Bridging the Gap:

Gender, Work-Family Practices

And Productivity

Dissertation
zur Erlangung des Doktorgrades
der Wirtschafts- und Sozialwissenschaftlichen Fakultät
der Eberhard Karls Universität Tübingen

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Tübingen

2015

Tag der mündlichen Prüfung: 15.12.2015

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Acknowledgements

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1. Introduction

The topic of the equal integration of both genders in the workforce has been frequently discussed in the 21st century, especially given that since 1970, participation rates of working-aged women have heavily increased all over Europe (see AHN/MIRA 2002). According to JOCHMANN/SCHAWILYE/SCHMIDT (2012), gender is the most-often mentioned dimension of diversity in the annual reports of German DAX-30–listed companies. Numerous reports, official documents, and policy initiatives from European institutions serve to promote the equal treatment of male and female employees. European members confirmed their desire to increase female participation in decision-making positions in academia and in business through the Amsterdam Treaty of 1997 (see HOLST 2006). The European Parliament has stressed the importance of equal participation of females and males in highly ranked positions in all fields (see SZYDLO 2014).

Although in recent years, companies and politicians have addressed gender issues, in many areas of the workforce, an unequal distribution of highly ranked positions between men and women still exists. Qualified female employees often do not hold such positions. For example, there is a large gap between the percentage of employed and well-educated women and those holding professorship positions or sitting on the boards of EU companies. In Germany, young women account for about half of university graduates, but they hold only 14 percent of full professorships (C4/W3) (see Expertenkommission Forschung und Innovation 2013: 109). Also in Germany, the overall percentage of women in the workforce was 55 percent in 2013, but they only held 10 percent of all boardroom positions (see HOLST/SCHIMETA 2011). This gap, formerly known as the leaky pipeline, gives rise to the need for a deeper analysis of strategies to reduce the inequality of opportunities for women in academia and business.

An effective tool for overcoming the unequal participation rates of men and women in the workforce might be the organizational provision of work-family practices. Although over time, men and women appear to have begun dividing domestic work and caring responsibilities more equally, women typically spend a larger proportion of their time in child-raising and household activities than men (see e.g. SAYER 2005). To help women manage the dual burden of work and family, promoting work-family practices might be one effective way to minimize the gender bias in highly ranked

positions (see PEUS/WELPE 2011). A recent analysis of interviews with human resource directors of a dozen companies gives the first indication that one effective initiative to increase women's participation in the boardroom is to implement measures that facilitate work-life balance (see DESVAUX/DEVILLARD-HOELLINGER/BAUMGARTEN 2007).

Following this train of thought, this doctoral thesis is about the gap and how it might be bridged. This thesis tackles issues about gender, the organizational provision of work-family practices and productivity. Chapters 2 to 4 focus on corporate business, and chapter 5 is about academia. Chapter 2 starts with the performance-enhancing effects of gender diversity in the boardroom. This chapter shows that only if a critical mass of women is reached in the boardroom do companies experience positive performance effects. Chapter 3 raises the question of how a company can encourage more women to join boards. Signaling a female-friendly organizational culture by winning a working mother award increases a company's chances of attracting female board members. Chapter 4 deepens the issues on work-family practices. More precisely, it looks at differences in the provision of work-family practices across welfare states and industries. It further focuses on the effect of these benefits on extraordinary turnover, defined as above average or below average employee turnover per year, country, and industry. Chapter 5 is about research productivity in academia. It empirically shows that there is a gap between female and male research productivity and analyzes the role and the timing of children. The following paragraphs provide further details on the particular chapters.

In chapter 2, joint work with KERSTIN PULL and KARIN VETTER, we look at the performance effects of different levels of gender diversity in the boardroom. We postulate that there is a U-shaped link between gender diversity and performance, based on critical mass theory by KANTER (1977a). The critical mass theory stresses the importance of different gender compositions in groups and argues that a more gender-diverse group performs better. Empirically, we explore whether the link between gender diversity and firm performance follows a U-shape with the help of a hand-collected panel data set of 151 listed German firms for the years 2000 to 2005. We control for reversed causality with a random effect estimator and a one year lag of the explanatory variable gender diversity measured by the Blau index. We find evidence that gender diversity

at first negatively affects firm performance and is associated with higher firm performance than completely male boards only after a "critical mass" of about 30 percent women has been reached. Given our sample firms, the critical mass of 30 percent women translates into an absolute number of about three women on the board and hence supports recent studies on a "magic number" of women in the boardroom (see e.g. TORCHIA/CALABRÒ/HUSE 2011).

Chapter 3 is about how to encourage women to join boards and the role of a company's female-friendly culture. Winning a working mother award can serve as highly visible signal of a company's female-friendly culture and help the company to attract highly qualified women. Due to the recent implementation of a mandated gender quota for boards of publicly traded firms in some European countries, there is a rising demand for qualified female board members, and qualified women may potentially choose which boards to join. The primary goal of this chapter is to analyze whether a female-friendly culture affects the percentage of female directors of European corporate boards. The theoretical argument is based on the signaling theory of SPENCE (1973). I argue that potential female board members look for signals of a female-friendly culture and that a company's having won a working mother award is a signal that the organization's culture is female-friendly. Empirically, I find support for my hypothesis derived from signaling theory in a sample of 199 listed companies in different European welfare states (Germany, Italy, Sweden, and the United Kingdom) for the years 2002–2011. Methodologically, panel-analytic regressions are used to establish a link from a female-friendly culture on the percentage of female board members in four different European countries. By using the fixed effects estimators and a lag of three years I find that companies that have won a working mother award have more females on their boards.

Not only can the provision of work-family practices lead to a company's being nominated for a working mother award and increase the changes to attract women on boards, it can also have an employee turnover decreasing effect in organizations. Several studies stress the importance of work-family practices (e.g. YANADORI/KATO 2009; GIARDINI/KABST 2008; PERRY-SMITH/BLUM 2000). In the literature, various definitions of work-family practices exist. Flexible working time, daycare services, generous vacations and additional maternity leave were predominantly associated with work-family practices (see ANDERSON/COFFEY/BYERLY 2002). In chapter 4, these four

benefits constitute the work-family practices examined. I compare the provision of work-family practices in welfare states and industries and test their impact on extraordinary turnover, defined as above average or below average employee turnover per year, country, and industry. Based on institutional theory, the provision of work-family practices should differ between welfare states and industries. Further, I argue, based on the turnover approach by the efficiency wage models, that work-family practices reduce extraordinary employee turnover. To test my hypotheses, I use the same dataset as in chapter 3. My data consist of an unbalanced sample of 199 listed firms in Germany, Italy, Sweden, and the United Kingdom for the years 2002 to 2011. Methodologically, I apply Z-statistics and random effect (RE) logit models to compare the provision of work-family practices across welfare states and industries. To analyze the impact of these practices on extraordinary turnover, pooled ordinary least squares (OLS) modelling with robust standard errors, RE estimators and fixed effects (FE) estimators are applied. Overall, I find statistically significant differences in the provision of work-family practices such as daycare services across welfare states and industries. Moreover, the results show that practices such as providing daycare services reduce extraordinary employee turnover whereas other practices (such as offering flexible working time and generous employee leave benefits) have no effects.

In the literature, having children has generally been viewed as a barrier to female employment (see UUNK/KALMIJN/MUFFELS 2005). The major assumption that underlies this view is the incompatibility of maintaining a family and employment and a division of household responsibilities according to gender (see FINDEISEN 2011; SAYER 2005). In chapter 5, joint work with KERSTIN PULL and USCHI BACKES-GELLNER, we focus on the effects of children on female productivity in an academic context. Although childbearing is time-consuming (i.e. associated with a negative resource effect), female researchers with children apparently manage to compensate for the negative resource effect associated with childbearing by working harder (positive incentive effect). Further, one could assume that only the most productive female researchers decide to pursue a career in academia and have children at the same time (positive self-selection effect). The sample consists of more than 400 researchers in business and economics from Austria, Germany, and the German-speaking part of Switzerland. Empirically, we analyze the effect of children and the timing of parenthood on research productivity via an ordinary least squares (OLS) estimator with robust standard errors.

We find that female researchers with children are more productive than female researchers without children. Referring to the timing of parenthood, we find that mothers who give birth to their first child after tenure are more productive than others. If we look at the research productivity of female researchers in the time period five years before giving birth to their first child and five years afterwards, we find that research productivity increases after childbirth, suggesting that perhaps only the most productive female researchers with children dare to self-select (or be selected) into academic careers.

Chapter 6 provides a conclusion. First, a summary of the results of the different chapters is given. Second, based on these findings, practical implications are presented. Finally, this chapter includes general remarks on the data and methods used in this dissertation as well as suggestions for further research.

2. Gender Diversity in the Boardroom and Firm Performance: What Exactly Constitutes a "Critical Mass"?

Chapter 2 is a slightly modified version of the paper "Gender Diversity in the Boardroom and Firm Performance: What Exactly Constitutes a "Critical Mass"?" by Jasmin Joecks, Kerstin Pull and Karin Vetter. This paper has been published in Journal of Business Ethics 118(2013)1: 61-72.

Abstract: The under-representation of women on boards is a heavily discussed topic – not only in Germany. Based on critical mass theory and with the help of a hand-collected panel data set of 151 listed German firms for the years 2000-2005, we explore whether the link between gender diversity and firm performance follows a U-shape. Controlling for reversed causality, we find evidence for gender diversity to at first negatively affect firm performance and – only after a "critical mass" of about 30 percent women has been reached – to be associated with higher firm performance than completely male boards. Given our sample firms, the critical mass of 30 percent women translates into an absolute number of about three women on the board and hence supports recent studies on a corresponding "magic number" of women in the boardroom.

Keywords: diversity, gender, supervisory board, performance

JEL-Code: G30; J16

2.1 Introduction

In the popular press, the representation of women on boards is heavily discussed (see HOLST/SCHIMETA 2011; KONRAD/KRAMER 2006). Not only in Germany male managers regularly hold the vast majority of board positions, and compared to the increase of the overall percentage of women in the workforce during the last decades, the representation of female directors in the boardroom falls far behind (see FARRELL/HERSCH 2005: 86).

Not surprisingly then, in many countries, there has been a pressure for governance reforms that may foster gender diversity in the boardroom. Norway was one of the first countries to impose a law in 2003 requiring public-limited companies to fill at least 40 percent of board positions with women by 2008 (see AHERN/DITTMAR 2012; HOLST/SCHIMETA 2011: 7). Spain followed Norway's example and enacted a law prescribing a 40 percent quota of female board members by 2015 (see ADAMS/FERREIRA 2009: 292). While other European countries, like, e.g., the Netherlands or France, also imposed women quotas (see HOLST/SCHIMETA 2011: 11; BÖHREN/STRÖM 2010: 1282), Germany, focuses on voluntary commitments. The so-called German Corporate Governance Code (2010) which asks firms to "comply or explain" with its recommendations states in article 5.4.1:

> *"The Supervisory Board shall specify concrete objectives regarding its composition which ... take into account the international activities of the enterprise ... and diversity. These concrete objectives shall, in particular, stipulate an appropriate degree of female representation."*

But with on average less than 10 percent women on German supervisory boards in the 30 largest and most actively traded companies listed on the Frankfurt stock exchange (DAX 30) (e.g., HOLST/SCHIMETA 2011), female representation in the boardroom is still rather low.

While fostering female representation in the boardroom for ethical and social reasons is beyond dispute, the performance effects of an increased female representation on the board are rather ambiguous: While some studies hint at a positive link between female representation on the boardroom and firm performance, others find no or even a negative link. In our paper, we add to the literature by postulating – based on critical mass theory – that the relation between gender diversity and firm performance is U-

shaped and by providing a first empirical test on this supposition based on a hand-collected panel data set of 151 listed German firms for the time period 2000-2005.

The remainder of the paper is structured as follows. We first present a review of the recent literature on the performance effects of gender diversity followed by a review and critique of critical mass theory as our basic theoretical point of reference. In the following section, we describe our data, variables, and methods. Our findings and analyses are subsequently reported in the following section. In the final section, we conclude with a discussion of our results and our paper's contribution.

2.2 Literature and Theoretical Starting Point

2.2.1 The empirical link between gender diversity and performance: A literature review

The empirical evidence on the link between female representation on the board and firm performance is controversial (for an overview of the literature see Table 1): While some studies find the relation between women on boards and firm performance to be positive, others provide evidence of a negative link, and still others do not find a link at all.

While some of the differences may be due to the data stemming from different countries (with differing board systems) and different time periods (see CAMPBELL/MÍNGUEZ-VERA 2010) or from the use of different performance measures and estimation methods (see CAMPBELL/MÍNGUEZ-VERA 2008: 441; RHODE/PACKEL 2014: 399), results may further be affected by studies being confronted with differing ratios of women on boards, i.e., there may be studies with overall rather low female representation and others with rather high female representation. If the link between gender diversity and performance was non-linear and, e.g., U-shaped, the first group of studies would most likely find the relation between gender diversity and performance to be negative, the latter group would find it to be positive. To the contrary, a study that covers boards with very low and very high female representations and that searches for a linear relation between gender diversity and performance, would most likely find no link between the two.

Table 1: Overview of the literature (chronological)

Author(s), Year	Gender diversity measure (explanatory variable)	performance measure (dependent variable)	data base (n, country, years)	main result
Mahadeo, Soobaroyen and Hanuman (2012)	women's ratio	ROA	371 directors of 39 companies listed on the Stock Exchange of Mauritius (2007)	positive link
Ahern and Dittmar (2012)	women's ratio	Tobin's Q	248 Norwegian public-limited firms (2001-2009)	negative link
Lindstaedt, Wolff and Fehre (2011)	women's ratio	ROA, ROE, price to book value	160 German companies of the DAX family (2002-2010)	positive link for firms with a high ratio of female employees and for B2C-business
He and Huang (2011)	Blau Index	ROA	530 US manufacturing firms (2001-2007)	negative link
Torchia, Calabrò and Huse (2011)	no. of women; four groups: (1) no, (2) one, (3) two, (4) three+ women	innovation (self-reported)	317 Norwegian companies (2005/2006)	three+ women are positively related to innovation
Lückerath-Rovers, (2011)	women's ratio	ROE, ROS, ROIC	99 Dutch companies (2005-2007)	positive link (ROE)
Böhren and Ström (2010)	women's ratio	Tobin's Q, ROA, ROS	203 firms in Norway listed on the Oslo Stock exchange (1989-2002)	negative link
Haslam et al. (2010)	dummy (women on the board: yes / no); women's ratio	ROE, ROA Tobin's Q	126 British companies included in the FTSE 100 index (2001-2005)	no link (ROA and ROE); negative link with at least one woman on board (Tobin's Q)
Adams and Ferreira (2009)	dummy (women on the board: yes/no); women's ratio	ROA, Tobin's Q	1939 US firms based on IIRC (1996-2003)	negative link

Author(s), Year	Gender diversity measure (explanatory variable)	performance measure (dependent variable)	data base (n, country, years)	main result
Miller and del Carmen Triana (2009)	Blau Index	ROI, ROS	326 US Fortune 500 firms (2003)	no link
Campbell and Mínguez-Vera, (2008)	dummy (women on the board: yes/no), women's ratio, Blau and Shannon Index	Tobin's Q	68 Spanish companies (1995-2000)	dummy not significant; otherwise: positive link
Rose (2007)	women's ratio	Tobin's Q	more than 100 Danish companies listed on the Copenhagen Stock Exchange (1998-2001)	no link
Randöy, Oxelheim and Thomsen (2006)	women's ratio	ROA, stock market value	154 Danish, 144 Norwegian, 161 Swedish firms (2005)	no link
Smith, Smith and Verner (2006)	women's ratio	gross profit, net sales, contribution to margin sales, operating income/net assets, net income after tax/net assets	2,500 Danish firms (1993-2001)	positive link depending on education of women and performance measure
Carter, Simkins and Simpson (2003)	dummy (women on the board: yes / no), women's ratio	ROA, Tobin's Q	638 US Fortune 1000 firms (1997)	positive link (Tobin's Q)
Erhardt, Werbel and Shrader(2003)	minorities' and women's ratio	ROA, ROI	112 US Fortune 1000 firms (1998)	positive link (demographic diversity included)
Shrader, Blackburn and Iles (1997)	women's ratio	ROS, ROA, ROI, ROE	200 US firms (from Wall Street Journal) (1992)	negative link
Siciliano, (1996)	women's ratio	social performance, total revenue to total expenses, donations	240 YMCA organizations (1989)	no link with total revenue to total expenses, positive link with social performance, negative link with donations

Source: own compilation.

2.2.2 Critical mass theory: A review and critique

In our study, we build on KANTER's (1977a, 1977b) seminal work concerning gender diversity in groups: critical mass theory. In her analysis of group interaction processes, KANTER constructs four different categories of groups according to their composition: uniform groups, skewed groups, tilted groups and balanced groups:

- *Uniform groups* are groups in which all members share the same (visible) characteristic. That is, with respect to gender, all members of the group are either male or female. Of course, also uniform groups develop their own differentiations, but with reference to salient external master statuses like gender, its members are similar (see KANTER 1977a: 208).

- *Skewed groups* are groups in which one dominant type (e.g., the males) controls the few (e.g., the females) and therefore also controls the group and its culture. The few are called "tokens". Tokens are not treated as individuals, but as representatives for their category (see KANTER 1977a: 208). KANTER suggests that a male dominated *skewed* group consists of up to 20 percent women.

- *Tilted groups* are groups with a less extreme distribution. Unlike in skewed groups, minority members can ally and influence the culture of the group. They do not stand for all of their kind, instead they represent a subgroup whose members are to be differentiated from each other in their skills and abilities (see KANTER 1977a: 209). According to KANTER, a male-dominated *tilted* group consists of 20 to 40 percent women.

- In a so-called *balanced group*, majority and minority turn into potential subgroups where gender based differences become less and less important. The focus turns to the different abilities and skills of men and women (see KANTER 1977a: 209). A *balanced* group with respect to gender representation has 40 to 60 percent women.

Concerning group interaction processes, KANTER regards *skewed* groups to be especially problematic: Either the tokens are in the focus or they are overlooked, and they may be subject to stereotyping (see KANTER 1977a: 210). For women, there are different strategies to cope with a token status (see KANTER 1977b: 968). Either they pretend that differences between women and men do not exist, or they hide their individual characteristics behind stereotypes (see KANTER 1977a: 239). The incumbent men, too,

will also behave differently in *skewed* as opposed to *uniform* groups leading *skewed* groups to be outperformed by *uniform* ones.

