially recent “shocks” like the public disclosure of abuse scandals might have driven exit rates. In the U.S., thousands of cases of sexual abuse have been documented in the 40th Statewide Investigating Grand Jury report 1 (U.A. 2018a) and have received broad media coverage in the last decade. In Germany, the situation is not much different: just recently, the Catholic Church in Germany published the results of a systematic investigation of sexual abuse cases in Germany. It revealed that 3,677 mostly male minors became victims of sexual abuse between 1946 and 2014 (MAYR 2018). In early 2010, a number of cases of sexual abuse of altar boys by Catholic priests became public for the first time. Since then the Catholic Church had to publicly deal with this scandal, the dimension of which still remains unknown.

However, the abuse scandals did not remain the only shocks hitting the Catholic Church as a number of financial scandals became public since 2014, when the bishop of the diocese of Limburg was found guilty of misallocating public funds of at least 31 million Euro to renovate his residence (U.A. 2018b). Similar cases were revealed in other dioceses like Eichstätt (U.A. 2018c), where 50 million Euro of public funds had been diverted in investments in real estate in the U.S.. Another case occurred in the diocese of Freiburg where the bishop’s relevant staff ceased to pay social security contribution for the entire diocese’s staff, the amount of which has been estimated to be as high as 160 million Euro (U.A. 2018d).

In this paper, we take such events or “shocks” as natural experiments to investigate their impact on member exits from the Catholic Church in Germany. While we are particularly interested in the effect the abuse and financial scandal have on exit rates,

⁹ This chapter is based on the manuscript „Between Heaven and Hell: Spillover Effects of Exogenous Shocks on Exits from the Catholic and Protestant Churches in Germany“ which is joint work with BERND FRICK

we also try to investigate these “shocks” in comparison to other events happening in the Catholic Church, like e.g. the election of Popes or the announcement of encyclicals such as *Humanae Vitae*. Moreover, we also take into consideration political events like the fall of the Berlin Wall and the introduction of the solidarity tax or changes in the German tax system for reasons to be explained below. Further, we also analyze whether these shocks have spillover effects to the Protestant Church, resulting in higher exit rates as a response to the shocks occurring in the Catholic Church. The remainder of this paper is organized the following: First, we present a brief review of the relevant previous literature. Second, we describe our theoretical and methodological framework, followed by descriptive statistics and econometric findings. We then discuss our findings. The paper ends with a conclusion.

5.2 Previous Literature

Economics of religion is a rather young field (for reviews see e.g. GORSKI/ALTINORDU 2008; HOFFMANN 2013; IANNACCONE 1998; IYER 2016). Nevertheless, various economic aspects have been investigated in different religious contexts already, like e.g. the role of religion for economic development, education and for labor market outcomes (see e.g. GUIISO/SAPIENZA/ZINGALES 2003; ARRUNADA 2010; FEES/MÜLLER/RUHNAU 2014; SCHALTEGGER/TORGLER 2010; BASTEN/BETZ 2013; VAN HOORN/MASELAND 2013; NUNZIATA/ROCCO 2018; CANTONI 2015; BECKER/WOESSMANN 2009; COLVIN/MCCRACKEN 2017; BOPPART/FALKINGER/GROSSMANN 2014; BECKER/WOESSMANN 2010; SPENKUCH 2017; SINNEWEL/KORTT/STEEN 2016; CORNELISSEN/JIRJAHN 2012) as well as for the political strategies pursued by different Popes (see e.g. BARRO/MCCLEARY 2016; BANDIERA et al. 2011; BENNEDSEN/PEREZ-GONZALEZ/WOLFENZOHN 2012; GOODALL/KAHN/OSWALD 2011; GOODALL/POGREBNA 2015; LAZEAR/SHAW/ STANTON 2015). As we focus on exogenous shocks in our analysis, we restrict our review of the literature to two aspects of the economics of religion – *the determinants of church attendance* and *of church membership*.

The determinants of church attendance have first been analyzed by LAZERWITZ (1961), who finds church attendance to be higher among women and upper-class people. This holds for Protestants and Catholics as well as for Methodists and Baptists. SMITH (1998) documents that “real” church attendance rates in the U.S. are significantly

lower than reported rates due to a social desirability bias. GRUBER/HUNGERMAN (2008) find that in U.S. shopping malls opening on Sundays increase the opportunity costs of religious participation and, therefore, negatively affect church attendance (similar findings see SULLIVAN 1985). BECKER/NAGLER/WOESSMANN (2017) find that during the period of secularization in Germany the increase in peoples' education ultimately led to a decline in church attendance.

So far, there are only a handful of studies that have investigated the impact of certain exogenous shocks on membership in the Catholic Church. HOUT/GREELEY (1987) document that in the U.S. church attendance started to decline in 1968, the same year when Pope Paul VI published his highly controversial encyclical *Humanae Vitae*, which strictly prohibits the use of contraceptives. BOTTAN/PEREZ-TRUGLIA (2015) analyze the impact of abuse scandals on religious participation and religious beliefs in the U.S. in the period 1980 to 2010 when more than 3,000 scandals had been disclosed. Each scandal is associated with a persistent decline in church attendance as well as a decrease in church membership in the respective area. Analyzing similar data on abuse cases in the U.S. between 1971 and 2000 in the Catholic Church, PIAZZA/JOURDAN (2018) find that over time the impact of sex abuse scandals on exit rates increased significantly at a local level. HUNGERMAN (2013) finds that in the aftermath of sexual abuse scandals in the U.S. non-Catholic faiths received significantly higher donations. Finally, DILLS/HERNANDEZ-JULIAN (2012) find that in the U.S. enrollment in Catholic schools decreased significantly following disclosure of sexual abuse scandals. LYYTIKÄINEN/SANTAVIRTA (2013) use data from Finland to investigate the relationship between church taxes and church membership. They find that church exits increase in the very last days of a year, as this is the last chance to avoid paying taxes for the next year. Using aggregate data for the Catholic and the Protestant churches in Germany from 1953 to 2015, FRICK/SIMMONS (2017) find that exogenous shocks like sexual abuse and financials scandals, German reunification as well as certain encyclicals by the reigning Pope all had statistically significant effects on exits in both denominations. These results are surprising insofar as e.g. encyclicals by the head of the Catholic Church are not binding for Protestants and should, therefore, be irrelevant to them.

With the exception of the latter study, the extant literature investigates only one event or “shock” but does not compare the effects of different events. Therefore, we include a variety of different (potentially) explanatory variables to explain the peaks of exit rates in certain years. In contrast to FRICK/SIMMONS (2017) who use aggregated data from the entire Federal Republic of Germany for the Catholic and the Protestant Church, we focus on the Catholic Church in Germany in this study by analyzing data on exits from 20 dioceses over an extended period of 61 years.

A large number of exits is problematic for two reasons: First, the financial situation of the church deteriorates as exiting members cease to pay taxes. This is in so far an issue as the church is one of the important providers of health care and social services (see BARTH 2010: 780). Second, organizational legitimacy deteriorates too as exits reflect increasing levels of dissatisfaction and discontent among (previous) members. The existence of the church as an organization strongly depends on the involvement of its members who can be considered its most valuable resource (see IANNA CONNE/OLSON/STARK 1995; PIAZZA/JOURDAN 2018). The questions we ask in this paper are, therefore, as follows: Can we explain the observable variation in the annual exit rate of Catholics in Germany? Are there any spillover effects to the Protestant Church?