With an increase in their relative numbers from a *skewed* to a *tilted* or even a *balanced group*, women are more likely to be individually differentiated from each other. As a consequence they might then also bring in their different knowledge-bases and perspectives. As is well documented in the literature, men and women differ in a whole range of respects: Women are more risk averse than men (see e.g., CROSON/GNEEZY 2009; NIEDERLE/VESTERLUND 2007; JIANAKOPLOS/BERNASEK 1998), they are less aggressive in their choice of strategy, and more likely to invest in a sustainable way (see APESTEGUIA/AZMAT/IRIBERRI 2012; CHARNESS/GNEEZY 2012). Women may hence add value to a male-dominated boardroom by providing new perspectives and by asking different questions (see FARRELL/HERSCH 2005: 87; BURGESS/THARENOU 2002: 40; BURKE 1997: 912). While in a *skewed* group, these new perspectives may either not be adequately expressed by the female tokens or not spotted by the dominant males, in *tilted* or *balanced* groups, the combination of female and male attributes will more likely allow for productive discussions and will hence positively affect group performance (see APESTEGUIA/AZMAT/IRIBERRI 2012; KONRAD/KRAMER 2006).

In sum, critical mass theory postulates that, until a certain threshold or "critical mass" of women in a group is reached, the focus of the group members is not on the different abilities and skills that women bring into the group. As a consequence, *skewed* groups will have a lower performance than *uniform* or *tilted* and *balanced* groups. *Tilted* groups – i.e., groups where a critical mass of 20 to 40 percent women has been reached – will outperform *uniform* and *skewed* groups.

Despite its popularity, critical mass theory has rarely been put to an empirical test. While studies on gender diversity often explicitly refer to KANTER (see e.g., TSUI/EGAN/O'REILLY 1992), they rarely directly test KANTER's predictions on the performance of different group types. Among the few exceptions are SPANGLER/GORDON/PIPKIN (1978) and FENWICK/NEAL (2001). While the latter provide empirical support for KANTER's theory and find *tilted* groups in a student simulation study to outperform *skewed* and *uniform* ones, SPANGLER/GORDON/PIPKIN (1978) find achievements of women law students to be diminished in *skewed* as opposed to *tilted* student work groups. Both, SPANGLER/GORDON/PIPKIN (1978) and FENWICK/NEAL (2001), are

confined to simple mean comparisons and do not substantiate their results with the help of a multivariate analysis.

We do not only add to the existing literature by testing KANTER's predictions in a business context and by combining our univariate findings with a multivariate regression analysis, but also explicitly address the fact that the "critical mass" in KANTER's theory is exogenously – and rather arbitrarily – defined to lie in a range of 20 to 40 percent women (for a corresponding criticism see CHILDS/KROOK 2009, 2008, 2006; CELIS et al. 2008; GREY 2006). Unlike the preceding literature, we attempt to endogenously determine the critical mass of women in the boardroom by regressing firm performance on gender diversity and including a quadratic term. Allowing for non-linearities, we expect to find a U-shaped link between gender diversity and performance. Finding such a U-shaped link would support KANTER's theory of a critical mass, but at the same time highlight the need to endogenously determine the critical mass of women in the boardroom.

2.3 Methods

2.3.1 Sample

Our initial sample consists of all 160 companies listed in one of the German stock exchange indices DAX, MDAX, SDAX, and TecDAX on December, 31st 2005. We exclude 9 firms that were not of German legal form in order to make sure that all companies in the sample were subject to the same regulatory environment. Our sample hence consists of 151 companies whom we observe over a five year period (2000-2005).

The board system in Germany is a two-tier system with the supervisory board appointing and supervising management (see DITTMANN/MAUG/SCHNEIDER 2010: 41). Unlike in a one-tier board system, the main responsibility of the German supervisory board is to monitor, supervise and appoint the management board which in turn is responsible for firm operations. German supervisory boards comprise directors elected by shareholders and, depending on their size, also by employee representatives.

2.3.2 Variables and data sources

Concerning the *dependent variable*, similar to other studies that analyze the relation between women on boards and firm performance (see e.g., LINDSTAEDT/WOLFF/FEHRE 2011; HASLAM et al. 2010; SHRADER/BLACKBURN/ILES 1997),

we measure firm performance in terms of return on equity (ROE). The data on ROE are taken from Thomson Financial Datastream.

With respect to our central *explanatory variable*, gender diversity, we hand-collected data on board members' gender from firms' annual reports on the basis of board members' first given names. We found none of the boards to be female dominated, i.e., there were no boards with more than 50 percent women.

With respect to KANTER (1977), we first created four dummy variables reflecting the different group types: *uniform* board (assuming the value "1" if a board has no woman; "0" otherwise), *skewed* board (assuming the value "1" if a board has at least one woman but less than 20 percent women; "0" otherwise), *tilted* board (assuming the value"1" if the ratio of women in the boardroom is at least 20 percent, but less than 40 percent; "0" otherwise) and *balanced* board (assuming the value "1" if the ratio of women is at least 40 percent).

In search for an endogenous determination of the critical mass of women in the boardroom, we further calculated a measure of *gender diversity*. As one of the most wide spread diversity measures for categorical variables (see e.g., BEAR/RAHMAN/POST 2010; WEBBER/DONAHUE 2001; HAMBRICK/CHO/CHEN 1996; MAGJUKA/BALDWIN 1991), we used the so-called Blau index of diversity. Following BLAU (1977), diversity of a group is given by

$$H = 1 - \sum_{c=1}^{k} s_c^2 \,,$$

where k stands for the number of categories (i.e., k=2 in the case of gender) and s_c is the fraction of supervisory board members with characteristic c (i.e. the fraction of female/male supervisory board members). Following ALEXANDER et al. (1995) we standardize the index such that H=0 signifies complete homogeneity (i.e., all board members are male) and H=1 indicates complete heterogeneity (i.e., one half of all board members is female and the other is male). In order to account for potential non-linearities, the Blau index of gender heterogeneity does not only enter our regression in its linear but also in its quadratic form.

As *controls*, besides year and industry dummies and in accordance with the literature (see e.g., LINDSTAEDT/WOLFF/FEHRE 2011, BERMIG/FRICK 2010), we include a firm's

market value as well as a dummy variable for the use of the German accounting standard HGB[1] as both are obviously apt to influence our dependent variable ROE. Further, and again in accordance with the literature, we control for a set of board related variables: board size (see LÜCKERATH-ROVERS 2011, ADAMS/FERREIRA 2009, or FARRELL/HERSCH 2005), codetermination (see LINDSTAEDT/WOLFF/FEHRE 2011; OEHMICHEN/RAPP/WOLFF 2010; FAUVER/FUERST 2006), and multiple directorships (see e.g., LINDSTAEDT/WOLFF/FEHRE 2011). Board size is measured by the number of members on the board and potentially related to gender diversity in the boardroom. Codetermination is measured by a dummy variable that takes the value "1" if the board is codetermined (i.e., besides shareholders' representatives there are also employee representatives on the board) and "0" otherwise. Codetermination might be related to our dependent variable ROE (see e.g., BERMIG/FRICK 2011b) and – as ARNEGGER et al. (2010) have shown – potentially also to gender diversity. Finally, the variable "multiple directorships" is calculated as the average number of board memberships a board member holds besides the one in the board under consideration. Again, this variable might well affect ROE (positively due to further board member' experience; SARKAR/SARKAR 2009, or negatively because of time constraints; FICH/SHIVDASANI 2006) and it might also relate to gender diversity (see FARRELL/HERSCH 2005: 87). Information on the different controls is taken from diverse sources, e.g., Thomson Financial Datastream, Deutsche Börse (2010), and firms' annual reports.

2.3.3 Analysis

The central challenge for our empirical analysis is reversed causality as we cannot exclude that well-performing firms are more likely to appoint women to their boards (see SMITH/SMITH/VERNER 2006: 579) or that women self-select into the boards of well performing firms. Further, unobserved factors may influence both, the percentage of women on boards and firm performance. To address potential problems of endogeneity and in accordance to a similar approach by DITTMANN/MAUG/SCHNEIDER (2010) and FARRELL/HERSCH (2005), we use panel estimations and lag our central explanatory variable *gender diversity* by one year. Further, we also lag the board controls

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[1] Due to the internationalization of the German stock market, more and more German firms switched their financial reporting from the local German accounting standard HGB to the IFRS or U.S. GAAP during our period of observation.

board size, *co-determination* and *multiple directorships* as they are potentially related to gender diversity.

In a first step, we compare firm performance for different board types according to the classification by KANTER and then analyze the link between board type and firm performance in a multivariate regression analysis. In a next step, we regress firm performance on our measure of gender diversity in its linear and also in its quadratic term to account for potential non-linearities and to endogenously determine the "critical mass" of women on the supervisory board. In an attempt to further substantiate our results on the critical mass of women in the boardroom, we close with a regression on the apparent "magic number" of women in the boardroom. In all models, we use Ordinary Least Squares estimators (OLS) with robust standard errors and firm clusters. As the Breusch-Pagan Lagrange multiplier (LM) shows the random effects estimator (RE) to be more appropriate in all models, we include the lead of the central explanatory variable in the regression in order to test for strict exogeneity, and find gender diversity to be exogenous in all specifications. We decide against the use of fixed effects estimators (FE) because for more than a third of our firm population, our main explanatory variable, gender diversity, does not change over time. According to a Hausman test, we further find the random effect estimator to be more efficient than the FE estimator.

2.4 Results

2.4.1 Descriptives

Table 2 contains the means, standard deviations, and correlations for all the variables included in our analysis. After the elimination of outliers[2], mean *ROE* in our sample is 9.42 with a standard deviation of 19.28. The average Blau index of *gender diversity* is .26 corresponding to a ratio of female board members of about 8 percent (only slightly increasing in time from about 7 percent in 2000 to about 9 percent in 2005). The Blau index of gender diversity in our sample ranges from zero (no women on the supervisory board) to one (half of the members of the supervisory board are women). There are no boards in our sample where the ratio of women is larger than 50 percent. 20 percent of firms in our sample report according to the *German standard* HGB. *Market value* is on average 5,544.81 million Euros, about three quarters of the firms in our

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[2] Outliners were defined as having an ROE of either more than 100 or less than -100.

sample are *codetermined*, each board member holds on average about three other *directorships* and average *board size* is 11.4 ranging from 2[3] to 21.

As to the *industry distribution*, the largest percentage of firms in our sample belongs to Industrials (28.5 percent) followed by Financials (18.5 percent) and Consumer Goods (12.6 percent). Female representation on the board is higher in Financials, Telecommunication, Pharma & Healthcare and in Consumer Goods, and less prevalent in Industrials and Basic Materials. These results are consistent with the literature according to which female directors are more often to be found in Consumer Goods or Financials than Industrials (see ADAMS/ FERREIRA 2009: 295; BRAMMER/MILLINGTON/PAVELIN 2009; GROSVOLD/BRAMMER/RAYTON 2007: 353).

Concerning correlations with our dependent variable *ROE*, we find it to be slightly positively related to market value (r=.05*) and to co-determination (r=.08**), and slightly negatively related to multiple directorships (r=-.13***). Consistent with our theoretical prediction, we do not find an indication for a linear relationship between ROE and gender diversity.

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[3] According to the Stock Cooperation Act (*Aktiengesetz*), German supervisory boards have a minimum size of three and a maximum of 21 seats depending on statutory equity capital. A supervisory board consisting of only two members hints at a temporary vacancy.

Table 2: Means, standard deviations, and correlations

Variables	Mean	Sd	(1)	(2)	(3)	(4)	(5)	(6)
(1) ROE	9.42	19.28	1					
(2) Gender diversity$_{(t-1)}$	.26	.28	-.01	1				
(3) German standard	.20	.40	.04	-.04	1			
(4) Market value	5,545	12,667	.05*	.14***	-.07**	1		
(5) Codetermination$_{(t-1)}$	.72	.45	.08**	.33***	.09***	.23***	1	
(6) Multiple Directorships$_{(t-1)}$	3.40	1.30	-.13***	.28***	.05	-.00	-.30	1
(7) Board size$_{(t-1)}$	11.45	6.10	-.02	.27***	-.06*	.48***	.67***	-.09**

Variables: ROE (return on equity); gender diversity: normalized Blau Index ranging from 0 (only male directors) to 1(equal distribution); German standard: use of HGB as accounting standard ("1" if firm uses HGB, "0" otherwise); market value (in million Euros); codetermination ("1" if there are employee representatives on the board, "0" otherwise); multiple directorships: average number of (additional) directorships per director; board size (number of directors on the board).
Notes: *, **, *** denote significance at the 10%, 5% and 1% levels, respectively.
Source: own compilation.

As to potential interrelations with our main explanatory variable *gender diversity*, we find it to be positively related to market value (r=.14***), co-determination (.33***), multiple directorships (r=.28***), and board size (r=.27***). That is, firms with a larger market value are characterized by a (slightly) higher degree of gender diversity in the boardroom. The same is true for codetermined firms as opposed to non-codetermined firms. Further, gender diversity in the boardroom is positively related to multiple directorships as well as to board size. That is, larger and more experienced boards have, on average, more women.

Concerning interrelations between the different *controls*, the most striking correlations concern board size: It is strongly positively related with multiple directorships

(r=.67***) and with codetermination (r=.48***). In order to test for potential multi-collinearity, we examined the variance inflation factors (VIF). As all VIF values were below 2.58, there is no multicollinearity problem.

2.4.2 ROE and female board representation: Following KANTER (1977)

Before starting with the regression analysis, in Table 3, we first take a look at the average ROE for the different degrees of female participation in supervisory boards according to the definition by KANTER (1977a, 1977b). As expected (see HOLST/SCHIMETA 2011), the most common groups in our sample are *uniform* groups with n=394 and *skewed* groups with n=360. Firms with a *uniform* supervisory board (i.e., no female representatives on the board) on average have an ROE of 9.6. Firms with a *skewed* supervisory board (<20 percent females) on average have a significantly lower (p<0.05) ROE of 7.7, while firms with a *tilted* supervisory board (20-40 percent females) and those with a *balanced* supervisory board (>40 percent females) again have a higher average ROE (12.3 and 12.4, respectively) with the difference between ROE in *skewed* as opposed to *tilted* groups being statistically significant in a Mann-Whitney-Test (p<0.05). That is, there is evidence, that skewed boards perform worse than uniform boards, and that tilted boards outperform skewed boards. Hence, if there is a "critical mass" of women on supervisory boards that is needed in order for female representation to positively affect firm performance, this apparently is reached within *tilted* boards – just as proposed by KANTER.

Table 3: Average ROE for different board types according to KANTER

	Uniform Board$_{(t-1)}$	Skewed Board$_{(t-1)}$	Tilted Board$_{(t-1)}$	Balanced Board$_{(t-1)}$
		Mann-Whitney Test		
	z-Statistics	z-Statistics	z-Statistics	z-Statistics
Average ROE	9.6054 (19.9445)	7.6890 (18.9063)	12.2577 (13.8063)	12.4160 (8.0199)
Skewed Board$_{(t-1)}$ (< 20% women)	2.007**			
Tilted Board$_{(t-1)}$ (20–40% women)	-.657	-2.009**		
Balanced Board$_{(t-1)}$ (> 40% women)	-.078	-.405	.274	
No Observations	394	360	79	5

Notes: Standard errors are in parentheses.

*, **, *** Denote significance at the 10%, 5% and 1% levels, respectively.

Source: own compilation.

Our results from the Mann-Whitney Test are mirrored by subsequently performed OLS and RE regression analyses (Table 4) with ROE as the dependent variable and with dummy variables for the different types of boards as defined by KANTER (with *skewed* boards representing the reference category) and a set of further controls. Owing to the missing values, our sample size is reduced to 140 firms. Concerning controls, we find ROE to be positively related to market value and negatively related to board size, while the other controls are unrelated to ROE. With respect to the groups as defined by KANTER, we find that firms with a *tilted* board have a higher ROE than firms with a *skewed* board. The coefficients for the two other group dummies (*uniform* board and *balanced* board) are not statistically significantly different from zero, i.e., having a completely male (*uniform*) or a *balanced* board (40-50 percent women) does not contribute to a higher ROE as compared to having a *skewed* board (<20 percent women).

Table 4: OLS and RE regression with dummy variables for the different board types according to KANTER

Variables	OLS ROE	RE ROE
Uniform board(t-1)	1.2339 (2.3385)	3.7659 (2.3264)
Tilted board(t-1)	5.3564* (3.0855)	5.7445** (3.0855)
Balanced board(t-1)	-1.4547 (5.0027)	-1.1359 (4.1812)
German standard	3.2169 (2.3920)	3.8854 (1.9858)
Market value	.0001* (.0001)	.0002* (.0001)
Codetermination(t-1)	3.7980 (3.8734)	2.6131 (3.7311)
Multiple Directorships(t-1)	-1.8588 (1.1983)	-1.7981 (1.0999)
Board size(t-1)	-.5718* (.2546)	-.4610* (.2490)
Constant	19.7830*** (6.4288)	17.4468*** (6.1943)
No of obs.	630	
No of groups	140	
Year effects	yes	
Industry effects	yes	
Firm effects	yes	
R²	.1144	.1097
Prob>F	4.03***	
Prob>chi² Breusch Pagan Lagrange multiplier test		***
Prob>chi² Hausman test		***
Prob>chi² Test of strict exogeneity		ns
Uniform Board		ns
Titled Board		ns
Balanced Board		ns

Notes: Standard errors are in parentheses.

*, **, *** Denote significance at the 10%, 5% and 1% levels, respectively.

Source: own compilation.

Concluding, the results hint at a critical mass of women being reached in tilted as opposed to skewed groups. Other than pre-defining a critical ratio of female representation, in what follows, we attempt to *endogenously* determine the degree of female representation on supervisory boards at which a potentially negative effect will turn into a positive one by including a linear *and* a quadratic term of gender diversity into the regressions.

2.4.2 ROE and female board representation: In search of the critical mass

Table 5 shows the results of our OLS and RE estimation with ROE as the dependent variable and gender diversity in its linear term (in the a-variants) and also its quadratic term (in the b-variants).

Starting with the controls, our results are quite similar to the regression with the different board types according to KANTER. Market value has a positive impact on performance; whereas, depending on the model, multiple directorships and board size have a negative effect.