5.3 Theoretical Framework

Based on the assumption of utility-maximization, individuals join an organization when the expected returns to membership exceed the expected costs and eventually leave that organization when the expected costs rise above the expected benefits. In a particular religious denomination however, membership is usually passed over from parents to their children. Thus, in this specific context, individuals usually do not decide themselves to join a church but are rather born into it. Consequently, the only decision that most individuals can make in their lifetime is to either remain a loyal member or to exit at some point in time. Their decision depends on how they perceive the relationship between costs and returns of continued membership (See FRICK/SIMMONS 2017: 1476).

5.3.1 The Role of Leadership in the Catholic Church

The Catholic Church is a highly centralized institution with a pronounced hierarchical structure. Its head, the Pope, is elected by the College of Cardinals. Once elected, the Pope remains in office until he dies (exception: Benedict XVI). The church's policy is mainly exercised by the Pope. As he also selects new members to the College of Cardinals, he also has quite some indirect influence on who will be elected as his successor. WITTMAN (2012) therefore argues that "electing a leader for life results in the electoral body electing older religious leaders than would be the case if the leader were elected for a term. This effect is magnified when the leader is an autocrat as there are then fewer ways to limit the damage from the leader" (WITTMAN 2012: 17).

Thus, the Catholic Church can be considered an institution in which "leaders can become exceptionally powerful – indeed even totalitarian – because they are the embodiment of the organizational ideal" (SCHWARTZ 1990, qtd. in BARTH 2010: 784). Therefore, we hypothesize:

H11a: The election of a new Pope has either a significantly positive or significantly negative impact on exit rates from the Catholic Church, depending on the public perception of the person as either "liberal" or "conservative".

As the Pope is the head of the Catholic Church, Protestants are not affected by this kind of change in the Catholic Church.

H11b: The election of a new Pope has no impact on exit rates from the Protestant Church.

We further expect that the publication of *Humanae Vitae* in 1968 led to an increase in church exits: as the political and societal climate became more liberal in the mid 1960s in terms of sexual liberty and freedom, an encyclical strictly prohibiting the use of contraceptives was perceived a "fallback" of the Catholic Church, especially among young people. As the encyclical only affects Catholics, we hypothesize:

H12a: The publication of Humanae Vitae had a positive impact on exits from the Catholic Church.

H12b: The publication of Humanae Vitae had no impact on exits from the Protestant Church.

5.3.2 Goal Displacement, Social Identity and Individual Exit Decisions

The Catholic Church can be described as an organization following intangible goals like e.g. increasing the dignity of human life. This intangibility can cause a situation referred to as displacement of goals (see WARNER/HAVENS 1968: 541). This phenomenon often occurs in organizations pursuing rather abstract goals like helping people to become better citizens or helping people in a way that they are able to help themselves or contributing to the improvement of people's well-being (see WARNER/HAVENS 1968: 542). The problem resulting from such intangible goals is a lack of guidance for group action. Consequently, tangible substitutes are developed (see WARNER/HAVENS 1968: 540). BARTH (2010: 784) emphasizes that many church officials more and more neglected core aspects of their work, like the spiritual care and general welfare of the members of their church, which should actually be their primary mission. In such a situation, goal displacement starts to play a role: For many of its representatives, it is not the initial mission that is in the focus, but the "protection" of the organization itself. Thus, in the context of our paper, the financial scandal as well as the abuse scandals can be considered the result of goal displacement.

As individuals identify themselves with the social group they belong to, they experience their positive perception being challenged when a negative event occurs. As a result, they experience dissonance (see PIAZZA/JOURDAN 2018: 171). It becomes even harder for an individual when the negative event - or scandal - gains a public attention, which may lead individuals not to consider themselves as belonging to this organization anymore or to feel alienated (see e.g. ELLEMERS/SPEARS/DOOSJE 2002; PIAZZA/JOURDAN 2018). If people do not want to be associated with an organization with a bad reputation, they often react by exiting (see e.g. O'REILLY/CHATMAN 1986; PONTIKES/NEGRO/RAO 2010; PRYOR/REEDER/MONROE 2012; PIAZZA/JOURDAN 2018). In the present context, this means that as soon as a scandal – be it an abuse or a financial scandal – becomes public, many members do not feel comfortable anymore with being a member of the Catholic Church. Members thus "resolve" their problem by deciding to exit from the Catholic Church (see PIAZZA/JOURDAN 2018: 171).

Given the massive extent of goal displacement in the Catholic Church, that are reflected in the abuse scandal in Regensburg or the financial scandal in Limburg, many Catholics consider these events as a threat to their social identity, which results in their decision to leave the church. Even though our data is aggregate instead of individual level data – as required by social identity theory – we expect the phenomenon to show up in aggregate as well as in individual data. Thus, we hypothesize:

H13a: Scandals in the Catholic Church lead to an increase in the exit rate.

As the election of Popes or the announcement of encyclicals by Popes are inherent to the Catholic Church, financial or abuse scandals might not remain a Catholic phenomenon. Thus, in contrast to the election of Popes, Protestants might react to scandals revealed in the Catholic Church similar to Catholics as they might assume that the events might have simply gone undetected so far in their own denomination.

H13b: Scandals in the Catholic Church have a statistically significant impact on exit rates in the Protestant Church.

5.3.3 The Role of Political Changes and Tax Regimes

Further, we expect that political changes like the fall of the Berlin Wall in 1989 influence exit rates, as members of both denominations in East Germany did not have to pay church taxes before reunification. However, as GATZ (2009) argues, this money was urgently required as the dioceses in the east of Germany had to be restructured following reunification. This additional financial burden might have induced people who struggled with their church membership anyway to leave the institution. As this affects both, the Catholic and the Protestant Church, we expect reunification to have a positive impact on exit rates:

H14: The reunification of Germany leads to an increase in church exits in both denominations.

Closely connected to effects of the German reunification is the introduction of the so called solidarity tax (a tax introduced to finance the economic as well as the political reconstruction of East Germany) that was implemented in 1991 (see e.g. GATZ 2009).

We expect this to have a positive influence on exit rates, too, as people who are in doubt about their church membership – no matter if they are Catholic or Protestant – might decide against it, as they now have to pay another tax on top of their church tax:

H15a: The introduction of the solidarity tax leads to an increase in church exits.

The church tax that each member has to pay is directly proportional to the individual's income. Thus, with increases in the marginal tax rate we expect more members of both Churches to leave as their church taxes also increase.

H15b: An increase/decrease in minimum/maximum tax rates leads to an increase/decrease in exit rates.

Before we proceed to the empirical tests, we first describe our data and variables, followed by the descriptive statistics and the econometric analysis. It is important at this point to mention that we investigate the impact of exogenous shocks on an individual's church membership, but not his or her religiosity, as we cannot observe the latter in our data.