Table 5: OLS and RE regression results with gender diversity in its linear and quadratic form

	OLS		RE	
	a	b	a	b
Variables	ROE	ROE	ROE	ROE
Gender diversity$_{(t-1)}$	.9193	-4.8109	-3.1656	-18.2132*
	(4.2027)	(10.0051)	(3.6224)	(10.8816)
Gender diversity²$_{(t-1)}$		7.9657		21.1498*
		(12.1226)		(12.5525)
German standard	2.9982	2.9329	3.6811*	3.6202*
	(2.3941)	(2.3824)	(1.9839)	(1.9679)
Market value	.0002*	.0002*	.0002***	.0002**
	(.0001)	(.0001)	(.0001)	(.0001)
Codetermination$_{(t-1)}$	3.8506	3.9387	2.8181	3.0081
	(3.8890)	(3.8940)	(3.7652)	(3.7569)
Multiple directorships$_{(t-1)}$	-1.9697*	-1.9455	-1.9532*	-1.9021*
	(1.1908)	(1.1940)	(1.0925)	(1.0886)
Board size$_{(t-1)}$	-.6214**	-.5926**	-.5637**	-.4898**
	(.2466)	(.2539)	(.2343)	(.2414)
Constant	21.6896***	21.5214***	22.2146***	21.7679***
	(6.0213)	(6.0497)	(5.6622)	(5.6809)
No observations		630		
No groups		140		
Year effects		Yes		
Industry effects		Yes		
Firm effects		Yes		
R²	.1088	.1095	.1042	.1036
Prob>F	***	***		
Prob>chi²			***	***
Breusch Pagan Lagrange multiplier test				
Prob>chi²			***	***
Hausman test				
Prob>chi²			ns	ns
Test of strict exogeneity				
Gender diversity			ns	ns
Gender diversity²				ns

Notes: Standard errors are in parentheses. *, **, *** Denote significance at the 10%, 5% and 1% levels, respectively.

Source: own compilation.

Concerning the relation between gender diversity and ROE, our RE regression in fact confirms it to be non-linear and concave. Figure 1 plots the link between gender diversity and ROE according to the RE estimation including the quadratic term (model 2b in Table 5) and shows it to be U-shaped. The graph displays a global minimum at a normalized Blau Index of about 0.4 (corresponding to a share of women on the board of about 10 percent) and shows increasing performance levels starting from there. Only at a Blau index of about 0.85 (corresponding to a ratio of about 30 percent women on the board) ROE reaches the level of *uniform* boards with only male representatives. That is, we find evidence of the "critical mass" of female representatives on the board to be reached at a share of about 30 percent. Over and above this threshold, the performance of a more diverse board exceeds the one of a completely male board.

Figure 1: ROE and gender diversity
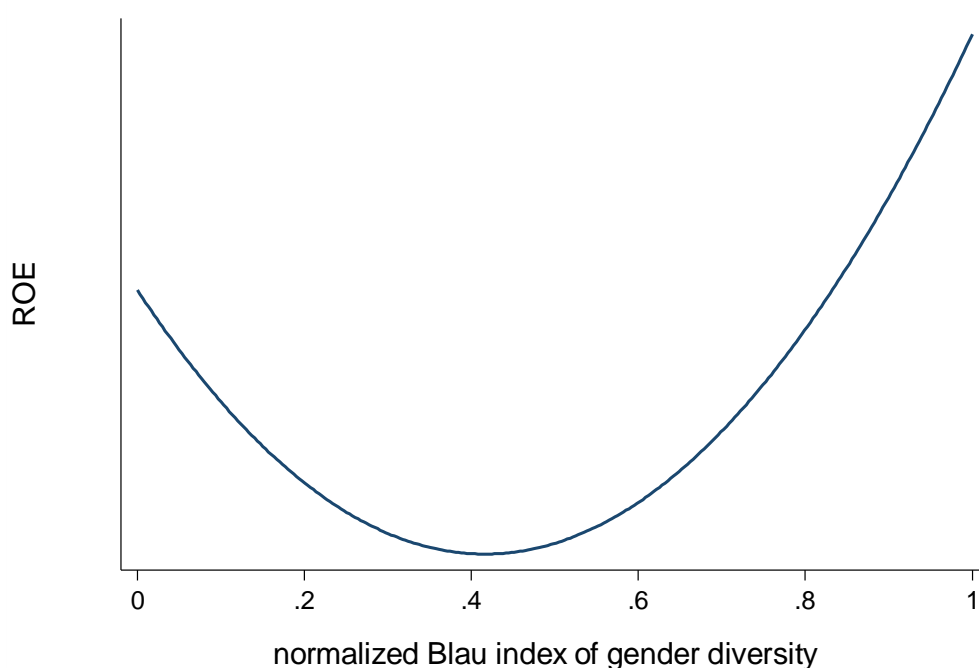
Source: Own data

As our finding of a U-shaped relation between gender diversity and firm performance does not prove to be robust with respect to other performance measures and/or a different set of controls, our evidence on a "critical mass" of 30 percent female representatives is to be regarded rather tentative. However, as we will show below, our results are not only supported by the fact that a 30 percent female representation lies within the spectrum of KANTER's *tilted* groups but also by the recent literature on a supposedly "magic" number of three women on the board (KONRAD/KRAMER/ERKUT 2008).

2.4.3 A magic number?

With board size in our sample averaging 11.45, the critical percentage of about 30 percent women on the board translates into an absolute critical mass of on average three women. Strikingly, this is exactly what TORCHIA/CALABRÒ/HUSE (2011) find in their recent analysis on female board representation and firm innovativeness: When there are three or more women on the board, firm innovativeness is higher than when there are less than three women on the board. Similarly, based on an interview study with 50 women directors and building on KANTER's theory, KONRAD/KRAMER/ERKUT (2008) as well as KONRAD/KRAMER (2006) recently suggested the critical mass of women in the boardroom to be equal to three.

In what follows, we further substantiate our results, linking our analysis to the above cited studies. In our analysis, we distinguish firms with (a) no woman on their supervisory board from firms with (b) one woman on the board, (c) two women on the board, and (d) three or more women on the board. One woman on the board (b) corresponds to our global minimum of about 10 percent female board representation, and three or more women on the board (d) correspond to our critical mass of female board representation of about 30 percent. Again, we run OLS and RE regressions (Table 6); the reference category is boards with only one woman (b).

We find that having three or more women on the board significantly increases ROE as compared to having only one woman on the board. Unlike the preceding analysis, we find this result to be robust to the use of different performance measures (e.g., Tobin's Q or PTBV) and/or control variables. Hence, our study is well in line with the recent literature on a critical mass of "three" as the "magic" number of women on the board, thus substantiating our preceding analysis.

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Table 6: OLS and RE regression with dummy variables for different numbers of women on the board

Variables	OLS ROE	RE ROE
No woman$_{(t-1)}$	3.8219 (2.3421)	1.8328 (2.4364)
2 Women$_{(t-1)}$	2.7782 (2.3008)	2.0557 (1.9627)
3 or more women$_{(t-1)}$	7.4753** (3.2676)	5.1895** (2.2620)
German standard	2.7431 (2.3619)	3.6323 (1.9734)
Market value	.0001* (.0001)	.0002* (.0001)
Codetermination$_{(t-1)}$	4.0168 (3.8446)	2.7896 (3.7514)
Multiple directorships$_{(t-1)}$	-1.9548* (1.1750)	-1.9228* (1.0812)
Board size$_{(t-1)}$	-.6843*** (.2579)	-.5445*** (.2439)
Constant	20.6137*** (6.3650)	18.5663*** (6.0231)
No observations	630	
No groups	140	
Year effects	yes	
Industry effects	yes	
Firm effects	yes	
R²	.1186	.1130
Prob>F	4.29***	
Prob>chi²		***
Breusch Pagan Lagrange multiplier test		
Prob>chi²		***
Hausman test		
Prob>chi²		ns
Test of strict exogeneity		
No women		ns
Two women		ns
At least three women		ns

Notes: Standard errors are in parentheses.*, **, *** Denote significance at the 10%, 5% and 1% levels, respectively.

Source: own compilation.

2.5 Discussion and Conclusions

In our study, we explored the relation between gender diversity in the boardroom and firm performance based on critical mass theory. While the existing literature that builds on critical mass theory *exogenously* (and rather arbitrarily) defines the percentage of women on boards which is judged to be "critical" as being reached in tilted groups with 20-40 percent women, we attempt to determine the critical mass of women on boards *endogenously* by adding a quadratic term into the regression analysis. Further, we add to the existing empirical literature on board composition and firm performance by explicitly accounting for potential problems of endogeneity with the help of a panel data set. Last but not least, our analysis is based on the supervisory boards in a dualistic corporate governance system which up to now – for the case of Germany – mostly concentrated on the role of employee or bank representatives (see e.g., BERMIG/FRICK 2011a; FAUVER/FUERST 2006 for the former and DITTMANN/MAUG/SCHNEIDER 2010 for the latter) and where only very recently gender issues have been tackled (LINDSTAEDT/WOLFF/FEHRE 2011; OEHMICHEN/RAPP/WOLFF 2010; BERMIG/FRICK 2010).

In accordance with critical mass theory, we find *skewed* supervisory boards to be outperformed by *tilted* supervisory boards, i.e., we find evidence for the critical mass of women in boards to be reached in tilted groups with a percentage share of women between 20 and 40 percent. Aiming at an endogenous determination of what represents the critical mass of women in the boardroom, we subsequently analyze the relation between gender diversity in supervisory boards and firm performance explicitly allowing for non-linearities. In fact, we find evidence for a U-shaped link between gender diversity on the board and firm performance: Apparently, it needs a critical mass of women on the board in order to realize the advantages a more diverse board may offer. We find this critical mass to be in the range of about 30 percent female representation on the board – i.e., a clear case against tokenism on boards. Further, we find evidence of this critical mass to translate into a "magic" number of three women in the boardroom and hence lend support to the recent studies by TORCHIA/CALABRÒ/HUSE (2011), KONRAD/KRAMER/ERKUT (2008) and KONRAD/KRAMER (2006).

As for the managerial implications of our study, our results suggest that a more gender diverse board composition will only enhance performance if diversity is sufficiently large (10 + percent female representation) and that only for boards with a critical level

of 30+ percent females (3+ women on the board), performance will be over and above the one of male boards. At very low levels of gender diversity (below 10 percent female representation), an increase in diversity might even be associated with reduced firm performance.

Concerning political implications, our study suggests that – unless there are no restrictions on the supply side – female representation in the boardroom should be in the range of 30+ percent. The question whether a women quota should be legally enforced or not, however, goes beyond the scope of our article. Drawing our data from a legal context without a women quota, we are not in a position to judge whether the established link between board diversity and performance would also exist in a system where women were appointed *only* because of the quota and not because of the knowledge and expertise they bring into the board. For example, the study by AHERN/DITTMAR (2012) suggests that women who are appointed to a board due to a quota are, on average, younger and have less CEO experience than their male counterparts – which might in fact hint at restrictions on the supply side of eligible women that are ready and qualified to serve on supervisory boards.

As usual, our study also has several limitations. First, with a period of five years, our analysis is based on a quite short time period. Further studies may want to concentrate on longitudinal panel data covering a longer time span. Second, we study the link between board diversity and performance within one special national context (the German system with a two-tier board structure and codetermined supervisory boards). As GROSVOLD/BRAMMER/RAYTON (2007) stress, the institutional and cultural context might be of importance when analysing board diversity and its effects. Hence, further studies should incorporate cross-country analyses.

3. How to Get Women on Board(s)? The Role of a Company's Female Friendly Culture

Abstract: I study whether having won a working mother award increases the chances to attract female board members in a company. Recently, mandated gender quotas for boards of publicly-traded firms are discussed all over Europe. One of the consequences of a mandated gender quota is a rising demand for qualified female board members so that women might choose which board they join. Potential female board members might look for signals of a female friendly culture. Having won a working mother award can show a female friendly culture in an organization and therefore increases the percentage of female board members. I find support for my hypothesis using a sample of 199 listed companies in different European welfare states (Germany, Italy, Sweden, and the United Kingdom) from 2002–2011.

3.1 Introduction

During the last few decades, there has been a growing public interest in the representation of women on boards (see HOLST/KIRSCH 2014; KONRAD/KRAMER 2006). Recently, there have been intense debates on women quota laws in European countries. To foster a growing representation of women on corporate boards, many European countries have already enacted fixed women quotas for corporate listed companies. Since Norway imposed a law in 2003 requiring public-limited companies to fill at least 40 percent of their board positions with women by 2008 (see AHERN/DITTMAR 2012), more and more countries have instituted women quotas for listed companies (see ADAMS/KIRCHMEIER 2013).

To comply with the law, companies increasingly face the challenge of attracting qualified potential female board members. Since qualified women in the top ranks are currently scarce (see FARRELL/HERSCH 2005), companies may have problems in finding qualified female board members to ensure a fixed women quota- as the Norwegian examples shows. According to AHERN/DITTMAR (2012), the newly appointed female directors in Norway are wives, daughters or sisters of existing directors or they are former female directors with multiple directorships, which indicates that it is difficult to attract qualified female candidates. This suggests that targeting a high percentage of women in corporate boards by enacting a women quota does not fully address the underlying causes of female underrepresentation in corporate leadership. Therefore, it is important to have a good understanding of how to make a board position attractive for women.

Studies investigating the reasons why directors accept or refuse particular board memberships find that these reasons differ between female and male directors. According to MOHAN (2014), one reason for the underrepresentation of women in corporate boards is that a career in a publicly traded corporation is not attractive enough for women, and that they decide against a boardroom position. The resulting question is what makes a boardroom position attractive for women. In their qualitative study, SETHI/SWANSON/HARRIGAN (1984) find fit with spouse and children as an important reason for female directors joining a board in the US. The McKinsey study by DESVAUX/DEVILLARD/SANCIER-SULTAN (2010) also finds programs that help to reconcile work and family life are one effective way to achieve a higher representation at the top of European corporations. In sum, potential female board members who have

choices about a boardroom position might be more likely to choose companies that support the compatibility of work and family.

The primary goal of this paper is to analyze if and how companies can attract female board members by signaling a female friendly culture. Theoretically, having won a working mother award might act as a signal to potential female directors, indicating that the firm pays attention to a female friendly culture. Empirically, I analyze whether companies that have won a working mother award have a higher percentage of female directors in their corporate boards using a sample of 199 publicly traded companies in four different European countries (Germany, Italy, Sweden and the United Kingdom) from 2002–2011.

The structure of the paper is organized in the following manner. In section 2, I review the relevant literature on what determines the percentage of women on corporate boards. Section 3 derives the hypothesis regarding the relation between having won a working mother award and the percentage of female directors using a reversed signaling approach. Section 4 provides descriptive statistics and the results of the empirical model. Section 5 discusses the results and concludes.

3.2 Literature Review

Previous research has put forward a number of reasons why to nominate women to corporate boards. As noted by TERJESEN/SEALY/SINGH (2009), the vast majority of studies investigating women on corporate boards consider female representation on boards of directors to be exogenous, and focus on the outcomes. Besides ethical and social issues, women bring different abilities, perspectives, and values into the boardroom, which have been shown to potentially enhance performance (for a review see POST/BYRON 2014; JOECKS/PULL/VETTER 2013). Also, firm reputation might be positively affected (see WILLIAMS 2003; BRAMMER/MILLINGTON/PAVELIN 2009; BEAR/RAHMANN/POST 2010).

In addition, other researchers have focused on the underlying mechanism why there might be a relation between women on corporate boards and firm performance. Some studies focus on the characteristics of female board members and find women to have a more "questioning attitude" (HUSE/NIELSEN/HAGEN 2009) and a more process-oriented working style (see HUSE/MINICHILLI/SCHONING 2005). Regarding the demographic characteristics for example, RUIGROK/PECK/TACHEVA (2007) find that female

board members on Swiss corporate boards are younger and less educated than their male board members. This result is in line with findings by AHERN/DITTMAR (2012). They report that due to the quota regulations boards of Norwegian listed companies consist of younger and less experienced board members. The difference between male and female board members might be an indication for the problems companies face in finding qualified female board members to ensure a mandated women quota.

To date there is little empirical evidence on the question how a company might increase their chances to attract female board members. A limited number of studies have shed light on the determinants of a higher female representation on corporate boards. These studies consider the determinants associated with the likelihood of women being added to corporate boards. They emphasize the importance of firm size, board composition, and industry sector on higher female representation on corporate boards. For example, HILLMANN/SHROPSHIRE/CANNELLA (2007) and GEIGER/MARLIN (2012) provide evidence of an impact of organizational size on the likelihood of female representation on boards of directors for U.S. companies. In the European context, NEKHILI/GATFAOUI (2013) find a positive relationship between women directors and board size in a sample of French firms.

While the existing empirical research only very recently focus on the determinants of a higher representation of women on boards, my study contributes to the literature by looking at the role of a female friendly culture. Due to internal preferences and external pressure on companies, there will be a rising demand for potential female board members. However, companies might face availability constraints; since studies from Norway show women at the very top of the corporate hierarchy are still scarce (see AHERN/DITTMAR 2012). Women might have choices regarding whether to serve on a board. A female-oriented culture might increase the chances to attract female board members in a company. I extend existing literature by taking into account winning a working mother award as a signal for a female friendly culture for potential female directors. Such a perspective will allow companies to attract potential female board members in the future.

3.3 Hypothesis

A common argumentation is that a barrier for a higher representation of women on corporate boards is that women are excluded due to the organizational culture. Indeed,

most research finds empirical evidence that gender stereotypes and prejudiced attitudes play a role in explaining the low number of women on corporate boards (see e.g., OAKLEY 2000). However, women also often voluntarily decide against a corporate management position because they are not attracted to them (see MOHAN 2014). Women have a preference for a particular working culture (see VAN VIANEN/FISCHER 2002: 316). Given the increasing demand for more women in the boardroom, qualified potential female board members will have a choice to select the most attractive firms.

Self-selection, in terms of motives, preferences, or self-views, may eventually play an equally or even more important role when it comes to the appointment of women on boards than selection by others. According to JUDGE/CABLE (1997), persons are attracted to organizations that share similar values, needs, and preferences. Perceived person organization fit is important for the effective socialization of team members (see BRADDY/MEADE/KROUSTALIS 2006). The study by THOMAS/WISE (1999) on female and male MBA candidates indicate that female professionals value diversity more highly than males did in their assessments of an organization's attractiveness. A recent analysis of interviews with human resource directors of a dozen companies revealed that one of the most effective initiatives to increase women's participation in the boardroom is to implement measures to facilitate the work-life balance (see DESVAUX/DEVILLARD-HOELLINGER/BAUMGARTEN 2007). These studies stress the importance of self-selection of potential female board members in a company that signals a culture congruent with their own preferences.

In theory, work-family conflicts apply to both sexes alike, but they continue to place additional challenges on working women. According to the theory on social structure of the family (see PARSONS 1949), individuals learn from childhood to adapt to certain roles. Women are responsible for family and housework, whereas men specialize in work. PARSONS/BALES (1955) argue that due to the biological fact that women bear children, the functional asymmetry of gender roles is inevitable. Women consider domestic work and child care responsibilities to be more important than enhancing a career. Therefore, women more often interrupt their working lives in order to fulfill their domestic duties and child-rearing (see BARNETT/HYDE 2001: 782). Further recent studies on the division of domestic work and caring responsibilities show that mothers typically invest more time in child raising and household activities than fathers (see e.g., FINDEISEN 2011; SAYER 2005). Because the majority of household activities are

fulfilled by women, female employees demand a higher degree of flexibility in their professional lives and value practices that combine work and family to a greater extent than male employees.

Organizational culture in the boardroom can be described as masculine orientated e.g., competition, individualism, and the prioritization of career over family is valued (see ROSENER 1995; WILSON 1998). Male directors might expect different experiences in their professional life compared to female directors (see GANESH/GANESH 2014). Recent studies show that women have weaker preferences for a competitive environment compared to men (see e.g. CATANZARO/MOORE/MARSHALL 2010; NIEDERLE/VESTER-LUND 2007; VAN VIANEN/FISCHER 2002). According to MAIER (1999), in a feminine-oriented culture, there is an emphasis on maintaining balance in life activities. The central conclusion drawn from this literature is that culture in the boardroom is based on organizational practices that promote images of leadership, views of self, and forms of communication that are more frequently adhered to by male directors than by female directors.

In the original signaling model, SPENCE (1973) noted how employees can invest in signals that disclose their non-observable quality to employers. SCHMIDTKE (2002) and BACKES-GELLNER/TUOR (2010) reversed the original signaling model and explained how companies can send signals of a non-observable culture in a company and therefore attract potential employees. For example, they argue that the observable characteristic of the existence of apprenticeship training can be a signal for non-observable characteristics, such as career prospects and interesting tasks at the workplace. In what follows, I apply the model of reversed signaling to the context of a female-oriented culture.

To apply the reversed signaling model, the following conditions must hold. The first condition is that a firm's characteristics are not directly observable, e.g., potential female directors cannot observe directly if a company is female friendly. Indeed, for potential female members, it is difficult to observe a female friendly culture, and it becomes apparent only after they have worked on the board for some time. The second condition is that it is not easy to reliably communicate a female friendly culture at a firm. The third condition concerns the risk to the potential female board member to accept a board position without reliable information on the non-observable characteristic of a female friendly culture. Female employees expect values, such as intrinsic

significance, social significance, and meaning at their workplace (see SCHWARTZ 1989: 67f.). This means there might be a board position where these values are fulfilled and others where they are not. This assumption implies that a woman has at least two offers to join a board (i.e., which would seem to be a reasonable assumption), and she must choose between them. The choice of a board position allows potential female board members to reduce their risk by looking for signals of a female friendly culture. Therefore, the company might want to send a signal of a female friendly culture.

A signal of a female friendly culture might be the having won a working mother award. Different magazines, such as *Working Mother* or *BusinessWeek* nominate companies on different criteria, such as flexible working time, daycare services, and employee leave (e.g., additional maternity leave and generous vacations). Therefore, the ratings are based on the external analysis of company policies. The nomination of a working mother award might be an effective signal for a female friendly culture for several reasons. Whereas flexible working times, daycare services, and employee leave are single additive practices, having won a working mother award is an aggregate variable. According to BECKER/GERHART (1996), work-family practices become effective when they are offered as a bundle. Only companies that fulfill several criteria of family-friendliness will win a working mother award, so the award might be a good portrayal of the company's culture. Moreover, the process of building a family supportive culture is not a short-term issue (see GIARDINI/KABST 2008). If a company wins a working mother award, it can be assumed that it implemented a bundle of work-family practices over a certain time period.

When assuming that having won a working mother award is a signal for a female friendly culture, a few requirements must be met. Firstly, as noted by SPENCE (1973), a signal will only be valid if there is a negative correlation between signaling costs and non-observable characteristics. The non-observable characteristic under consideration is a female friendly culture. Winning a working mother award comes with a cost. The costs of producing the signal must be higher for firms without a female friendly culture than for those that do have a female friendly culture. Providing many work-family practices and being nominated for it is something in which the company must invest. Costs can be measured not only in terms of money but also in terms of time. It is not possible to invest in this signal for every firm because for example the provision of

child care services comes with direct monetary costs. Time is needed for the management to implement a bundle of work-family practices. It is therefore reasonable to assume that for companies with a less female friendly culture, it might be more time-consuming and costly to implement work-family practices and getting a nomination than for a company with an existing female friendly culture. While implementing various work-family practices the potential for conflict with the management and the employees might be much stronger and more frequent for companies with a less female friendly culture. Practices such as the provision of child care services in a company with a less female friendly culture might not be recognized and utilized by a large proportion of the employees. The process of a female friendly culture building is not a short-term issue. Only over a longer period of time utilization rates of child care services might increase. Secondly, the signal must be observable. A potential female board member must be able to easily and reliably find out about if the firm under consideration has won a working mother award or not. This is the case: Companies are externally nominated for the award, and if they win it, their homepage will provide that information. Thirdly, the signal must be a matter of choice. There is no law that requires companies to implement work-family practices and participate in the nomination process. Even if companies are externally nominated with a working mother award, only companies that have developed "portfolios" of work-family practices have the chances to win the award. Thus, winning a working mother award is not given and might be a signal for a female friendly culture to potential female board members.

If one expects a working mother award to be an effective signal for a female friendly culture, then one would expect firms that have won a working mother award to have more women in the boardroom.

Hypothesis: Companies that have won a working mother award are more likely to have a higher percentage of women on their corporate boards.

3.4 Methods

3.4.1 Sample

The initial sample in my study consisted of an unbalanced panel of 199 listed firms in Germany, Italy, Sweden, and the United Kingdom, which I observed over a ten-year period (2002-2011). In the sample, 30 firms were listed in the German DAX index, 40 in the MIB Italy, 29 in the OMX Stockholm, and 100 in the British FTSE100. The four

European countries represent, according to ESPING-ANDERSEN (1990, 1999), a wide range of different work patterns of men and women as well as benefits provided by the state. In addition, whereas the board system in Germany and in Sweden is co-determinated and boards comprise member elected by shareholders and by employee representatives, the board system in Italy and the United Kingdom is not co-determinated (see ADAMS/KIRCHMEIER 2013). Nevertheless, governmental approaches to increasing the representation of women on boards of directors are quite similar in the countries included in my analysis (see ADAMS/KIRCHMEIER 2013). All countries refer to a higher representation of women on boards in their corporate governance codes; Germany and Italy impose a law regarding women quotas by 2015 (see ADAMS/KIRCHMAIER 2013). Therefore, the sample consists of composite picture of female representation on corporate boards across a wide range of countries in Europe.

The data was taken from Asset4, a Thomson Reuters database. This database collects information from publicly available sources such as CSR reports, annual reports, and company websites. Information on the different controls was taken from diverse sources (e.g., Thomson Financial Datastream, DEUTSCHE BÖRSE (2010), and firms' annual reports).

3.4.2 Variables

The *dependent variable* is the percentage of female board members. The central *explanatory variable* is a dummy variable for having won a working mother award. The variable working mother award equals 1 if a company has won a working mother award, 0 otherwise. Companies were nominated for the working mother award based on four categories: flexible working time, daycare services and employees' leave (e.g., additional maternity leave and generous vacations). Besides using year, country, and industry dummies as controls, I also included a set of board- and firm-related variables that are correlated with the representation of women on boards according to the literature: percentage of female managers in a company (see MATSA/MILLER 2011; BILIMORIA 2006); board size (see GEIGER/MARLIN 2012; ADAMS/FERREIRA 2009; or FARRELL/HERSCH 2005) and founding year (see GEIGER/MARLIN 2012; HILLMANN/SHROPSHIRE/CANNELLA 2007). The percentage of female managers might be positively related to the number of female directors on the board because female managers in a company may become potential board members. Board size is measured by the number of members on the board. The size might be positively related to female

board members: Recent empirical literature shows that the larger the board, the higher the percentage of women on the board (see GEIGER/MARLIN 2012; ADAMS/FERREIRA 2009). Regarding founding year, it might be the case that older companies are less likely to view women as a valuable and needed resource and are less likely to have women on their boards (see GEIGER/MARLIN 2012). The industry dummies are defined utilizing the nine supersectors of the Deutsche Börse (2010). Companies are categorized into one of nine supersectors which are: Basic Materials, Consumer Goods, Consumer Services, Financials, Industrials, Information Technology, Pharma& Healthcare, Telecommunication and Utilities.

3.4.3 Analysis

In analyzing the impact of the nomination of a working mother award on the percentage of female board members, the most challenging point is reversed causality. One might argue that female directors are more likely to bring about a change in work family politics ultimately leading to a working mother award. To address potential causality problems, I use a panel dataset and lag the central explanatory variable nomination with a working mother award by one year and alternatively by three years. Using the lag of the explanatory variables helps to identify the direction of causality. Even if I cannot fully rule out endogeneity problems for unobservable variables those change over time, by using the FE estimator I can control for all unobservable factors that are time invariant. First, I use the pooled Ordinary Least Square estimator with robust standard errors. I present these results as a benchmark. Since firm fixed effects are jointly significant in all estimated models and Hausman tests reject the null hypothesis of no systematic differences with random effects estimates, I only present the OLS and the FE estimator.

In order to provide consistent effects for the coefficients, the strictly exogenous assumption must apply e.g. the lagged variables must be strictly exogenous conditional on our independent variables, and the unobserved effects must be uncorrelated not only with the error term in the current period but also in the lagged periods. By incorporating the lead of the endogenous variable in the regression, I test for strict exogeneity. As I cannot find the lead of the variable winning a working mother award to have a significant effect on the percentage of female board members I conclude that the results of the FE Modell are consistent.

3.5 Results

Table 7 shows the summary statistics for all variables included in the analysis at firm-year level. The average percentage of female board members is 13.5 percent ranging from 0 percent to 64 percent and doubling in time from about 7 percent in 2002 to about 14 percent in 2011. In Sweden, female board members fill on average 21 percent of all board seats whereas in Italy female board members only fill on average 2.8 percent of all board seats. These results are similar to the results by TERJESEN/SINGH (2008). Their cross country research highlights significant variation across countries, i.e. female board representation varies from as low as about 2 percent in Italy to as high as about 12 percent in Sweden in 2004. Roughly 5 percent of the companies have won a working mother award. The average percentage of female managers in a company is 24 percent ranging from 0 percent to 79 percent. On average, a board consists of about 14 board members ranging from 6 to 28. Founding year varies from 1472 until 2011.

As to the industry distribution, more than half of the firms belong to Industrials (23.5 percent) followed by Financials (22.1 percent) and Consumer Goods (12.5 percent). The lowest percentage of female board members can be found in industries of Industrials (9.7 percent) and Basic Materials (5.8 percent). Recent empirical literature also finds that female directors are more prevalent in Financials than in Industrials (see ADAMS/FERREIRA 2009).

Table 7: Summary statistics for all variables at firm-year level

Variable	Obs	Mean	Std. Dev.	Min	Max
Female board members (%)	734	13.531	10.879	0	63.64
Working mother award$_{(t-1)}$	687	.068	.253	0	1
Working mother award$_{(t-3)}$	569	.056	.231	0	1
Female managers (%)	739	23.744	13.611	.12	79
Board size	735	13.668	4.023	6	28
Founding year	732	1926.052	83.256	1472	2011

Source: own compilation.

Table 8 provides the Pearson correlation matrix of the included variables. Regarding the dependent variable percentage of female board members and the central explanatory variables having won a working mother award$_{(t-1)}$ and having won a working mother award $_{(t-3)}$, there is a positive and statistically significant correlation (r = .12*** and r=.13*** respectively). This might be a first hint that having won a working mother award increases the percentage of female board members in the long run. Additionally, I find statistically significant and positive correlations between the dependent variable percentage of female board members and the control variable percentage of female managers (r=.32***). Thus the percentage of female managers seems to increase the percentage of female board members. Interestingly, the control variable board size is slightly negatively related with the percentage of female board members (r=-.04*) and also the variable founding year is not statistically significantly related to my dependent variable. As to potential interrelations, the explanatory variable working mother award is positively related to board size (.10***) i.e., larger firms are more likely to win a working mother award. There is no correlation with the variable percentage of female managers. Concerning interrelations between the different controls, there are no striking correlations. In order to test for potential multicollinearity, I examined the variance inflation factors (VIF). As all VIF values were below 2.37, there is no multicollinearity problem.

Table 8: Pearson correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Female board members (%)	1					
(2) Working mother award$_{(t-1)}$	.120***	1				
(3) Working mother award$_{(t-3)}$	.126***	.437***	1			
(4) Female managers (%)	.321***	.027	.068	1		
(5) Board size	-.044*	.110***	.121***	-.131***	1	
(6) Founding year	.004	-.005	.008	.084**	-.060**	1

*** p<.01, ** p<.05, * p<.1

Source: own compilation.

Figure 2 displays the percentage of female board members in the time period five years before a company has won a working mother award and five years afterwards. As can be seen, the percentage of female board members increases after having won a working mother award. Whereas the graph renders first tentative hints of a positive effect of having won a working mother award on the percentage of female board members, the following regression analyses take further potential time trends and control variables into account.

Figure 2: Percentage of female board members before the company won a working mother award and afterwards
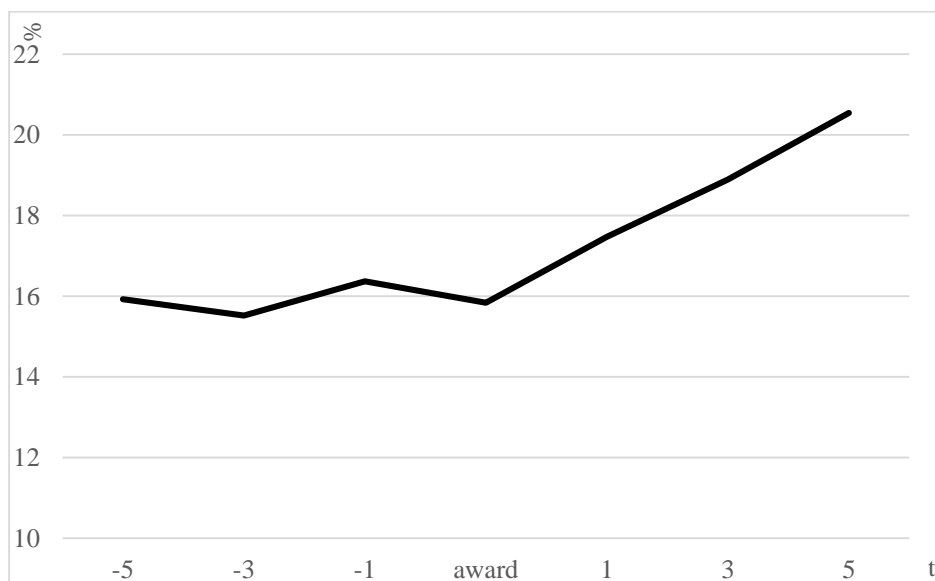
Source: own data

Table 9 shows the main results of the OLS and FE estimation with the percentage of females on boards as the dependent variable. As a result of missing values I have n= 675 observations when lagging the explanatory variable having won a working mother award for one year and n=559 observations when lagging it for three years. Starting with the controls, depending on the model and the lag, the results are similar to previous studies. Both, the percentage of female managers (see BILIMORIA 2006) and board size (see GEIGER/MARLIN 2012; NEKHILI/GATFAOUI 2013) are positively related to the percentage of female directors on boards. Furthermore, I find significant industry, country, and year effects.

The hypothesis suggests that companies that win a working mother award are more likely to have a higher percentage of women in their corporate boards. In models with a lag of one year, I find no significant effect of having won a working mother award on the percentage of female employees. In models with a lag of three years, I find a positive effect of having won a working mother award on the percentage of female board members. Therefore, concerning the positive linear relation between the nomination with a working mother award and female board members, the regression results partly confirm the hypothesis. Companies that have won a working mother award have more female directors on their boards three years later.

For further robustness of the results, I ran several alternative analyses. First, I ran the regression models with a lag of two and alternatively with a lag of four years in the explanatory variable working mother award. I find insignificant effects for the lag of two years. The results of the model with a lag of four years lead to similar conclusions than the lag of three years indicating the direction of causality. The positive effect on the percentage of female board members for a larger time lag might be explained by the fact that board members are also appointed to a board with a certain time lag e.g. approximately every four years in the German context (see §102, Stock Cooperation Act (AKTIENGESETZ 2010)). These findings reflect that the change in particular board compositions needs some time to be influenced by a working mother award.

Second, I conduct the same regressions with the number of female board members instead of the percentage of female board members. The results with the number of female board members as the dependent variable do not differ in their sign and significance level.

Table 9: OLS and FE regression results

	OLS		FE	
	Female board members (%)	Female board members (%)	Female board members (%)	Female board members (%)
Working mother award$_{(t-1)}$	3.595 (1.40)		.323 (.16)	
Working mother award$_{(t-3)}$		4.285* (1.80)		2.345** (2.33)
Female managers (%)	.171** (2.20)	.184** (2.47)	-.076 (-1.45)	-.075 (-1.13)
Board size	-.050 (-.42)	-.041 (-.31)	.257 (1.59)	.417* (1.82)
Founding year	.005 (.98)	.001 (.28)	. .	. .
Sweden[a]	12.66*** (6.10)	13.56*** (6.70)	. .	. .
Italy	-8.658*** (-6.47)	-7.677*** (-5.93)	. .	. .
United Kingdom	1.260 (.85)	2.522* (1.72)	. .	. .
_cons	-6.474 (-.63)	3.036 (.31)	10.05*** (3.81)	6.128* (1.68)
Year effects	yes	yes	yes	yes
Firm and industry effects	yes	yes	yes	yes
No obs.	675	559	675	559
No groups	128	124	128	124
R²	.50	.53	.10	.11
Prob>F			***	***
Hausman Test			***	***

a reference country is Germany
t-statistics are in parentheses. $^* p < .10, ^{**} p < .05, ^{***} p < .01$
Source: own compilation.