5.4 Data and Variables

5.4.1 Data

Our data includes information on members, exits, church attendance, parishes and priests for all 27 Catholic dioceses in Germany for the years 1946 thru 2017 (Aachen, Augsburg, Bamberg, Berlin, Dresden-Meißen, Eichstätt, Erfurt, Essen, Freiburg, Fulda, Görlitz, Hamburg, Hildesheim, Köln, Limburg, Magdeburg, Mainz, München und Freising, Münster, Osnabrück, Paderborn, Passau, Regensburg, Rottenburg-Stuttgart, Speyer, Trier and Würzburg). To avoid biases resulting from new dioceses, from reunification and from mergers of already existing dioceses we restrict our analyses to the 20 dioceses that have been in existence since 1946 already and exclude Berlin, Görlitz, Magdeburg, Erfurt, Dresden-Meißen, Hamburg and Essen. Due to the fact that we include data on taxes, that is available only from 1957 on, we had to further restrict our dataset to the years 1957-2017. Thus, our dataset is a balanced panel with 1,220 diocese-year-observations coming from two sources: the “Kirchliches

Handbuch”, an annual collection of statistics of all German dioceses on different matters, and from the website of the German Bishops’ Conference. Similarly, we collected data on exits from the Protestant Church from the website of the Protestant Church in Germany from 1957-2017.

5.4.2 Variables

The dependent variable in our econometric analysis is the exit rate, indicating the annual number of exits per 1,000 members by diocese. The independent variables are the election of Pope John XXIII in 1958 (dummy=1 if year=1958 and 1959), the election of Pope Paul VI in 1963 (dummy=1 if year=1963 and 1964), the publication of the encyclical “*Humanae Vitae*” in 1968 (dummy=1 if year=1968 and 1969), the election of Pope John Paul II in 1978 (dummy=1 if year=1978 and 1979) and the election of Benedict XVI in 2005 (dummy=1 if year=2005 and 2006). Moreover, we consider various scandals that have occurred over time as potential explanatory variables. Therefore, we include in our estimations public disclosure of sexual abuse scandals in Germany in 2010 (dummy=1 if year=2010 and 2011) and a dummy for public disclosure of the financial scandal in the diocese of Limburg (dummy=1 if year=2014 and 2015). As we want to analyze the effect of the scandals on exit rates over time, we generate a time trend variable for the abuse scandal in 2010 and for the financial scandal in 2014, which includes three years after the respective scandal became public knowledge. As we cannot separate the effects of the financial scandal in 2014 and the election of Pope Francis in 2013, we exclude the current Pope’s election from our estimations. We further take into account German reunification in 1990 (dummy=1 if year=1990 and 1991) as well as the introduction of the solidarity tax. Finally, we also include variables reflecting changes in tax regimes by using the minimum and the maximum tax rate as potential determinants of exit rates.

5.5 Descriptive Statistics

Figures 15, 16 and 17 show that the pattern of exits is quite similar across the dioceses with considerable differences in the magnitude: Exits are rather low in the dioceses of Passau, Regensburg, Trier, Würzburg, Münster, Eichstätt and Aachen and rather high in Osnabrück, Köln, München, Mainz, Limburg and Hildesheim (the remaining

dioceses – Augsburg, Bamberg, Paderborn, Freiburg, Speyer, Fulda and Rottenburg-Stuttgart – range somewhere in between (for averages see Figure A1 in the Appendix). It also appears from Figures 15, 16 and 17 that there are several peaks. Around 1990, the number of exits increased considerably (most likely due to reunification and the ensuing increase in taxes). In 2005, annual exits declined, this time most likely due to the election of Pope Benedict XVI, the first German Pope after almost 500 years. Two other peaks are striking as well, one in 2010 and another one in 2014. The former reflects the consequences of the sexual abuse scandals that were made public in that year and the latter reflects the impact of the misallocation of church funds by the bishop of Limburg that was made public in early 2014. However, first increases in the annual number of exits can already be observed in the late 1960s and the early 1970s.

Figure 15: German Dioceses with Low Exit Rates, 1957-2017

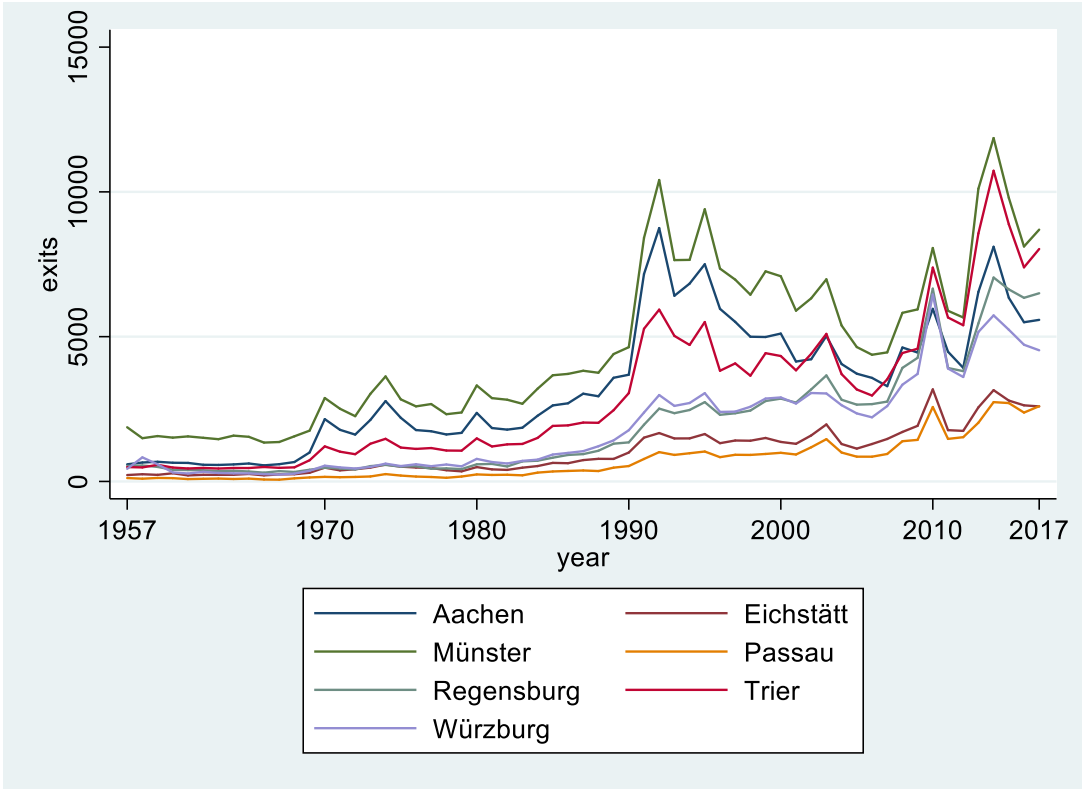


Figure 16: German Dioceses with Intermediate Exit Rates, 1957-2017

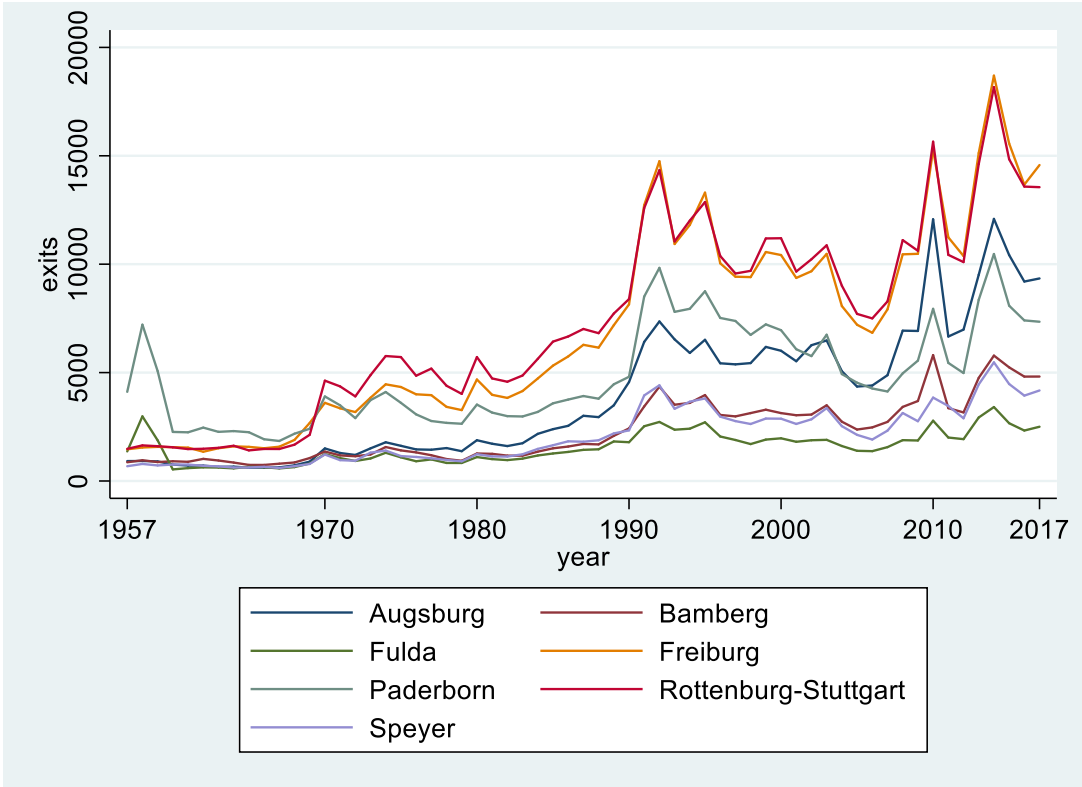
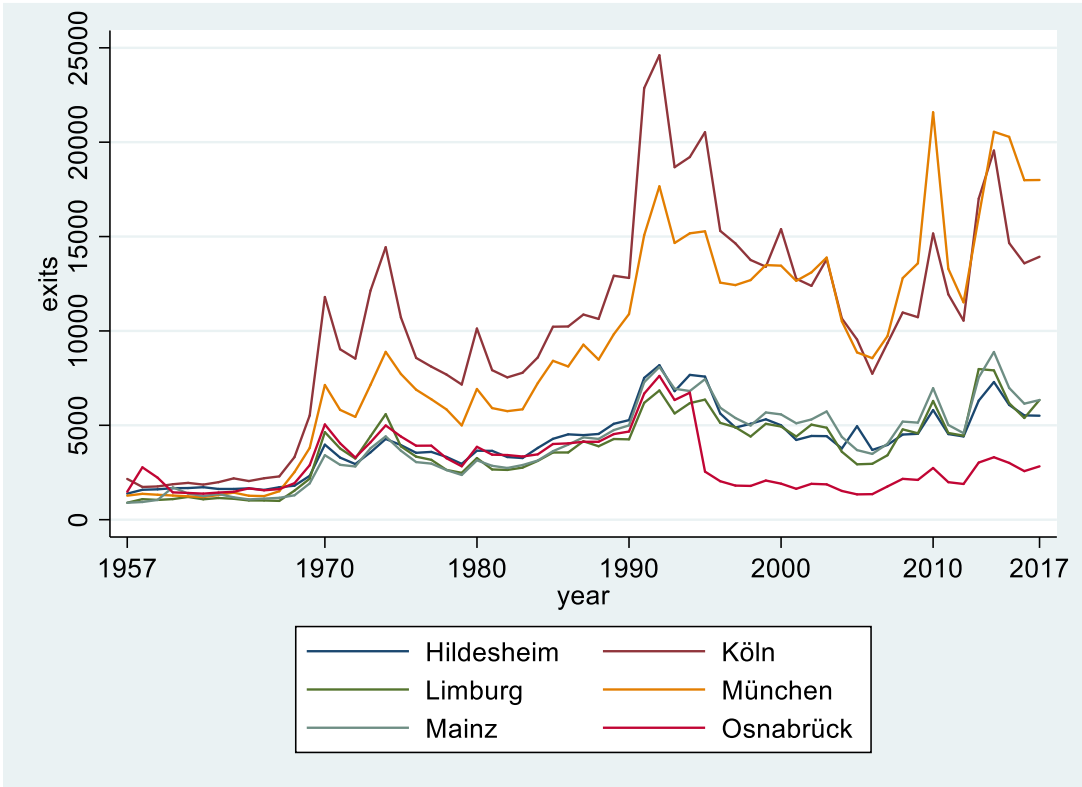


Figure 17: German Dioceses with High Exit Rates, 1957-2017



5.6 Methodology and Econometric Findings

5.6.1 Fixed Effects Estimations – Catholics

We estimated Fixed Effects regressions including four categories of shocks: Pope elections and declarations, political changes, scandals as well as changes in tax regimes with a time lag of up to three years.

The results for *Pope elections* and *declarations* suggest that the election of both, Pope John in 1958 and Paul in 1963, had a highly significant positive effect on exits. The publication of *Humanae Vitae* in 1968 by Pope Paul had a statistically significant negative effect only in the third time lag, meaning that it did not contribute to church exits. Further, the elections of the two succeeding Popes, John Paul in 1978 as well as of Benedict in 2005, had highly significant negative effects on exits controlling for different lag lengths suggesting that these elections reduced the annual exit rates. This is well in line with the appreciation of both persons by the German public.

Table 16: Fixed Effects Estimation – Catholics

Type of Shock	Variable	(1) Exit Rate	(2) Exit Rate	(3) Exit Rate
	Exit Rate _{t-1}	0.662*** (0.042)	0.594*** (0.053)	0.466*** (0.065)
	Exit Rate _{t-2}	---	0.072** (0.033)	-0.147*** (0.044)
	Exit Rate _{t-3}	---	---	0.496*** (0.021)
Pope Elections/ Declarations	John 1958	0.425*** (0.072)	0.232*** (0.054)	---
	Paul 1963	0.105*** (0.020)	0.114*** (0.022)	0.177*** (0.037)
	Humanae Vitae 1968	-0.053 (0.037)	-0.055 (0.039)	-0.078* (0.039)
	John Paul 1978	-0.338*** (0.048)	-0.349*** (0.048)	-0.449*** (0.064)
	Benedict 2005	-0.643*** (0.089)	-0.689*** (0.100)	-1.062*** (0.142)
Politics and Scandals	Reunification 1990	0.485*** (0.059)	0.467*** (0.058)	0.260*** (0.043)
	Abuse Scandal 2010	0.002 (0.085)	0.084 (0.109)	0.376** (0.141)
	Abuse time trend	0.224*** (0.049)	0.194*** (0.061)	-0.113 (0.079)
	Finance Scandal 2014	0.706*** (0.154)	0.841*** (0.186)	1.345*** (0.195)
	Finance time trend	-0.057 (0.040)	-0.096** (0.042)	-0.430*** (0.037)
Changes in Tax Regime	Min Income Tax Rate	-0.267*** (0.031)	-0.285*** (0.029)	-0.424*** (0.037)
	Max Income Tax Rate	0.232*** (0.033)	0.247*** (0.032)	0.337*** (0.035)
	Solidarity Tax	0.250*** (0.033)	0.263*** (0.033)	0.288*** (0.033)
	Time Trend	0.029*** (0.004)	0.029*** (0.004)	0.026*** (0.003)
	Constant	-7.001*** (1.191)	-7.454*** (1.160)	-9.648*** (1.179)
	<i>N</i>	1,200	1,180	1,160
	<i>R-squared</i>	0.880	0.881	0.903
	<i>Number of dioceses</i>	20	20	20