3.6 Summary and Discussion

Based on the discussion of a gender quota of the European Commission there might be a shortage of qualified female board members in the future in the European boards. Little research on women on corporate boards examines determinates of high female representation in corporate boards. Previous literature focuses on either outcomes of gender diversity or on the characteristics of female board members. The few studies that focus on determinants of female representation on corporate boards examine the importance of firm size, board composition, and industry sector (see e.g. NEKHILI/GATFAOUI 2013; GEIGER/MARLIN 2012; HILLMANN/SHROPSHIRE/ CANNELLA 2007). Given the external pressure for more women on boards, further aspects are gaining importance. Taking a first step to fill this research gap, I adopt a reverse signaling approach to examine the determinants of female representation on corporate boards, concentrating on the effect of having won a working mother award.

Reversed signaling theory suggests that firms can send signals to recruit and attract potential employees or board members respectively. These might look for observable signals revealing information on non-observable characteristics. Potential female board members might interpret a working mother award as a signal of a female friendly culture and self-select into a corresponding board position. Empirically, I find that when a firm has won a working mother award, it is more likely to have female board members within three years. Although my dataset does not make it possible to directly observe the dissemination of work-family practices or whether the award meets the demands of potential female directors, my empirical results show consistency with the signaling approach.

In addition, my findings provide support for previous research results that certain organizational variables, such as board size, have an effect on the female representation of corporate boards. Larger board size is associated with a higher percentage of female board members. Furthermore, my results also show that female representation on corporate boards varies cross European countries. Although female board members are also fairly underrepresented in Sweden, other countries, such as Italy, lag far behind. Analyzing cross-country differences as a determinant for higher female representation may be an interesting avenue for future research.

My findings suggest that if companies experience difficulties in filling their board positions with qualified female candidates, it can be helpful to create a female friendly culture. While these findings provide the first tentative implications for a corporate strategy, they also call for more research in this area. Qualitative research is needed to understand how potential female board candidates decide on a board position. By recording their attitudes and behaviors, qualitative interviews with female board members about their motivation to join a board can provide deeper analyses.

4. Comparing the Provision of Work-Family Practices across Welfare States and Industries and Testing Their Impact on Extraordinary Turnover

Abstract: Using a sample of 199 listed companies in different European countries (Sweden, Germany, Italy, and the United Kingdom) from 2002–2011, this paper focuses on the differing provision of work-family practices across welfare states and industries and on testing their impact on extraordinary turnover. This study examines the effect of these practices on extraordinary employee turnover, defined as above average or below average employee turnover per year and by country and industry. Differences in the provision of work-family practices necessitate recognition and reconciliation as these practices affect employee turnover in the context of country and industry. The results first show statistically significant differences in the provision of work-family practices across welfare states and industries. Second, the findings support a statistically significant relationship between extraordinary employee turnover and certain practices, such as providing daycare services; however, practices including generous vacations and additional maternity leave have no effect. Possible endogeneity problems are addressed using a longitudinal dataset.

Keywords

Turnover, work-family practices, welfare state, industry

JEL

J22, J16

4.1 Introduction

In the last few decades, the provision of work-family practices in organizations has become a highly discussed topic in academic and practical debate (see e.g., DEVEN/MOSS 2002; MEYERS/GORNICK 2003). The increase in the percentage of female employees, single parents, and dual-income couples in the workforce highlight the relevance of work-family practices (see PASAMAR/ALEGRE 2014). Due to these changes in the workforce, unbalanced relationships between work and family have emerged. The incompatibility of work and family often leads to poor performance outcomes for individual employees, families and organizations (see KALLIATH/BROUGH 2008). The provision of work-family practices by organizations might be an efficient way to allow employees to better reconcile work and family life (see SALTZSTEIN/TING/SALTZSTEIN 2001). In this context, it is important to deepen discussion on the issue of work-family practices.

To date, few studies have investigated the conditions that favor the provision of work-family practices on the organizational level. Previous studies focus on the characteristics of firms adopting work-family practices, such as firm size (see INGRAM/SIMONS 1995), number of female employees (see POELMANS/CHINCHILLA/CARDONA 2003), sector (see DEN DULK et al. 2013) or country (see DEN DULK 2001; DEN DULK/PETERS/POUTSMA 2012). Thus far, industry characteristics have been neglected in this discourse.

Besides external conditions that result in a higher provision of work-family practices, positive effects might also motivate companies to further concentrate on these practices. To measure a company's success in retaining its workforce, employee turnover might serve as an effective barometer (see YANADORI/KATO 2009). Existing empirical studies regarding the effect of work-family practices on turnover primarily rely on non-European-based data. For a sample of US-companies, BAUGHMAN/DINARDI/HOLTZ-EAKIN (2003) find that work-family practices decrease employee turnover. Studies conducted in Asian countries also indicate a negative relationship between work-family practices and employee turnover, with work-family practices reducing turnover (see e.g., LEE/KIM 2010; NGO/FOLEY/LOI 2009; YANADORI/KATO 2009). Most empirical studies investigate the impact of work-family practices on employee turnover using data collected in a single industry within a single country (see

e.g. LEE/HONG 2011). Other studies use data on employee turnover from multiple industries in one country (see e.g., HUSELID 1995; YANADORI/KATO 2009). However, very little attention has been paid to the effects of these practices on employee turnover across countries and industries. Furthermore, previous studies mainly use cross-sectional data. With cross-sectional data, it is hard to establish a causal relationship between a company's provision of work-family practices to reduced employee turnover rates. Longitudinal data may address potential endogeneity problems.

I try to fill the gaps left by earlier research by using a sample from an unbalanced panel dataset of 199 listed companies in different European welfare states (Sweden, Germany, Italy and the United Kingdom) and by classifying industries as belonging to either the classic or the technology industry[4] for the time period between 2002 and 2011. First, I compare work-family provisions for companies operating in two prototypical examples of welfare states (socially- versus liberally-oriented systems) as well as for companies operating in either the classic industry or the technology industry. Second, I analyze the effectiveness of work-family practices in terms of extraordinary employee turnover, defined as above average or below average employee turnover per year, by country and industry. With this measure, I attempt to avoid problems in measuring different employee turnover levels across countries and industries. Based on governmental regulations (see OECD employment outlook 1993) and different individual workers' preferences mobility (see BLINDER/KRUEGER 1996), the average employee turnover varies, and turnover levels differ across industries. The differences in the tasks across industries necessitate the need to account for different turnover levels. For instance, in the technology industry where many tasks are routinized and require little training, high turnover rates are more common and less costly than in the classics industry where the majority of tasks depend on network information and highly-specific skills (see BLINDER/KRUEGER 1996). Third, I address possible endogeneity problems by using a longitudinal dataset.

In the present paper, I distinguish four individual work-family practices: generous vacations, flexible working time, daycare services, and additional maternity leave. These practices are the most common according to the literature (see e.g. YANADORI/KATO 2009; BEAUREGARD/HENRY 2009; ARTHUR 2003). My analyses show that depending on different practices, the provisions of welfare states and industries differ, as does the

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[4] Industries are defined according to the Deutsche Börse into classic and technology industries.

impact on extraordinary turnover. To better understand the phenomenon, it is crucial to focus on the effects of single practices.

4.2 Hypotheses

4.2.1 Provision of work-family practices across welfare states and industries

Institutional theory predicts that organizations will be guided by external sources, such as the state or an industry, in implementing work-family practices (see MEYER/ROWAN 1977). Institutional rules function as assistance in becoming isomorphic with the environment. Institutional isomorphism occurs through coercive, normative, and mimetic institutional pressures (see DIMAGGIO/POWELL 1983; TOLBERT/ZUCKER 1996). Coercive pressure is driven by regulatory mechanisms and societal expectations (see DIMAGGIO/POWELL 1983). Normative pressure arises through conformity with professional standards, and mimetic pressure involves an organization's response to uncertainty (see DIMAGGIO/POWELL 1983). According to institutional theory, which highlights cultural influences on structures and decision-making (see ZUCKER 1987), firms adopt work-family practices to respond to employee needs. Institutional pressures lead to awareness of the need to implement better practices to reconcile work and life.

The country classification by EVANS (2001) and the seminal work of ESPING-ANDERSEN (1997; 1999) distinguish four different European welfare states. The four states – the "Nordic model", the "Central European model", the "Southern European model", and the "Insular model" – attach varying significance to the family, the market, and the state. Sweden, Germany, Italy, and the United Kingdom, respectively, serve as prototypical examples of these different welfare states. For companies, different welfare states provide different sociopolitical environments, such as legislation on childcare and leave arrangements. Below, the four welfare states are introduced in terms of the social institutions for combining work and family life.

Nordic model: Sweden represents the Nordic model with its well-developed public systems (see GAUTHIER 2002). While public support for work-family practices has increased all over Europe, the most extensive national work-life policies are still provided in Scandinavian countries (see PASAMAR/CABRERA 2013: 963). In these countries, the state comprehensively regulates family-friendly practices (see EVANS 2001: 22). In contrast to the Southern European or the Insular model, subsidized formal care

services are offered for children at a younger age in Sweden (see THÉVENON 2011). The relatively generous benefits offered by public policy enable parents to temporarily leave their place of employment after the birth of a child (see THÉVENON 2011).

Central European model: Germany serves as an example of the Central European model. This model is characterized by numerous social protection systems, while public policy is marked by "conservatism". The family is considered a social institution protected by the state (see EVANS 2001). A combination of the market, the state and the family is responsible for citizens' welfare. Similar to Nordic countries, state arrangements for childcare are available, but only for children aged three and above. For children under the age of three, there is a considerable shortage of public childcare services and a lack of full-time services (see THÉVENON 2011; GAUTHIER 2002). Very recently, the government introduced a law consolidating daycare for children under the age of three in Germany (see BMFSFJ 2015). The aim of the law is to guarantee a legal right to public child care through subsidies to all pre-kindergarteners (see BMFSFJ 2015). Compared to the Southern European or the Insular model, long periods of leave characterize parental leave regulations in the central European model (see EVANS 2001).

Southern European model: Italy serves as an example of the Southern European model. Family patterns are quite important in Italy, and the family is considered to be responsible for citizens' welfare. Compared to the Nordic or the Central European model, there is comparatively low public support for reconciling work and family. Childcare availability varies by the age of the child. Childcare facilities are more common for children aged three and above, but in rural areas, even this resource is scarce. Only a very limited proportion of Italian families make use of public childcare under the age of three. Assistance provided by grandmothers is the more common way to reconcile work and family (see DEL BOCA/LOCATELLI/VURI 2005). Traditional work patterns are typical for the country: Women tend to stay at home after childbirth, and the traditional picture of the man as the breadwinner still holds.

Insular model: The United Kingdom represents the Insular model. Typically in this model, the market bears the responsibility for citizens' welfare. The state interferes little in the Insular model, which emphasizes individual freedom and market intervention (see EVANS 2001: 23). The private market offers childcare (see VIITANEN 2005), and the state offers few benefits for paid leave following the birth of a child. The period

of protected employment is comparatively short, and parental benefits are limited (see THÉVENON 2011).

Table 10: Typology of different welfare states

Welfare state	Socially-oriented		Liberally-oriented	
Model	Nordic model: e.g. Sweden	Central European model: e.g. Germany	Southern European model: e.g. Italy	Insular model: e.g. the United Kingdom
Responsible social institutions for the citizens' welfare	State	Combination of all	Family	Market

Source: own compilation.

Table 10 illustrates the four welfare states and the responsibility of social institutions for citizens' welfare. In Sweden and Germany, public intervention is common, including many services relevant to the reconciliation of work and family such as public day care services or family leave benefits. In the United Kingdom and Italy, the market or the family is considered to be responsible for mediating work and family life. Based on the social institution responsible for the citizens' welfare, countries can be classified into socially-oriented or liberally-oriented welfare states. The Nordic and the Central European model can be characterized as socially-oriented, whereas the Southern European model and the Insular model can be characterized as liberally-oriented.

Institutional theory predicts that companies in the Nordic and Central European models will adopt more work-family practices than companies operating in the Southern European and Insular models. According to ESPING-ANDERSEN (1990; 1997), there is almost no state or societal pressure on companies to implement social benefits in the Southern European and Insular model.

Thus, the higher the state support for a combination of work and family life, the higher the probability of implementing work-family practices. The first hypothesis (1a) thus reads as follows:

Hypothesis 1a: Companies operating in socially-oriented welfare states are more likely to provide work-family practices than companies operating in liberally-oriented welfare states.

Similarly, companies operating in different countries adopt different levels of work-family practices because companies operating in different industries respond to changes in family structure differently. Institutional theory stresses the importance of external sources. Depending on a company's industry, employers have to respond to the expectations of competitors and suppliers to gain legitimacy (see DIMAGGIO/POWELL 1983; TOLBERT/ZUCKER 1994). Different industry settings might face varying degrees of institutional pressure to implement work-family practices. According to BLOOM/KRETSCHMER/VAN REENEN (2011), industries may differ in their degree of competition. Internal and external pressures may lead to an extended provision of work-family practices (see BLOOM/KRETSCHMER/VAN REENEN 2011).

To classify the wide range of industries for European-listed companies into two groups, the Deutsche Börse applies the concept of classic and technology industries, which includes nine defined industry groups (basic materials, consumer goods, consumer services, financials, industrials, information technology, pharma& healthcare, telecommunication and utilities). Below, the two industry groups are discussed with regard to differences in workforce characteristics relevant to the provision of work-family practices.

Classic industry: This sector assignment includes companies from traditional sectors ("Classic"). They are characterized by a high percentage of female employees in their workforce (see MILLIKEN/MARTINS/MORGAN 1998). For example, companies operating in the consumer services and financials industry are included in the classic industry.

Technology industry: This sector assignment includes companies from high technology sectors ("Technology"). The vast majority of the workforce is male (see MILLIKEN/MARTINS/MORGAN 1998). Examples for organizations included in the technology industry are communications- and information technology-based organizations as well as companies producing high-tech industrial goods or engineering.

The level of work-family practices can differ to a meaningful degree based on differences in the industry sectors and countries. One would expect that companies operating in the classic industry are more likely to adopt work-family practices than companies operating in the technology industry as the institutional pressure to implement work-family practices might be higher in industries with a higher percentage of women. In

summary, public attention, state regulations in certain welfare states, and varying patterns in particular industries mirror the growing institutional pressure on companies to implement work-family practices. Therefore, the second hypothesis (1b) is thus:

Hypothesis 1b: Companies operating in the classic industry are more likely to implement work-family practices than companies operating in the technology industry.

4.2.2 Work-family practices and extraordinary employee turnover

The turnover approach by the efficiency wage models postulates that some companies pay higher wages than others in order to reduce employee turnover costs (vgl. STIGLITZ 1986; KATZ 1986). If employee turnover serves as a decreasing function of compensation, companies pay; if companies bear part of the costs of employee turnover, companies might be incentivized to increase compensation in order to avoid high employee turnover. According to the literature (see e.g., BLAU 1964; PFEFFER 1981), the provision of work-family practices can serve as firm-specific non-monetary compensation. The provision of work-family practices can be seen as a symbol of organizational care and support for employer's individual needs (see PFEFFER 1981). The more generous the benefits, the more committed the employee to his or her organization because the costs of losing his or her job increase. A job that offers flexible working hours and/or daycare services is harder to find compared to a job without these options (see SHEPARD/CLIFTON/KRUSE 1996). If all companies were identical, one would not expect to see differences in employee turnover, but when companies operate in different industries and countries, the average annual employee turnover will vary across industries and countries. In some countries and industries, it is easier to replace employees with better alternatives than in others. This variation occurs either in management capacity or in the technology of production (see KRUEGER/SUMMERS 1988). To account for the problem of differing degrees of average turnover, it is important to look at extraordinary high or low turnover. Therefore, I take into account the deviation of employee turnover, measured as above average or below average employee turnover per year, by country and industry.

Extraordinary turnover takes into account the competitive context within which a firm operates. Some companies might have higher levels of turnover in their current competitive situation. For example, the average turnover in the USA is two times larger than in Japan, while turnover rates in manufacturing industries are three times lower

than in finance industries (see OECD employment outlook 1993). Above or below average annual employee turnover is a more detailed measure for the effect of work-family practices on employee turnover across countries and industries.

Summing up, work-family practices may serve as a source of sustained competitive advantage in companies, thus decreasing extraordinary turnover, which leads to the following hypothesis:

Hypothesis 2: Work-family practices reduce extraordinary employee turnover.

4.3 Methods

4.3.1 Sample and Variables

The countries in the data set represent a wide range of different welfare states. The initial sample consists of an unbalanced panel of 199 listed firms in Germany, Italy, Sweden and the United Kingdom for the years 2002 to 2011. In the sample, 30 firms are listed in the German DAX index, 40 in the MIB Italy, 29 in the OMX Stockholm and 100 in the British FTSE100.[5]

Information on the variables is taken from different sources, including Worldscope, Asset4 and Deutsche Börse (2010). Worldscope and Asset4 are Thomson Reuter's databases collecting information from publicly-available sources, such as CSR reports, annual reports and company websites.

For my analyses, I use two different subsamples of the total sample consisting only of those companies for which all variables are available. There were missing values for the following variables: work-family practices (18.6 percent of dataset), female employees (54 percent of dataset), number of employees (6.9 percent of dataset), return on equity (8.3 percent of dataset) and employee turnover (72.4 percent of dataset). Information on work-family practices, female employees and employee turnover are missing because companies report information on these variables on a voluntary basis. In the first subsample, a total of 143 companies (844 observations, 42 percent of the dataset) have complete data. In the second subsample, I end up using 98 listed European firms and 433 firm observations (22 percent of my dataset). I compare the com-

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[5] This means that the juristic headquarters are located in this particular country or that the index contains companies with operating headquarters in this particular country. Information on all variables is taken from the headquarters location and not from potential multinational enterprises all over the world.

panies in the two different subsamples with those excluded due to missing value information and find no differences in the percentage of female employees and performance as measured by ROE. The means for the single work-family practices and the number of employees are slightly higher in my reduced sample (see Table 11).