Standard errors (clustered at diocese level) in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

With respect to political events and changes, it appears that German reunification in 1990 had a highly significant positive impact on exits in all three model specifications, i.e. independent of lag length. The abuse scandal in 2010 had a positive and significant effect only in Model 3, that is with a lag length of three years. Depending on the model specification, i.e. the number of lags, the coefficient of either the abuse dummy or the linear time trend following the abuse scandal is highly significant. The effect of the

finance scandal in 2014 is, on the contrary, rather strong immediately at the time it became public, but significantly decreased in the years after the scandal.

Changes in tax regimes have a statistically negative impact as reductions in the minimum tax rate are associated with a decrease while increases in the maximum tax rate are associated with rising exit rates. Moreover, the coefficient of the solidarity tax variable has a statistically significant and positive effect on exit rates in all model specifications. Moreover, the time trend is statistically significant in all models, too, suggesting that exit rates increase independent of exogenous shocks.

5.6.2 Arellano-Bond Estimations - Catholics

We further used the Arellano-Bond estimator (see CAMERON/TRIVEDI 2010) to separate the impact of current as well as past information on church exits.

Table 17: Arellano-Bond Estimation – Catholics

Type of Shock	Variable	(1) Exit Rate	(2) Exit Rate	(3) Exit Rate
	Exit Rate _{t-1}	0.619*** (0.022)	0.570*** (0.035)	0.454*** (0.033)
	Exit Rate _{t-2}	---	0.063* (0.033)	-0.147*** (0.032)
	Exit Rate _{t-3}	---	---	0.485*** (0.030)
Pope Elections/ Declarations	John 1958	0.452*** (0.141)	0.278 (0.182)	---
	Paul 1963	0.126 (0.134)	0.118 (0.133)	0.179 (0.119)
	Humanae Vitae 1968	-0.057 (0.128)	-0.066 (0.127)	-0.081 (0.114)
	John Paul 1978	-0.357*** (0.124)	-0.363*** (0.123)	-0.456*** (0.111)
	Benedict 2005	-0.652*** (0.143)	-0.692*** (0.143)	-1.056*** (0.130)
Politics and Scandals	Reunification 1990	0.449*** (0.137)	0.445*** (0.136)	0.249** (0.123)
	Abuse Scandal 2010	0.055 (0.139)	0.115 (0.142)	0.388*** (0.129)
	Abuse time trend	0.224*** (0.055)	0.199*** (0.056)	-0.104* (0.053)
	Finance Scandal 2014	0.811*** (0.150)	0.905*** (0.157)	1.374*** (0.144)
	Finance time trend	-0.031 (0.058)	-0.069 (0.061)	-0.407*** (0.058)
Changes in Tax Regime	Min Income Tax Rate	-0.286*** (0.034)	-0.295*** (0.034)	-0.428*** (0.032)
	Max Income Tax Rate	0.254*** (0.031)	0.260*** (0.031)	0.344*** (0.029)
	Solidarity Tax	0.271*** (0.033)	0.277*** (0.033)	0.296*** (0.030)
	Time Trend	0.034*** (0.004)	0.032*** (0.003)	0.028*** (0.003)
	Constant	-7.819*** (1.061)	-7.936*** (1.057)	-9.932*** (0.959)
	<i>N</i>	1,180	1,160	1,140
	<i>Number of dioceses</i>	20	20	20

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results of the Arellano-Bond estimation suggest that the election of Pope John had a statistically significant positive effect on exits when including only one lag. As our dataset starts in 1957, John is omitted when lag length increases to three. Neither had the election of Pope Paul a statistically significant effect on church exits, nor did the publication of *Humanae Vitae* have an effect on church exits. The election of both, Pope John Paul and Pope Benedict had again – like in the Fixed Effects estimation –

a highly significant negative effect on exit rates independent of lag length.

German reunification had a highly significant positive effect independent of lag length, too. The abuse scandal in 2010 had a highly significant positive effect on church exits only when lag length is three years. In the first two model specifications, however, it appears that exit rates increased in the two years following the shock. This suggests that in the first two years after the scandal became public, people exited from church, but in the third year, it did not significantly contribute anymore to exits. The effect of the financial scandal is different: According to our estimation, exits increased immediately, but this effect decreased rather quickly.

A change in the minimum tax rate has a highly significant and negative effect on exits while a change in the maximum tax rate has a highly positive effect on exits independent of lag length. The coefficient of our solidarity tax variable again has a highly positive effect on exits. Moreover, the time trend itself is significantly positive for all three years too, suggesting that religious attachment has been gradually declining.

5.6.3 Fixed Effects Estimations – Protestants

Comparing the Fixed Effects results for the Catholics with those for the Protestants it appears that the coefficients representing the different Pope elections are strikingly similar. They are of the same direction and of similar magnitude (Pope John significantly positive and for Popes John Paul and Benedict significantly negative). With regard to the abuse scandal, our results suggest that among Protestants it is significantly negative, suggesting that in the year it happened there were no spillover effects. The finance scandal, in turn, has a highly significant impact on exits in the Protestant Church in the year it happened that decreased over time.

Table 18: Fixed Effects Estimation - Protestants

Type of Shock	Variable	(1) Exit Rate	(2) Exit Rate	(3) Exit Rate
	Protestant exits $t-1$	0.675*** (0.014)	---	---
	Protestant exits $t-2$	---	0.560*** (0.022)	---
	Protestant exits $t-3$	---	---	0.598*** (0.024)
Pope Elections/ Declarations	John 1958	0.119** (0.048)	0.154** (0.067)	---
	Paul 1963	-0.088** (0.036)	-0.117** (0.046)	-0.092* (0.044)
	Humanae Vitae 1968	0.228*** (0.053)	0.025 (0.077)	-0.066 (0.078)
	John Paul 1978	-0.573*** (0.042)	-0.863*** (0.056)	-1.299*** (0.071)
	Benedict 2005	-0.506*** (0.059)	-1.158*** (0.080)	-1.671*** (0.063)
Politics and Scandals	Reunification 1990	0.572*** (0.059)	-0.062* (0.031)	-0.388*** (0.040)
	Abuse Scandal 2010	-0.634*** (0.049)	-1.015*** (0.086)	-0.950*** (0.081)
	Abuse time trend	0.071*** (0.016)	-0.100*** (0.029)	-0.301*** (0.047)
	Finance Scandal 2014	1.577*** (0.066)	3.181*** (0.082)	2.888*** (0.071)
	Finance time trend	-0.717*** (0.032)	-1.014*** (0.045)	-0.185*** (0.033)
Changes in Tax Regime	Min Income Tax Rate	-0.436*** (0.037)	-0.755*** (0.058)	-0.908*** (0.060)
	Max Income Tax Rate	0.398*** (0.042)	0.678*** (0.065)	0.777*** (0.067)
	Solidarity Tax	0.390*** (0.036)	0.676*** (0.060)	0.697*** (0.061)
	Time Trend	0.036*** (0.003)	0.046*** (0.003)	0.050*** (0.003)
	Constant	-12.201*** (1.479)	-20.579*** (2.285)	-22.855*** (2.350)
	<i>N</i>	1,180	1,160	1,140
	<i>R-squared</i>	0.884	0.847	0.837
	<i>Number of dioceses</i>	20	20	20

Standard errors (clustered at diocese level) in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.6.4 Arellano-Bond Estimations – Protestants

Table 19: Arellano-Bond Estimation – Protestants

Type of Shock	Variable	(1) Exit Rate	(2) Exit Rate	(3) Exit Rate
	Exit Rate _{t-1}	0.666*** (0.021)	0.567*** (0.032)	0.579*** (0.031)
	Exit Rate _{t-2}	---	0.129*** (0.031)	-0.113*** (0.038)
	Exit Rate _{t-3}	---	---	0.338*** (0.033)
Pope Elections/ Declarations	John 1958	0.112 (0.164)	0.098 (0.210)	---
	Paul 1963	-0.084 (0.158)	-0.066 (0.154)	-0.012 (0.149)
	Humanae Vitae 1968	0.216 (0.152)	0.236 (0.149)	0.279* (0.144)
	John Paul 1978	-0.579*** (0.147)	-0.609*** (0.144)	-0.828*** (0.141)
	Benedict 2005	-0.510*** (0.169)	-0.634*** (0.168)	-0.963*** (0.166)
Politics and Scandals	Reunification 1990	0.560*** (0.165)	0.495*** (0.162)	0.372** (0.157)
	Abuse Scandal 2010	-0.635*** (0.162)	-0.715*** (0.160)	-0.713*** (0.154)
	Abuse time trend	0.068 (0.065)	0.048 (0.064)	-0.054 (0.062)
	Finance Scandal 2014	1.591*** (0.169)	1.870*** (0.179)	1.754*** (0.173)
	Finance time trend	-0.706*** (0.107)	-0.848*** (0.111)	-0.550*** (0.111)
Changes in Tax Regime	Min Income Tax Rate	-0.441*** (0.040)	-0.485*** (0.041)	-0.562*** (0.040)
	Max Income Tax Rate	0.404*** (0.038)	0.432*** (0.038)	0.462*** (0.037)
	Solidarity Tax	0.395*** (0.040)	0.427*** (0.040)	0.416*** (0.038)
	Time Trend	0.037*** (0.004)	0.032*** (0.004)	0.024*** (0.004)
	Constant	-12.388*** (1.290)	-13.034*** (1.274)	-13.167*** (1.229)
	<i>N</i>	1,160	1,140	1,120
	<i>Number of dioceses</i>	20	20	20

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The Arellano-Bond estimations show again that, in contrast to the Catholics, the effect of the abuse scandal on exits is negative. However, we do not find a significant effect of the time trend following the abuse scandal. Again, the effect of the finance scandal is significantly positive in 2014, but in contrast to the Catholics, the specific time trend is significantly negative. The effects of changes in the tax regime as well as the solidarity tax and the linear overall time trend are – as in the case of the Catholic Church significantly positive in both estimations, the Fixed Effects model as well as the Arellano-Bond Model.

5.7 Discussion

Taking into account the results displayed in Tables 16 and 17, we find partial support for *H11a*: *Depending on the public evaluation of the person as either “liberal” or “conservative”, the election of a new Pope has either a significant positive or significantly negative impact on exit rates from the Catholic Church.* In the Fixed Effects model, the election of Pope John and Paul led to an increase in the exit rate, while this was not the case in the Arellano-Bond estimation, except for Pope John in the model with just one lag. The elections of Pope John Paul and Pope Benedict led to decreases in exit rates in both models. The result for the latter might be due to the fact that Germans “identified” with the German Pope by saying “*Wir sind Papst*” (“We are Pope”) and thus less people exited from church.

At the same time, we have to reject hypothesis *H11b*, as we find statistically significant effects of Pope elections also in the Protestant Church.

We do not find support for *H12a*: *The publication of *Humanae Vitae* had a positive impact on exits from the Catholic Church*, except in one particular model specification (Fixed Effects with a lag length of three years. Although we find a significantly positive impact of *Humanae Vitae* on exits in the Protestant Church in the Fixed Effects Model with a lag length of one year, we also reject *H12b*.

Further, we tested the influence of scandals in the Catholic Church on exit rates and found that the abuse scandal had a statistically significant effect in the three years after it became public. The effect of the finance scandal was highly significant in the first year and decreased soon thereafter. Thus, we find support for *H13a*: *Scandals in the Catholic Church lead to an increase in the exit rate.* This is consistent with evidence presented by BOTTAN/PEREZ-TRUGLIA (2015) on declining church membership in the U.S. following publication of the abuse scandals.

H13b is partially supported as the abuse scandal did not lead to higher exits in the Protestant Church in the year it became public neither in the Fixed Effects nor in the Arellano-Bond Model. With regard to the financial scandal, we find support for *H13b*, as the results indicate in both models an increase in exit rates in the year the scandal

occurred and a decrease in the following years. Thus, with regard to the financial scandal, we observe a strong spillover effect.

We also find support for *H14: The reunification of Germany leads to an increase in church exits in both denominations* as well as for *H15a: The introduction of the solidarity tax leads to an increase in church exits* and for *H15b: An increase/decrease in minimum/maximum tax rates leads to an increase/decrease in exit rates*. The latter results are statistically significant for both, the Catholic and the Protestant Church.

5.8 Conclusion

Summarizing, our estimations show that exogenous shocks have a statistically significant and economically relevant impact on the decision of individuals to either leave church or retain their membership. We find that the most recent elections of a new Pope had a positive impact on church membership as they reduced the annual number of exits in Germany. Apart from that, declining religious attachment, i.e. secularization, has a statistically significant impact as exit rates increase over time. The most recent scandals (sexual abuse as well as misuse of church funds), however, had a negative impact in the sense that the annual number of exits increased. The effect is more pronounced for the financial scandal and even has a strong impact on exits from the Protestant Church. Thus, especially for the financial scandal we find a spillover effect on the Protestant Church. It is also striking that changes in the tax regime as well as the solidarity tax lead to significant increases in exit rates in both churches. Thus, our research question can be answered in the affirmative – the shocks that we have identified can explain large parts of the observable variation in the annual exit rate in both denominations, with changes in taxes having the largest impact on people to exit church. With regard to spillover effects we mainly observe that the financial scandal in the Catholic Church had effects on exit rates in the Protestant Church.