Table 11: Summary statistics for the two samples

Variables	Obs	Mean	Obs	Mean
1 Extraordinary turnover	---	---	433	-.055 (4.625)
2a Vacation	844	.152 (.359)	433	.159 (.366)
2b Flextime	844	.411 (.492)	433	.524 (.500)
2c Daycare	844	.249 (.433)	433	.349 (.477)
2d Maternity leave	844	.172 (.377)	433	.233 (.423)
3 Female employees (%)	844	35.918 (17.199)	433	32.348 (16.053)
4 No. of employees	844	69.343 (95.167)	433	76.497 (103.426)
5 ROE	844	14.721 (15.469)	433	13.602 (14.506)

Stand. Dev. in parentheses

I use four variables to assess work-family practices: generous vacations, flexible working time, daycare services and additional maternity leave. Flexible working time is measured using this question: *Does the company claim to provide flexible working hours or working hours that promote a work-life balance?* I create a dummy variable, flextime, by coding 1 if the company reports providing flexible working time as a work-family practice according to Thomson Reuters, 0 otherwise. The provision of generous vacations is measured by the following question: *Does the company claim to provide generous vacations, career breaks or sabbaticals?* Similarly, the dummy variable, vacation, equals 1 if the company reports to provide generous vacations according to Thomson Reuters, 0 otherwise. Concerning daycare services, information is captured through the following question: *Does the company claim to provide daycare services for its employees?* Based on information from Thomson Reuters, the dummy variable of daycare takes a value of 1 if the company provides daycare services, 0

otherwise. To measure additional maternity leave, the following question is used: *Does the company claim to provide generous maternity leave benefits?* The variable of maternity leave is coded 1 if a company's maternity leave policy is more generous than what is required by law according to Thomson Reuters, 0 otherwise. These four work-family practices are similar to those used as measures in previous literature (see e.g. YANADORI/KATO 2009; GIARDINI/KABST 2008; PERRY-SMITH/BLUM 2000). On average, the most common offered practice is flexible working time (41 percent for the first subsample, 52 percent for the second subsample) followed by daycare services (25 percent for the first subsample, 35 percent for the second subsample) and maternity leave (17 percent for the first subsample, 23 percent for the second subsample). In both samples, an average of 15 percent of the companies provide generous vacations.

Based on ESPING-ANDERSEN (1990; 1999), I include four European countries in the analysis: Sweden, Germany, Italy and Great Britain. Based on state support, Sweden and Germany represent a socially-oriented welfare state, and Italy and Great Britain represent a liberally-oriented welfare state. In my first subsample, 44 percent of the companies operate in a rather socially-oriented welfare state, and 56 percent of the companies operate in a rather liberally-oriented welfare state. The proportions are similar in my second subsample.

According to the Deutsche Börse classification of supersectors (2010), nine different industry sectors are considered: basic materials, consumer goods, consumer services, financials, industrials, information technology, pharma and healthcare, telecommunication and utilities. Based on these industry sectors, companies are further classified into the classic industry or technology industry category (Deutsche Börse 2010). In my first subsample, 64 percent of the companies belong to the classic industry, and 36 percent of the companies belong to the technology industry. My second subsample has a similar composition.

Employee turnover is assessed by the percentage of employees leaving the company during a given year. This measure includes all forms of employee turnover, both voluntary separation, such as quitting, and involuntary dismissals, such as firings.[6] On average, employee turnover is 10.19 percent. To display extraordinary turnover in my

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[6] This percentage includes all personnel leaving the company; retirements or deaths are excluded.

regression analysis, I use country and industry sectors' standardized turnover. I calculate the deviation of a company's individual annual turnover based on an average annual turnover from the company's industry and country. This measure has the advantage of accounting for country and industry-specific differences in turnover per year. Extraordinary employee turnover measures whether or not employee turnover is above average or below average for a specific year, country and industry.

For further illustration, Table 12 presents the average annual employee turnover in 2011 for my sample. The table distinguishes employee turnover within one country in different industry sectors. Depending on the industry sector, companies in Germany have the lowest average employee turnover, and companies in United Kingdom have the highest. My sample appeas comparable to statistics reported by the OECD outlook in 1993. The OECD's data on employee turnover are derived from household surveys in 1991. The surveys asked employees how long they had been working continuously for their employer (see OECD outlook 1993: 150). The survey also reports that Germany has a lower employee turnover than the United Kingdom. On average, there is also variation in turnover levels across industry sectors. Due to missing values, I do not have information on employee turnover for all countries and industries in each year.

Table 12: Breakdown of average employee turnover in each country and industry sector for the year 2011

	Germany	Sweden	Italy	UK
Basic Materials	8.33	4.5	.	9.38
Consumer Goods	2.25	16	13.21	3.97
Consumer Services	.	18	14.11	16.62
Financials	10.33	9.18	5.76	11.24
Industrials	8.09	13.4	11.96	14.84
Information Technology	9.4	12.5	.	.
Pharma& Healthcare	.	17.4	.	16.25
Telecommunication	5.4	8.4	9.58	10.96
Utilities	10.1	.	6.65	10.7

Source: own compilation.

As further *controls* for the regressions, I include the percentage of female employees
in accordance with the literature (see e.g. YANADORI/KATO 2009). Depending on the
composition of a company's workforce with respect to gender, there is an organiza-
tional culture that potentially supports work-family practices (see e.g.
POELMANS/CHINCHILLA/CARDONA 2003) and also influences employee turnover (see
e.g. YANADORI/KATO). Therefore, a relationship might exist between the percentage
of female employees and my dependent variable extraordinary employee turnover as
well as work-family practices. In both subsamples, the vast majority of employees are
male (64.1 percent are male employees in my first subsample and 35.9 percent are
female employees respectively; 67.65 percent are male employees in my second sub-
sample and 32.35 percent are female employees respectively).

I further control for the number of employees in a company (see e.g. WOOD/DE
MENEZES 2010) because the size of a company might affect the provision of work-
family practices. According to INGRAM/SIMONS (1995) there is a positive correlation
between organizational size and work-family practices. The number of employees
might also be related to turnover, and it serves as a proxy for firm size. Larger firms
will face greater company fluctuation as employees are more likely to change their job
within the company (see LEE et al. 2008). The number of employees is measured in
the thousands. On average, in my first subsample, there are 69.34 employees. In my
second subsample, there are an average of 76.50 employees.

A further control is firm performance (see e.g. HANCOCK et al. 2013; NGO/FOLEY/LOI
2009). Market related performance is measured by return on equity (ROE). Previous
research has shown a negative correlation between turnover and market-related per-
formance: the higher the company's turnover level, the lower firm performance (see
e.g. HANCOCK et al. 2013; NGO/FOLEY/LOI 2009). In both samples, ROE is about 14
percent. Finally, I also control for year dummies.

4.3.2 Analysis

To identify differences in the provision of work-family practices among companies
operating in different welfare states and different industries (hypothesis 1), I use Z-
statistics to compare proportions of my binary variables, work-family practices, as a
first step. As a second step, I use random effect (RE) logit models and include further
controls.

To test whether work-family practices influence extraordinary turnover (hypothesis 2), I use pooled OLS modeling with robust standard errors and firm clusters as well as a random effects estimator (RE) and fixed effects estimators (FE). For more than a third of the firms in my unbalanced dataset, the main explanatory variable, work-family practices, does not change over time. Therefore, it would not be appropriate to use the FE estimator according to a Hausman test as the random effect estimator provides more consistent results. As the Breusch-Pagan Lagrange Multiplier (LM) shows the random effects estimator (RE) to be more appropriate than the OLS estimator, I include the lead of the central explanatory variable in the regression in order to test for strict exogeneity, finding all work-family practices to be exogenous for all specifications. However, the RE estimator, as well as the pooled OLS estimator, rely on the problematic assumption that the regressors are not correlated with unobserved heterogeneity characteristics. It is not possible to rule out the possibility that some specific unobserved company heterogeneity is endogenous, thus limiting the causal interpretation. I therefore present both the pooled OLS and RE as well as the FE estimation.

To check for the robustness of the results for the impacts of work-family practices and extraordinary employee turnover (hypothesis 2), I also ran the regressions with the average annual rate of employee turnover as the dependent variable, finding my results to be robust to this alteration in the OLS and RE model[7].

4.4 Results

4.4.1 Provision of work-family practices across welfare states and industries

Hypothesis 1a suggests that companies operating in socially-oriented welfare states are more likely to provide work-family practices than companies operating in liberally-oriented welfare states. Table 13 shows a comparison of single work-family practices for different welfare states. The last two columns of Table 13 report the Z-statistics and their level of significance for the pairwise comparison test of proportion differences. Z-statistics for all work-family practices are found to be significant. That is, the provision of generous vacations, flexible working time, daycare services and maternity leave differs significantly between the countries under consideration. More companies

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[7] The FE model does not provide significant effect. The reason might be that all time constant variables are not considered, and only the within estimator is used.

operating in Sweden and Germany offer work-family practices, such as flexible working time and daycare services. These results provide initial tentative support for hypothesis 1a. However, more companies in liberally-oriented states provide work-family practices, such as generous vacation or additional maternity leave, which is contrary to my hypothesis.

Table 13: Single work-family practices across welfare states

Variables	Socially- oriented	Liberally- oriented	Pairwise differences	Z-value
Vacation	.090	.121	*	1.856
	(.012)	(.010)		
Flextime	.331	.282	**	-2.059
	(.020)	(.014)		
Daycare	.279	.105	***	-8.937
	(.019)	(.009)		
Maternity leave	.090	.136	***	2.635
	(.012)	(.010)		
No Obs.	531	1097		

*$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, *Stan. Dev.* in parentheses.

Source: own compilation.

Hypothesis H1b suggests that companies operating in the classic industry are more likely to provide work-family practices than companies operating in the technology industry. To identify differences in work-family practices for different industries, I again use Z-statistics to compare proportions of binary variables (see Table 14).

Table 14: Single work-family practices across industries

Variables	Classic Industry	Technology Industry	Pairwise differences	Z-value
Vacation	.134	.073	***	-3.801
	(.011)	(.011)		
Flextime	.328	.249	***	-3.377
	(.015)	(.017)		
Daycare	.190	.115	***	-3.938
	(.012)	(.013)		
Maternity leave	.156	.063	***	-5.552
	(.011)	(.010)		
No Obs.	1013	615		

*$p < 0.1$, ** $p < 0.05$, *** $p < 0.01$, *Stan. Dev.* in parentheses.

Source: own compilation.

The pairwise comparison test of proportion differences shows that all work-family practices differ significantly across industries. Companies operating in the classic industry provide more work-family practices than companies operating in the technology industry, therefore providing initial tentative support for Hypothesis 1b.

The results from the Z-statistics differ slightly from the subsequently performed RE Logit regression analyses (see table 15). In these analyses, single work-family practices are the dependent variables and dummy variables for the different types of welfare states are defined by ESPING-ANDERSEN (with the liberally-oriented state representing the reference category). The industry classification is based on Deutsche Börse (2010) (with the technology industry as a reference category) as well as a set of different controls. Because of the missing values primarily in the control variable percentage of female employees, my sample size is reduced to 143 firms. With respect to the influence of welfare states and industries on the provision of single work-family practices, the results are as follows: The provision of practices, such as vacation and flexible work time, is not influenced by the welfare state or the industry classification. Companies operating in the socially-oriented welfare state are more likely to provide daycare services than companies operating in the liberally-oriented welfare state. Therefore, the results only partially support hypothesis 1a, which states that companies operating in socially-oriented welfare states are more likely to provide work-family practices than companies operating in liberally-oriented welfare states. Hypothesis 1b suggests that companies operating in the classic industry are more likely to provide work-family practices than companies operating in the technology industry. The results partially support this hypothesis. Companies operating in the classic industry are more likely to provide daycare services and additional maternity leave.

Concerning controls, I find the percentage of female employees to be positively related to work-family practices such as generous vacation, flexible working time and daycare service. As measured by ROE, performance is negatively related to flexible working time and additional maternity leave, while the number of employees is positively related to almost all work-family practices—hinting at the economies of scale in the provision of work-family practices.

Table 15: RE effect logit model for different work-family practices

	(1) Vacation	(2) Flextime	(3) Daycare	(4) Maternity leave
Socially-oriented[a]	-1.289	-.160	2.780***	-1.144
	(-1.44)	(-.21)	(2.81)	(-1.15)
Classic industry[b]	1.402	.744	2.089**	3.168***
	(1.52)	(.97)	(2.05)	(3.10)
Female employees (%)	.069***	.034*	.049*	.022
	(2.79)	(1.69)	(1.90)	(.83)
No. of employees	.008**	.003	.015***	.005
	(1.96)	(.92)	(3.30)	(1.14)
ROE	.011	-.018*	.020	-.011
	(.72)	(-1.86)	(1.50)	(-.70)
Year	.968***	.942***	.407***	1.037***
	(7.69)	(10.80)	(5.99)	(7.69)
_cons	-1952.6***	-1894.2***	-827.9***	-2091.1***
	(-7.70)	(-10.80)	(-6.05)	(-7.71)
lnsig2u				
_cons	2.929***	2.600***	3.347***	3.361***
	(10.16)	(10.25)	(12.50)	(12.50)
No Obs.	844	844	844	844
No groups	143	143	143	143

a reference group is liberally-oriented welfare state; b reference group is technology industry
t-statistics are in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$
Source: own compilation.

4.4.2 Work-family practices and extraordinary employee turnover

The correlations for all variables included in my analysis are listed in Table 16. Concerning correlations for the variable of extraordinary turnover, I find it to be positively related to the number of employees (r=.22***) and the percentage of female employees (r=.09*). That is, larger companies and companies with a high percentage of female employees have, on average, slightly more extraordinary turnover. I find that all work-family practices and ROE do not correlate with extraordinary turnover (between r=-.03 and r=.08). Concerning interrelations between different controls, there are no striking correlations. I can therefore exclude multicollinearity problems (all VIF Factors are below 1.15).

Table 16: Correlations among variables

Variables	1	2a	2b	2c	2d	3	4
1 Extraordinary turnover	1.00						
2a Vacation	.08	1.00					
2b Flextime	.00	.33***	1.00				
2c Daycare	-.03	.24***	.19***	1.00			
2d Maternity leave	-.01	.30***	.27***	.26***	1.00		
3 Female employees (%)	.09*	.13***	.18***	.20***	.18***	1.00	
4 No. of employees	.22***	.08	.11**	.25***	-.05	-.09**	1.00
5 ROE	.00	-.13***	-.15***	-.21***	-.05	-.20***	-.10**

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

Source: own compilation.

Table 17 provides the empirical results with extraordinary employee turnover as the dependent variable. Model 1 provides the results of the pooled OLS estimation, model 2 displays the results for the RE estimation, and model 3 presents the results of the FE estimation. Hypothesis 2 states that work-family practices reduce extraordinary employee turnover. Depending on the practices (e.g. providing daycare services), hypothesis 2 can be confirmed. The effect of all work-family practices on extraordinary turnover prove stable across all three estimation models. Based on all models, the provision of day care service reduces extraordinary turnover; however, the provision of flexible working time, generous vacation and additional maternity leave have no effect on extraordinary turnover.

Table 17: Regression analysis: Work-family practices and extraordinary turnover

Variables	extraordinary turnover		
	Model 1: OLS	Model 2: RE	Model 3: FE
Vacation	1.196	.069	-.499
	(.85)	(.10)	(-.84)
Flextime	-.380	.961	.831
	(-.44)	(1.45)	(1.26)
Daycare	-1.226*	-.912*	-1.009*
	(-1.83)	(-1.67)	(-1.67)
Maternity leave	-.037	.460	.597
	(-.05)	(.75)	(.85)
Female employees (%)	.043*	.021	.089
	(1.89)	(.86)	(1.07)
No of employees	.012**	.013***	.008
	(2.42)	(2.72)	(1.12)
ROE	.011	.017	.024*
	(.69)	(1.49)	(1.85)
Classic industry	-.196	.135	
	(-.21)	(.14)	
Liberally-oriented state	-.108	.410	
	(-.14)	(.48)	
Year dummies	yes	yes	no
_cons	-1.508	-2.292*	-3.978
	(-.97)	(-1.65)	(-1.58)
No of obs.	433	433	433
No of groups	98	98	98
R²	.08	.06	.04
F- value			1.68
Wald chi²		22.45	
Breusch Pagan Lagrange multiplier test Prob>chi²		***	
Hausman test Prob>chi²			n.s.

t-statistics are in parentheses. $^{*} p < 0.1$, $^{**} p < 0.05$, $^{***} p < 0.01$

Source: own compilation.

Although it is not the primary interest of this paper, the sign and significance level of the controls on extraordinary turnover are noteworthy. In the OLS model, the percentage of female employees is positively related to employee turnover: companies with a higher percentage of female employees have higher extraordinary turnover. In addition, in the OLS and the RE model, the number of employees in a company is positively related to extraordinary turnover. Performance, measured as ROE, has no impact on extraordinary turnover.

4.5 Discussion

This study firstly focuses on differences in the provision of work-family practices across welfare states and industries. My findings partly support institutional theory. Companies operating in welfare states with well-developed public systems provide significantly more daycare services. However, the provision of other practices, such as generous vacation, flexible working time and additional maternity leave, is not influenced by the welfare state in which the company operates. According to DEX/SCHEIBEL (2001), some practices are less easily regulated by external resources like the state. Institutional pressure might be more effective on practices concerning the reconciliation of family and work instead of the reconciliation of work-life balance. In addition, companies operating in the classic industry provide significantly more daycare services and additional maternity leave. This result might also be driven by the fact that external pressure aims at practices implemented for parents with a special need of the use of these practices.

The study also secondly reveals the impact of work-family practices on extraordinary employee turnover. My findings show that providing daycare services is effective in reducing extraordinary turnover in a company. Moreover, I make use of the panel structure in my sample, carrying out different panel estimations to address potential problems of unobserved heterogeneity at the company level. The results are robust in all panel estimation models and show a beneficial effect: companies can reduce extraordinary employee turnover through the provision of day care services. However, other work-family practices have no effect on extraordinary turnover.

The failure to find that generous leave politics, such as longer maternity leave and generous vacation, are negatively related to extraordinary employee turnover might be explained by the type of benefits. Practices such as daycare services combine work and family; however, maternity leave, vacation and sabbaticals are practices that cut

back on working hours. BLAIR-LOY/WHARTON (2002) consider the use of work-family practices and find that more than two-thirds of the sample reported having no need or interest in cutting back on paid hours. Therefore, certain work-family practices might only decrease extraordinary employee turnover when employees consider using these practices.