6 Conclusion

In this doctoral thesis, female careers, underrepresentation of women and social identity were investigated by analyzing data from different fields. A variety of settings were considered, ranging from corporate governance, economics of sports, especially winter sports, and economics of religion. In the following part, the main findings are summarized, and practical implications as well as suggestions for future research are provided.

The aspects female careers and underrepresentation of women were investigated in the first three chapters of this doctoral thesis. In chapter 2 the implementation of a gender quota on corporate boards and its effects on firm and market performance was examined. Specifically, the effect of the implementation of the gender quota in Norway in comparison to gender equality recommendations in Finland, Denmark, and Sweden were investigated. In this specific context evidence was found that a higher share of women on corporate boards in Norway had a negative impact on accounting-based performance, measured as OI/assets and ROA, and no significant effect on market-based performance, measured as Tobin's Q and market-to-book value was found. The gender quota was found to be an effective way to increase the female share on corporate boards. In chapter 3 career duration of women and men in Alpine and Nordic skiing was analyzed to identify determinants of career duration. Individual performance measured as the annual World Cup points accumulated per season by each athlete was found as the key determinant of career duration for both, men and women. Evidence can be drawn from this chapter that individual performance i.e. achieving specific results, is more important than the number of competitors an athlete competes with. With regard to the career duration of men and women evidence was found that women who self-select into a highly competitive setting like World Cup competitions are as competitive as men and their career duration does not differ significantly from that of men. In chapter 4 career concerns of judges were investigated by analyzing data from ski jumping competitions of male and female athletes. I found evidence that judges are concerned about their career as they make their decision how many subjective points to give dependent on the objective measure how far an athlete jumped. This behaviour is especially pronounced for female judges indicating that women have stronger career concerns than men.

The aspect of social identity was investigated in chapter 5 by analyzing exit data from the Catholic and Protestant Church in Germany. Evidence was found that exogenous shocks have a statistically significant effect on the decision of an individual to exit from Church or retaining a member. The data revealed that the financial scandal had an even stronger impact than the abuse scandal on exits. Further, evidence for a spillover effect of the financial scandal on the Protestant church was found. Thus, exogenous shocks have an impact on an individual's social identity with the group or organization of which it is a member.

From each chapter practical implications on female careers, underrepresentation of women, and social identity can be drawn. The analysis in chapter 2 reveals that with the implementation of a gender quota on corporate boards a female representation on boards of 40% was reached. Thus, for overcoming female underrepresentation a gender quota is an effective method. While the practical implication that can be drawn from chapter 3 is that ultimately individual performance determines career length of an athlete chapter 4 more specifically gives a practical implication that career concerns play a role when assessing an individual's performance. The findings have important practical implications for corporate situations when e.g. objective and subjective performance evaluations determine bonus target goals as women tend to consider the objective results achieved more than men. With regard to social identity theory chapter 5 has revealed that exogenous shocks have an impact on an individual's feeling of belonging to an organization. Thus, the practical implication of this study is that organizations have to take care of their reputation as scandals lead to individuals leaving the organization when they cannot identify with its reputation anymore.

Besides these important findings and implications examined in this doctoral thesis, there are some limitations to consider. The main aspects that concern all chapters are data availability and generalizability of the results. Regarding chapter 2 it is the short time frame of the data from 2002 to 2008. The study in chapter 4 is limited by the fact that out of 266 judges only 19 are women. Further, data on age of the judges is missing. A limitation of chapter 5 is the identification of events. With regard to the abuse scandal the public disclosure of 2010 is identified as the event of interest. However, abuse scandals did not become public only in this specific year but rather occurred in waves also in the years after 2010. Thus, the effect of these events in the aftermath of

the 2010 event cannot be identified. The generalizability of the result of this doctoral thesis is a further restriction. The results for the effectiveness of a gender board quota of chapter 2 might hold for these Nordic countries. However, with a different sample of countries, the results might be different. For chapter 3 the generalizability to the corporate world is difficult as the setting of a skiing competition is very specific, especially with regard to the limited starting slots for each participating nation, which is not easily transferable to employee performance in a company.

Therefore, future research could investigate highly competitive settings like consulting to test whether career length is mainly determined by individual achievements and if it is irrelevant of gender. With regard to chapter 2, future research should examine long term effects of an increasing educational level with more women on boards. This might have a positive effect in the long run as a higher level of education might pay off over time in combination with women getting more board experience. Future research on gender effects in ski jumping should include data on age of the judges to investigate possible age effect in career concerns additionally to gender effects. Further, qualitative interviews or a mixed methods approach could reveal why female judges have stronger pronounced career concerns than men. With regard to chapter 5, future research could investigate whether the effect of shocks has a stronger impact on decisions of individuals in the area it initially occurred compared to areas farther away.

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Appendix

Table A1: Top Ten Prize Money Winners in the Alpine and the Nordic Ski World Cup 2017/18 (in CHF)

Alpine Skiing				
1	Marcel Hirscher	669.681	Mikaela Shiffrin	702.775
2	Henrik Kristoffersen	345.071	Wendy Holdener	273.794
3	Beat Feuz	260.875	Lindsey Vonn	264.430
4	Aksel Lund Svindal	241.000	Viktoria Rebensburg	262.436
5	Kjetil Jansrud	210.250	Sofia Goggia	261.398
6	Vincent Kriechmayr	172.475	Federica Brignone	223.493
7	Thomas Dressen	168.800	Tina Weirather	205.622
8	Alexis Pinturault	142.232	Petra Vlhova	203.955
9	Andre Myhrer	138.259	Frida Hansdotter	148.911
10	Matthias Mayer	108.175	Tessa Worley	139.131
Nordic Skiing				
1	Johannes Høsflot Klæbo	207.500	Heidi Weng	140.100
2	Alexander Bolshunov	139.625	Ingvild Flugstad Østberg	111.775
3	Sjur Roethe	85.875	Jessica Diggins	109.075
4	Simen Hegstad Krueger	61.050	Marit Bjørgen	94.175
5	Emil Iversen	59.675	Krista Pärmäkoski	79.900
6	Didrik Toenseth	58.775	Charlotte Kalla	65.600
7	Sergey Ustiugov	55.800	Ragnhild Haga	61.000
8	Federico Pellegrino	46.600	Stina Nilsson	53.300
9	Martin Johnsrud Sundby	42.000	Maiken Caspersen Falla	51.250
10	Alex Harvey	35.550	Sadie Bjornsen	41.075

Table A2: Prize Money and World Cup Points by Rank

Rank	Alpine Skiing		Nordic Skiing*	
	World Cup Points	Prize Money (in CHF)	World Cup Points	Prize Money (in CHF)
1	100	45,000	100	15,000
2	80	20,000	80	10,000
3	60	10,000	60	5,000
4	50	7,000	50	3,500
5	45	5,000	45	2,500
6	40	4,000	40	1,500
7	36	3,000	36	1,000
8	32	2,400	32	750
9	29	2,000	29	500
10	26	1,800	26	250
11	24	1,600	24	-
12	22	1,500	22	-
13	20	1,400	20	-
14	18	1,300	18	-
15	16	1,250	16	-
16	15	1,200	15	-
17	14	1,150	14	-
18	13	1,100	13	-
19	12	1,050	12	-
20	11	1,000	11	-
21	10	950	10	-
22	9	900	9	-
23	8	850	8	-
24	7	800	7	-
25	6	750	6	-
26	5	700	5	-
27	4	650	4	-
28	3	600	3	-
29	2	550	2	-
30	1	500	1	-

* In Nordic skiing, prize money varies considerably across the different events. What all the events have in common, however, is that only the first ten finishers receive prize money and that the distribution of the prize purse is the same, irrespective of the amount of money.

Table A3: Nationalities of judges

Nation	Frequency	Percent	Cummulative
Austria	36,957	10.28	10.28
Canada	5,534	1.54	11.82
Czech Republic	15,664	4.36	16.18
Estonia	1,967	0.55	16.73
Finland	31,006	8.63	25.35
France	8,086	2.25	27.60
Germany	52,839	14.70	42.30
Italy	8,820	2.45	44.76
Japan	20,363	5.67	50.42
Kazakhstan	6,048	1.68	52.10
Korea	4,807	1.34	53.44
Norway	46,663	12.98	66.42
Poland	28,895	8.04	74.46
Romania	6,710	1.87	76.33
Russia	14,958	4.16	80.49
Slovakia	4,421	1.23	81.72
Slovenia	28,748	8.00	89.72
South Korea	65	0.02	89.73
Sweden	6,936	1.93	91.66
Switzerland	19,410	5.40	97.06
Turkey	856	0.24	97.30
USA	9,697	2.70	100.00

Table A4: Nationalities of athletes

Nation	Frequency	Percent	Cummulative
Austria	41,189	11.46	11.46
Belarus	20	0.01	11.46
Bulgaria	1,739	0.48	11.95
Canada	6,435	1.79	13.74
China	1,405	0.39	14.13
Czech Republic	18,825	5.24	19.37
Estonia	2,680	0.75	20.11
Finland	14,070	3.91	24.03
France	11,154	3.10	27.13
Georgia	10	0.00	27.13
Germany	47,590	13.24	40.37
Great Britain	50	0.01	40.39
Greece	210	0.06	40.44
Hungary	240	0.07	40.51
Italy	12,250	3.41	43.92
Japan	24,620	6.85	50.77
Kazakhstan	4,510	1.25	52.02
Korea	2,925	0.81	52.84
Latvia	25	0.01	52.84
Netherlands	1,555	0.43	53.28
Norway	38,413	10.69	63.96
Poland	31,399	8.74	72.70
Romania	2,965	0.82	73.52
Russia	20,629	5.74	79.26
Slovakia	390	0.11	79.37
Slovenia	44,692	12.43	91.80
Sweden	1,095	0.30	92.11
Switzerland	12,940	3.60	95.71
Turkey	1,090	0.30	96.01
USA	12,405	3.45	99.46
Ukrain	1,930	0.54	100.00

Table A5: Correlation matrix including compensation points

	subjective points	distance points	same nationality	home event	windcompensation points
subjective points	1.000				
distance points	0.603***	1.000			
same nationality	0.045***	0.008***	1.000		
home event	0.022***	0.001	0.481***	1.000	
windcompensation points	-0.036***	-0.092***	0.001	0.002	1.000

Table A6: Robustness-Check including wind compensation points

subjective points	
distance points	0.734*** (0.003)
distance points*distance points	-0.142*** (0.001)
same nationality	0.104*** (0.006)
home event	0.042*** (0.005)
windcompensation points	0.016*** (0.002)
Constant	0.103*** (0.002)
Observations	203,542
R ²	0.445

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Table A7: Robustness-Check including wind compensation points (gender general)

subjective points	
judge female	0.085*** (0.007)
distance points	0.719*** (0.003)
judge female*distance points	0.069*** (0.014)
distance points*distance points	-0.146*** (0.001)
same nationality	0.097*** (0.006)
home event	0.045*** (0.005)
windcompensation points	0.017*** (0.002)
Constant	0.106*** (0.002)
Observations	203,542
R ²	0.424

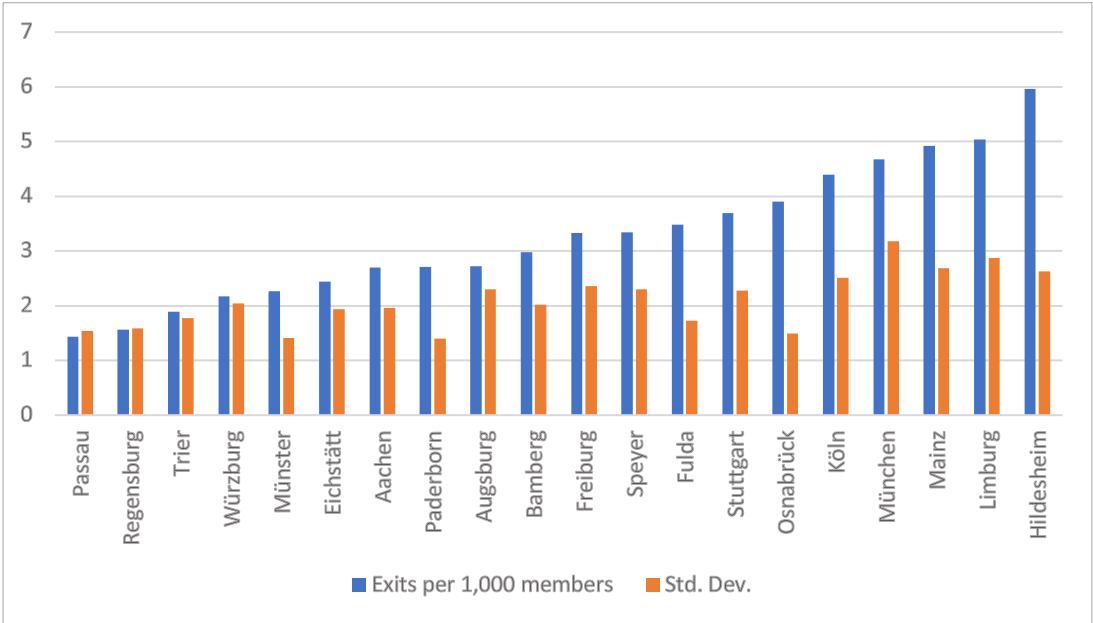
Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

**Table A8: Robustness-Check including wind compensation points
(jumper female and jumper male)**

	Female jumper (Model 1)	Male jumper (Model 2)
subjective points		
judge female	0.087*** (0.012)	0.112*** (0.010)
distance points	0.851*** (0.011)	0.703*** (0.004)
judge female*distance points	-0.024 (0.018)	0.116*** (0.022)
distance points*distance points	-0.029*** (0.009)	-0.148*** (0.001)
same nationality	0.085*** (0.010)	0.099*** (0.007)
home event	0.034*** (0.008)	0.050*** (0.006)
windcompensation points	0.025*** (0.004)	0.012*** (0.002)
Constant	-0.009** (0.004)	0.155*** (0.002)
Observations	60,468	143,074
R ²	0.432	0.362

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

Figure A1: Exits from the Catholic Churches, 1957-2017*



*Only dioceses existing from 1957-2017 considered

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