Overall, the study contributes to the literature in several ways. First, the lack of longitudinal data in the previous literature did not allow for the identification of causal effects. My results support a link between the provision of daycare services and extraordinary turnover; however, because I do not have complete data on my turnover variable I cannot look at time-lagged relationships. Causality is only implied but I cannot test it directly. Definitive answers to the causality question are only possible when one conducts an ideal, and consequently, improbable empirical experiment. Second, the study contributes to the empirical evidence in Asian countries and the United States, implying that work-family practices decrease employee turnover while taking into account turnover differences in countries and industries by focusing on extraordinary employee turnover. Thirdly, it supports and extends the results of the studies by DEN DULK/PETERS/POUTSMA (2012) and DEN DULK et al. (2013) by looking at listed European companies and at industry differences in the provision of work-family practices.

Whereas my research contributes to existing studies by employing longitudinal data as well as different industries and countries, my study has a number of potential limitations. Firstly, my empirical data does not provide information on the use of work-family practices. Employees' views on using work-family practices might provide more insight into the effectiveness of different practices in terms of commitment and turnover. It would be interesting to see differences in the availability and the use of work-family practices. Further studies could include the extent of use and the relevance of different work-family practices for employees, not just the availability of these practices.

A further limitation concerns the measurement of the employee turnover variable. I have information on the organizational level, but no additional information on the employee level. For example, the turnover variable has several missing values because it is reported on a voluntary basis, and it is publicly available information. Therefore, I cannot fully exclude that my results are biased. Moreover, because I have firm-level

data, I have no information about who leaves the firm. It might be that an unmotivated employee leaves the company and is replaced by a skilled motivated employee. In this case, turnover would not necessarily be harmful (see LAZEAR/SPLETZER 2013). Further studies should look in more detail at the productivity of an employee who leaves the company.

Thirdly, in my study, I am not able to analyze the impact of extraordinary voluntary turnover because the measurement of the turnover criterion variable does not distinguish between voluntary and involuntary employee turnover. According to HUSELID (1995), estimates of the effect of work-family practices on turnover might be understated to the extent that these practices influence voluntary but not involuntary separation. However, by measuring only voluntary employee turnover, one cannot exclude the possibility of involuntary firings (see LEE et al., 2008: 668). For example, if employees anticipate being fired, they might want to avoid the stigma of firing and choose a "voluntarily" departure. Conversely, with involuntary turnover, one might also capture voluntary employee turnover: employees who want to leave the company might agree to any compromise in order to collect unemployment insurance (see LEE et al., 2008:668). Qualitative research might be a fruitful next step in order to better understand employees' different motivations for leaving a company.

Fourthly, there might be unobserved heterogeneity between the firms, for example, in the changes in corporate culture. One might argue that unobserved factors, such as corporate culture, do not vary over a time period of 10 years and can be seen as rather time-constant (see SEIFERT/SCHLENKER 2012: 193); however, unobserved heterogeneity might be further reduced by using further control variables as a proxy for corporate culture, such as a change in the executive board from a male CEO to a female CEO.

4.6 Conclusion

The increase in dual-income couples forms one of the most striking long-term trends in the labor market. The results of my study first suggest that the provision of work-family practices, such as providing daycare services, varies across welfare states and industries. Companies operating in welfare states with well-developed public systems and companies operating in the classic industry with a higher percentage of female employees provide significantly more daycare services. Secondly, the results suggest that the provision of certain practices, such as daycare services, can be beneficial in

terms of reducing extraordinary employee turnover for companies. As a result, an investment in family-friendly measures, such as daycare services, can lead to a reduction in extraordinary turnover.

5. Childbearing and (Female) Research Productivity – A Personnel Economics Perspective on the Leaky Pipeline[8]

Chapter 5 is a slightly modified version of the paper "Childbearing and (Female) Research Productivity – A Personnel Economics Perspective on the Leaky Pipeline" by Jasmin Joecks, Kerstin Pull and Uschi Backes-Gellner. This paper has been published in Journal of Business Economics 84(2014)4: 517-530.

Abstract: Despite the fact that childbearing is time-consuming (i.e., associated with a *negative resource effect*), we descriptively find female researchers with children in business and economics to be more productive than female researchers without children. Hence, female researchers with children either manage to overcompensate the negative resource effect associated with childbearing by working harder (*positive incentive effect*), or only the most productive female researchers decide to go for a career in academia and have children at the same time (*positive self-selection effect*). Our first descriptive evidence on the timing of parenthood among more than 400 researchers in business and economics from Austria, Germany and the German-speaking part of Switzerland hints at the latter being the case: only the most productive female researchers with children dare to self-select (or are selected) into an academic career. Our results have important policy implications when it comes to reducing the "leaky pipeline" in academia.

5.1 Introduction

The labor force participation of women in Western countries has heavily increased over the past few decades. However, the percentage of women in higher ranked positions did not increase at the same pace. This so-called "leaky pipeline" can also be observed in academia (see figure 3): While in Germany in 2010, 52 percent of university graduates and 42 percent of researchers who obtained a doctorate were female, only 14 percent of full professors (C4/W3) were female (see Expertenkommission Forschung und Innovation 2013: 109).

One reason for this leaky pipeline is that a woman's decision to advance her career within or outside academia is influenced by the apparent trade-off between family responsibilities and career orientation. Several studies show that motherhood has an adverse impact on labor supply (see PAULL 2008; XIE 1997; SHAUMAN/XIE 1996; BLAU/ROBINS 1988), mobility (see SHAUMAN/XIE 1996), wages (see e.g. MILLER 2011; WALDVOGEL 1997) and career orientation (see BRANNEN 1989). The fact that career paths in academia require comparatively much flexibility might explain why many female researchers remain childless (see BUBER/BERGHAMMER/PRSKAWETZ 2011; MASON/GOULDEN 2004; PERNA 2001; FINKEL/OLSWANG 1996).

Existing studies investigating into the relationship between parenthood and research productivity are inconclusive: While e.g. SAX et al. (2002), COLE/ZUCKERMAN (1991) and HAMOVITCH/MORGENSTERN (1977) find childbearing not to be related to the number of publications, STACK (2004), KYVIK/TEIGEN (1996) and KYVIK (1990) find research productivity for female researchers with young children to be significantly lower than for other researchers. To the contrary, BARBEZART (2006) and BELLAS/TOUTKOUSHIAN (1999) find researchers with children to be more productive than those without children, and KYVIK/TEIGEN (1996) identify male researchers with more than two children to publish most.

Figure 3: The "leaky pipeline" in academia in Germany in 2010
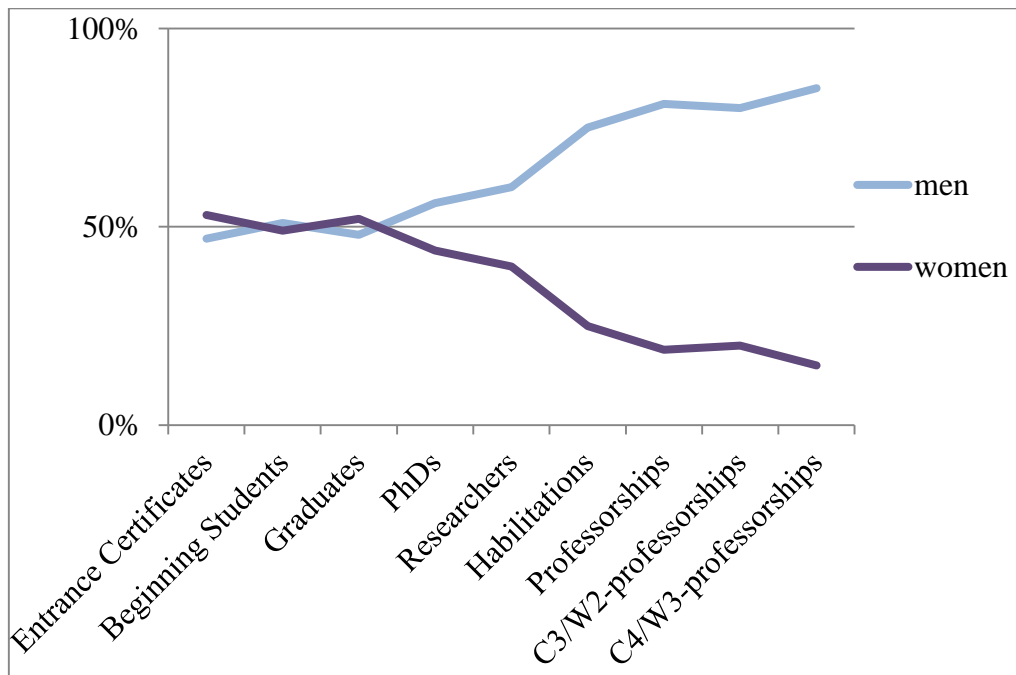
Source: Own Graph based on "Expertenkommission Forschung und Innovation" (2013: 109)

In our paper, we attempt to shed more light on the relation between parenthood and research productivity from a personnel economics perspective. In particular, we do not only study the relation between research productivity and *if* researchers have children, but also the relation between research productivity and *when* researchers have children. While we are not yet in a position to identify causality, our results might still be of interest in that we detect a somewhat counterintuitive positive relationship between motherhood and research productivity for female researchers while we find no relation between having children and research productivity for male researchers. Concerning the timing of parenthood, for female researchers we find that giving birth in a later career stage (after tenure) is related to a higher research productivity whereas we find, again, no relation for male researchers. We conclude, that either there are positive (incentive) effects of childbearing for female researchers, or, more likely, there is a positive process of self-selection where only the more productive female researchers decide to become mothers[9].

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[9] An alternative explanation might be that appointment committees in fact use higher hurdles for female researchers with children than for those without. While we do not rule out that occasionally such discriminatory hiring processes may exist, we expect them not to be widespread and hence conclude that if we observe positive productivity differences, these will be the results of a positive self-selection effect.

The remainder of the paper is structured as follows. In section 2 we review the literature and unfold our theoretical argumentation. Section 3 describes our data, variables and methods. In section 4, we present our findings. Section 5 concludes with first policy implications.

5.2 Literature and Theory

5.2.1 The "If": The relation between parenthood and research productivity

From a personnel economics perspective, there might be very different effects concerning the "if" of parenthood and its relation to research productivity: On the one hand, having a child will reduce the time that can be spent on research (negative resource effect) leading to a lower research productivity. On the other hand, having children might increase researchers' incentives to work even harder in order to be able to economically care for the children (positive incentive effect). Further, there might also be self-selection at work – however, again, the direction is unclear. While it might be the case that the less productive researchers have children with a higher probability (negative self-selection effect), it might also be the case that the more productive researchers are the ones that have children (positive self-selection effect). In what follows, we briefly elaborate on each of these effects and discuss whether and why these might be different for male and female researchers.

Resource effect: Raising children is time-consuming and substantially reduces the time budget that can be used for research. Further, if researchers temporarily leave their job and stay at home, they might also lose part of their human and/or social capital needed to go on with their research career and successfully publish their work. While this latter effect might not be "dramatic" with women in academia typically only leaving their jobs for a rather short period of time around childbirth (see WARD/WOLF-WENDEL 2004), having to care for a child will undoubtedly affect the amount of time available for research. As a result, raising children might be associated with a lower publication output. While in theory this negative resource effect could apply to mothers and fathers alike, empirical results on the division of labor within households show that mothers typically invest more time in child raising and household activities than fathers (see e.g. FINDEISEN 2011; SAYER 2005; BECKER 1985). Hence, we expect to observe the negative relation between raising children and publication output to be more pro-

nounced for women and substantially less pronounced for men. Rather, for male researchers, having children might result in their wives staying at home (at least temporarily), which would then even relieve the fathers from household jobs they would have contributed to otherwise. As a result, having children may in fact be even productivity enhancing for male researchers from a resource perspective – if it triggers traditional models of labor division in the household. The above cited empirical studies that find female researchers with young children to have a significantly lower research productivity (see STACK 2004; KYVIK/TEIGEN 1996; KYVIK 1990) and that find male researchers with children to be the most productive (see KYVIK/TEIGEN 1996) are compatible with this argumentation.

Incentive effect: If a female researcher decides to become a mother and still advance her academic career, having children might also result in being even more determined to succeed in academia in order to be able to ensure a sufficient and reliable income stream to care for their children. Further, having to combine an academic career and family might actually help female researchers to put their academic career into perspective and undertake their research in a more efficient way (WARD/WOLF-WENDEL 2004; ROPERS-HUILMAN 2000). Comparable arguments apply to male researchers: For them, becoming a father might also be associated with a positive incentive effect and a more efficient way to do their research – especially in those cases where their spouse decides to become a full time mother and does no longer contribute to the household income such that the fathers have a maximum incentive to be productive in order to be able to care for their family. Empirical studies that find researchers with children to be more productive than those without children (see BARBEZART 2006; BELLAS/TOUTKOUSHIAN 1999) and that identify fathers to be most productive (see KYVIK/TEIGEN 1996) are well in line with this supposition.

Self-selection effects: As parenthood is clearly endogenous, a positive or negative relation between parenthood and research productivity might also be the result of a process of self-selection where either the more productive researchers decide to become parents (positive self-selection effect) or the less productive researchers decide to become parents (negative self-selection effect). A *positive self-selection effect* will be observed if women in academia knowingly decide on having both, a career and a family, and only those who are confident to have enough capacity to cope with both go for the dual burden. All others decide to go for either kids and leave academia (then they

are no longer in the sample of researchers) or for their career (then they remain in the sample of researchers but don't have children). As a result, the researchers in the sample who combine kids and career are the ones with above average productivity. A *negative selection effect* would result if women who – over the course of their career – realized that they are only mildly successful in academia decided to have kids in search of an alternative role that makes up for not being among the most successful researchers.

5.2.2 The "When": Is there a relation between the timing of parenthood and research productivity?

Life-course theory: Concerning the "when" of parenthood and its relation to research productivity, the so-called life-course theory (ELDER 1975) might give an indication. According to ELDER (1975), an individual's life course is comprised of "interlocking role cycles" such as work, marriage and parenthood. The concept of multiple, interlocking role sequences or cycles applies to situations characterized by a rapid succession of transitions with the birth of the first child representing one example for such a succession of transitions. As ELDER/ROCKWELL (1979: 3) argue, the successful management of resources and squeezes is strongly related to the scheduling of events and obligations. The economic pressure of early childbearing is one example for the adaptive problems that might arise from an asynchrony between resources and demands. While life course theory applies for parents in all occupations, it appears to be particularly suitable for parents who find themselves on a tenure track in academia. In Germany, researchers in economics and business administration e.g., on average get tenure at the age of 38 (see SCHULZE/WARNING/WIERMAN 2008); i.e. for female researchers "the tenure clock" ticks at approximately the same pace as the "biological clock". Empirically, ELDER/ROCKWELL (1979) analyzed the relation between age at first birth and career position. They find variations in mother's age at first birth to be associated with considerable differences in the career position of parents. Late childbearing apparently offers a number of socioeconomic advantages: The later childbearing occurs, the more the fathers and mothers were able to accumulate material resources and augment their income. Further recent studies support the argument that the timing of the first birth has an effect on income: TANIGUCHI (1999) and ELLWOOD/WILDE/BATCHELDER (2004) both find a wage penalty for early child bearers. Likewise, KIND/KLEIBRINK (2012) find a positive causal income effect of delaying the birth of the first child for

both, mothers and fathers. MILLER (2011) shows that especially the highly educated women experience a decrease in income from early childbearing and substantial increases in earnings for delaying childbirth. To conclude, both, life course theory and the available empirical evidence on income effects of childbirth, suggest that – if income is a general indicator of career success and productivity[10] – there might be a positive relation between delaying the birth of the first child and research productivity, for women as well as for men.

Resource effect: Similarly, also from a personnel economics perspective, a positive relation between delaying the birth of the first child and research productivity might also be the result of the resource effect. Arguably, the costs of career interruptions are highest for women who are not yet tenured and who yet have to publish in order to make their career. As a result, also from the perspective of the resource effect, becoming a mother at a later point in time will be advantageous as compared to a situation of early childbirth. Further, as ISHII-KUNTZ/COLTRANE (1992) have shown, better educated women who substantially contribute to family income, have a higher propensity to equally share the housework with their partners. Even though mothers on average tend to invest comparatively more in child raising activities than fathers, it should nevertheless be easier for a female researcher to keep determined in her academic career if her career orientated role formation is already established. To the contrary, if child birth happens to be early in the academic career, a woman's career orientation may be suppressed (see TANIGUCHI 1999; ISHII-KUNTZ/COLTRANE 1992).

Incentive effect: Concerning incentive effects, these should in general be stronger in earlier career stages, i.e., before tenure (see e.g., BACKES-GELLNER/SCHLINGHOFF 2010; SCHLINGHOFF 2001) i.e., if parenthood increases incentives to publish and be productive because the researcher feels the need to earn a living for his/her family, this should rather make an effect in earlier career stages (and not when the researcher is already tenured). Hence, from the perspective of the incentive effect, it is early childbirth that might positively affect research productivity, not late childbirth. The results by SMITH/SMITH/VERNER (2013) that provide empirical evidence for higher promotion

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[10] However, there is evidence – at least outside academia – that wages do not only reflect productivity differences but may also reflect differences in social norms – particularly when comparing wages of males and females as shown by JANSSEN/TUOR/BACKES-GELLNER (2015). But of course, a large part of descriptive differences in the gender wage gap is due to differences in labor attachment, in career choices or in working time patterns as shown in an overview for example by KOLESNIKOVA/LIU (2011).

probability into a CEO position for women who gave first birth at a *young* age would also fit into this picture.

Self-selection effects: Also with respect to the timing of childbirth, there might be a process of self-selection where arguably the more productive and career-oriented researchers decide to become parents at a later stage of their academic career. Accordingly, a later childbirth might indicate a stronger career "taste" (BLACKBURN/BLOOM/NEUMARK 1993).

5.3 Data, Variables and Methods

Our study is based on a unique data set of 419 researchers in business and economics from Austria, Germany and the German-speaking part of Switzerland. The data set contains information on researchers' journal publication output until 2010, researchers' age, gender and field ("business administration" vs. "economics"). While the data on publication output and demographics are collected on a regular basis via the online portal *Forschungsmonitoring* initialized by the German Economic Association *Verein für Socialpolitik* covering more than 4,000 researchers in business administration and economics in the German speaking countries at different career stages, we gathered the information on the family situation (having children: if and when, and living in a partnership: yes or no) via an additionally conducted survey of the researchers in the data set in 2010.

As *dependent variable* we use researchers' annual publication output in refereed journals as an indicator of research productivity. To account for a potentially differing quality of journal publications, we use the 'Handelsblatt' Journal ranking as one of the most visible, though not uncontroversial, journal rankings for the researchers in the data set (see KRAPF (2011) for the details). To measure publication productivity, we divide a researcher's quality- and coauthor-adjusted journal publication output as measured in 'Handelsblatt' points by his or her 'career age', i.e., by the number of years since the researcher published his or her first journal article (see MUSCHALLIK/PULL 2015).[11] For the researchers in our data set, the average publication productivity amounts to 0.14 publication points per year where one single-authored article in

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[11] As a robustness check we also measured career age by the number of years since obtaining the PhD (see e.g. FIEDLER et al. 2008; CHLOSTA et al. 2010) and find our results to be robust to this alteration.

"The Journal of Business Economics (*Zeitschrift für Betriebswirtschaft*)" is ascribed 0.20 publication points.

Our central *explanatory variable* in our first regression is the dummy variable "children" (1 = the researcher has at least one child, 0 = otherwise). 60 percent of the researchers in our data base have children, 40 percent do not (yet) have children (51 percent among the female researchers, and 38 percent among the male researchers). In our second regression, we look at the timing of the first birth and distinguish between researchers who became a parent before obtaining their PhD, with or after obtaining their PhD and with or after getting tenure. 24 percent of the researchers in our sample got their first child before obtaining their PhD (28 percent of the females and 23 percent of the males), 63 percent became a parent with or after obtaining their PhD (64 percent of the females and 63 percent of the males), and 13 percent got their first child with or after getting tenure (8 percent of the females and 14 percent of the males).

As a first important *control variable* we include the researcher's gender. 18 percent of researchers in our data set are female, 82 percent are male. Besides controlling for gender, we also estimate our regressions separately for male and female researchers in order to detect potential differences in how the explanatory and control variables relate to research productivity. Further, we include whether the researcher lives alone or in a partnership in an attempt to grasp a researcher's family situation and potential support structure. 81 percent of the researchers in our data set live in a partnership. Furthermore, we control for age. Mean age is 42, ranging from 28 years of age until 70. As further controls, we include field of research ("business administration" vs. "economics"), research abroad, and mentoring participation.[12] Table 18 displays the means, standard deviations and correlations of all variables. All variance inflation factors (VIF) were below 1.32; i.e., there is no multicollinearity problem.

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[12] Since BREUNINGER (2012), working on the same data set, detected "research abroad" (defined as a research stay of at least one month at a foreign research institution) to be related to research productivity, we also include it as a control variable. 71 percent of the researchers in our data set stayed at a foreign research institution for at least one month. With the same reasoning, we further control for a researcher's attendance of a formal mentoring program, since MUSCHALLIK/PULL (2015) have found publication productivity to differ between researchers who attended or still attend a formal mentoring program. Five percent of researchers in our dataset attended or still attend a formal mentoring program.

Table 18: Variables: Means, standard deviations and correlations

Variables	Mean	Sd	(1)	(2)	(3)	(4)	(5)	(6)
(1) Research Productivity	.142	.131	1					
(2) Children (dummy, 1=yes)	.600	.491	.025	1				
(3) Female (dummy, 1=yes)	.184	.388	-.134***	-.108**	1			
(4) Partnership (dummy, 1=yes)	.811	.392	.033	.420***	-.090*	1		
(5) Age	43	9.393	-.133***	.347***	-.244***	.181***	1	
(6) Bus.Adm. (dummy, 1=yes)	.594	.492	-.024	-.014	.041	.043	-.066	1
(7) Research abroad (dummy, 1=yes)	.706	.456	.200***	.052	-.093*	.128**	.059	-.111**
(8) Formal mentoring (dummy, 1=yes)	.053	.225	.057	-.003	.219***	.004	-.109**	.041

*** p<.01, ** p<.05, * p<.1
Source: own compilation.

5.4 Results

5.4.1 The "If": The relation between parenthood and research productivity

The relation between parenthood and research productivity is analyzed using an Ordinary Least Squares (OLS) estimator with robust standard errors (Table 19). As a result of missing variables we have n=352 cases altogether, 61 female researchers and 291 male researchers.

When we run the model for all researchers in our data base (males and females), parenthood does not seem to be related to research productivity. The same is true, if we only look at the male researchers i.e., positive and negative effects associated with parenthood apparently outweigh one another for males. However, when the sample is restricted to female researchers, having children is associated with a *higher* research productivity i.e., for female researchers, the negative resource effects associated with having children are apparently overcompensated by a positive incentive effect or a positive self-selection effect where the most productive female researchers get children - or a mix of both. Our result is robust with respect to our measure of career age:

when we alternatively measure career age by the number of years since obtaining the doctorate instead of years since first publication, we find the very same results.

Concerning the controls, we find that female researchers apparently have a lower research productivity as measured in publication points per career year. This is compatible with the results obtained by e.g., FOX/FAVER (1985), BELLAS/TOUTKOUSHIAN (1999) or STACK (2004). Partnership is not significantly related to research productivity, neither for the males nor for the females. Age is negatively related to research productivity, i.e. the younger researchers have a higher research productivity measured in publication points per career year. The field of research ("business administration" vs. "economics") does not seem to make a difference. As in previous research with the same data set, stays abroad and formal mentoring are positively related to research productivity. While we cannot exclude reverse causality at this point, previous work employing matching techniques finds evidence for stays abroad (see BREUNINGER 2012) and formal mentoring (see MUSCHALLIK/PULL 2015) to positively influence research productivity.

Table 19: The "if": The relation between parenthood and research productivity (OLS)

| | OLS Research productivity | | |
	All	Women	Men
Children (dummy, 1=children)	.023	**.104***	.011
	(.014)	(.056)	(.016)
Female (dummy, 1=yes)	-.062***		
	(.018)		
Partnership (dummy, 1=yes)	-.006	-.030	.002
	(.021)	(.027)	(.027)
Age	-.003***	-.007	-.003***
	(.001)	(.004)	(.001)
Bus.Adm. (dummy, 1=yes)	-.004	.004	-.004
	(.014)	(.029)	(.015)
Research abroad (dummy, 1=yes)	.050***	.071**	.044**
	(.014)	(.027)	(.017)
Formal mentoring (dummy, 1=yes)	.044*	-.000	.077**
	(.026)	(.036)	(.039)
Constant	.257***	.306**	.254***
	(.041)	(.151)	(.044)
R²	.096	.191	.076
No. of observations	352	61	291

Robust standard errors in parentheses, *** $p<.01$, ** $p<.05$, * $p<.1$ Source: own compilation.

Figure 4 displays the research productivity of female researchers in the time period five years before giving birth to their first child and five years afterwards. As can be seen, research productivity actually peaks at birth. Taking into account the length of publication cycles, the graph hints at female researchers deciding to become pregnant only after they managed to successfully publish their work and be up for tenure. This clearly hints at a process of positive self-selection where only females who are highly productive in the first place decide to have a child while at the same time striving for an academic career. Further, the fact that research productivity goes down after birth, hints at the presence of a negative resource effect that only the very productive re-searchers manage to overcompensate.

Figure 4: Research productivity of female researchers before giving birth and afterwards
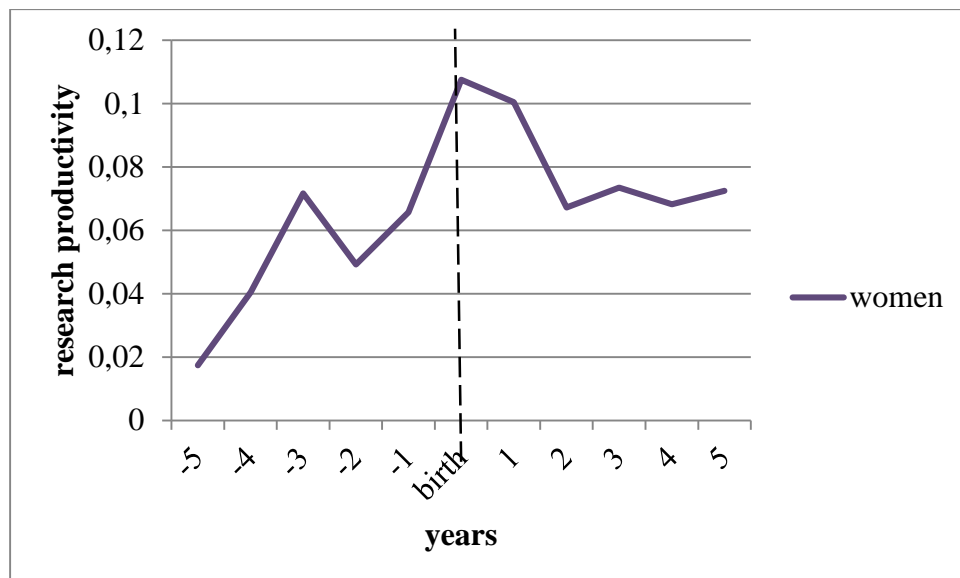
Source: Own data

5.4.2 The "When": Is there a relation between the timing of parenthood and research productivity?

In a next step we look at the timing of parenthood and distinguish between (a) researchers who get their first child before the doctorate, (b) researchers who get their first child in the year of their doctorate or later, but before they get tenure, and (c) researchers who get their first child in the year they get tenure or later. Researchers without children constitute the reference group.

Again, we use an OLS estimator with robust standard errors (Table 20) and apply the same control variables as before. The dependent variable again is average annual research output, i.e., research productivity, measured as a researcher's publication output in refereed journals (in terms of 'Handelsblatt' points) divided by career age. The number of cases is slightly reduced because of missing timing information. As our results for the controls are the same as before, in what follows we only report on the results for the timing variable.

Table 20: The "when": The relation between parenthood in different career phases and research productivity (OLS)

	OLS Research productivity		
	All	Women	Men
Birth of first child before doctorate [a]	.002	.074	-.011
	(.018)	(.048)	(.019)
Birth of first child with/after doctorate [a]	.024	.103	.012
	(.016)	(.064)	(.018)
Birth of first child with/after tenure [a]	.039	**.183****	.022
	(.024)	(.077)	(.026)
Female (dummy, 1=yes)	-.059***		
	(.018)		
Partnership (dummy, 1=yes)	-.005	-.037	.027
	(.021)	(.027)	(.028)
Age	-.003***	-.007	-.003***
	(.001)	(.004)	(.001)
Bus.Adm. (dummy, 1=yes)	-.003	-.006	-.002
	(.013)	(.029)	(.016)
Research abroad (dummy, 1=yes)	.046***	.061**	.040**
	(.015)	(.027)	(.018)
Formal mentoring (dummy, 1=yes)	.048*	.000	.081**
	(.027)	(.037)	(.041)
Constant	.245***	.310**	.242***
	(.042)	(.147)	(.046)
R²	.099	.222	.078
No. of observations	343	60	283

[a]: reference group: researchers without children, Robust standard errors in parentheses, *** $p<.01$, ** $p<.05$, * $p<.1$ Source: own compilation.

For the full sample as well as for the subgroup of male researchers, we find the timing of the first birth not to be related with research productivity. For the subgroup of female researchers we find that female researchers that gave birth to their first child *after* getting tenured have a higher research productivity than researchers without children. For female researchers that gave birth to their first child *before* getting tenure there is no significant difference in research productivity as compared to the childless female researchers. As the positive incentive effects associated with parenthood should be larger in earlier career phases, the fact that only the later births are positively related to research productivity hints at a process of positive self-selection to be at work: The more productive female researchers are confident to manage both: their academic career *and* motherhood.

Further, if the ones that decide to go for their career and have children at the same time are really the more productive ones, they are also likely to receive tenure earlier because they have a good enough track-record at an earlier point in time, which makes it more likely that their children are born after they got tenure. This, too, would explain why mothers who give birth to their first child after tenure are more productive than others: it would again be a positive self-selection effect. Lastly, our result is also compatible with a story of risk minimization of academic mothers, i.e., female researchers that decide to have children attempt to find the "least risky" moment to do so – i.e., the moment where a number of papers have been accepted for publication. Since such a risk minimization strategy supports our argument that female researchers with children have a strong preference for being successful in order to guarantee a sufficient and stable income to take good economic care for their children in the long term, we do not try to further empirically disentangle the two explanations.

As a robustness check for our results on the timing of childbirth, we also included "tenure" and "no. of children" and find our results to be robust to this alteration. Also, measuring career age as the number of years since obtaining the doctorate does not change our central results.

5.5 Concluding Remarks

In descriptive analyses for researchers in business and economics departments, we find female researchers with children to be more productive than female researchers without children – although a *negative resource effect* would suggest that the productivity of females is reduced as a result of childbearing. We argue that the positive productivity differential can be explained by a *positive incentive* and/or a *positive self-selection effect*. Our empirical results hint at a strong positive (self)selection where only female researchers with a far above average productivity (the high-performers) dare to go for a career in academia and have children at the same time – and/or where only these exceptionally productive female researchers are able to successfully pass the many selection steps built into the system.

Thus, with tenure and biological clock ticking at the same time, our results indicate that in comparison to male researchers a substantial number of equally talented and equally high achieving female researchers either "get lost" on their way (and leave academia for another job) – just because they wanted to have children and were afraid not to be able to manage the dual burden – or they remain childless (which is no better

from a societal perspective given the demographic problems being faced in many developed countries). To the contrary, male researchers typically do not face the same tradeoff: in most cases those who want to have children rely on their wives in case the dual burden comes too hard on them. Thus, for males, the potential of talented researchers is much better exploited than for females – leading to the well-known "leaky pipeline". While our results are rather descriptive and should hence be interpreted with caution they are in accordance with the preliminary results of a recent working paper by KRAPF/URSPRUNG/ZIMMERMANN (2013) who work with a different data set and different methods. This makes us confident that our results are more than mere statistical artifacts, and it encourages us to formulate the following policy implications.

If a country (or a single university) does not want to waste the innovative potential of half of its population, appropriate steps need to be taken to avoid that among female graduates mainly the very high and top performers dare to stay in or are selected into academia – while for the males the whole distribution of talents is exploited. Ideally, policy measures should consist of two parts: *First*, measures should be taken to reduce the burden of childcare for female researchers (i.e., reduce the negative resource effect), e.g. by ensuring a sufficient supply of daycare centers for toddlers, kindergarteners or school-kids within the university context. This will also help male researchers who want to take their share in child caring activities and hence in the long run may also generate an additional support for female researchers with partners in academia who want to become a mother. And, of course, a sufficient supply of childcare will also help the female top performers – who even in today's world decide to stay in academia – to further improve their research productivity. *Second*, measures should be taken that clearly signal all female researchers that they will not be disadvantaged if they decide to go for kids: e.g., by being able to stop the tenure clock or by installing an explicit handicap-system in appointment tournaments. Stopping the tenure clock would imply that tenure-track faculty members (e.g., tenure-track-'Junior Professors or Assistant Professors' in the German system) can delay their tenure review for family reasons if they think their research productivity is negatively affected.[13] A handicap-system would e.g. mean that female researchers with children need a lower number of

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[13] FLAHERTY/LESLIE/KRAMER (2013), e.g., show that the research output at the time of the tenure review of faculty members who stopped their tenure clock is not significantly different from non-users and they conclude that „stopping the tenure clock polices" are effective for leveling out the playing field for the tenure decision. However, they also find that faculty members stopping the clock suffer from lower incomes as stopping the tenure clock might signal a lower commitment.

publications to get tenure or to succeed in an appointment tournament than males or females without children.[14] Both, the ability to stop the tenure clock and the specific features of a handicap system could be especially tailored to keep all talented and not only the very top performing female researchers in academia and allow them to have children at the same time (as it is the case for the male researchers over the whole talent distribution). Only very strong signals for female researchers (see NIE-DERLE/SEGAL/VESTERLUND 2013, for a similar point concerning quotas) are likely to weaken the strong self-selection effect. By leveling out the playing field for up-coming female researchers with and without kids hopefully more talented female researchers will decide to go for an academic career and for kids, which in turn will help to reduce the leaky pipeline effect.

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[14] Interestingly, a handicap-system favoring female researchers with children would not reduce incentives for the others, but would in fact restore incentives for all researchers by reducing contestant heterogeneity – as has been shown theoretically for appointment tournaments (see CHLOSTA/PULL 2010) and empirically for tournaments in a business context (see BACKES-GELLNER/PULL 2013).

6. Conclusion

Strategies concerning the reconciliation of work and family life have gained in importance when it comes to encouraging an equal participation of women in the labor force. The implementation of work-family practices might help employees to combine work and family life and reduce the burden of childcare for both genders. By ensuring a sufficient supply of childcare services and offering flexible working time, a country (or a single company) can help all of its employees reach their fullest potential (see e.g. KONRAD/MANGEL 2000). This doctoral thesis provided a deeper analysis on the topic of gender, work-family practices, and productivity. The following summarizes the findings of this doctoral thesis and gives implications for further research.

Chapter 2 shed light on the performance effects of having a more gender diverse board. The findings indicated that only if a critical mass of about 30 percent female representation on a board is reached will gender diversity have performance-enhancing effects. We found evidence that gender diversity at first negatively affects firm performance and increases firm performance only after a threshold of about 30 percent female representation in the boardroom is reached. When we translated the critical mass of 30 percent women into an absolute number given our sample firms, we found that having about three women in the board is the "magic number." These results contributed to the critical mass theory introduced by KANTER (1977), who examined the effect of different gender compositions and argued against tokenism in organizations.

Chapter 3 analyzed the importance of providing a female-friendly culture to gain higher representation of female directors in the boardroom. So far, little was known about the drivers of female representation in the boardroom. This chapter extended the previous literature by focusing on winning a working mother award as a signal for a company's female-friendly culture. According to signaling theory, it seemed plausible to argue that women who are able to choose on which boards they want to serve might look for signals of a female-friendly culture. Companies can invest in the implementation of work-family practices to receive a nomination for a working mother award. The findings from four different European companies showed that the companies' having won working mother awards had a positive effect on the percentage of female directors three years later.

Chapter 4 investigated the provision of work-family practices in different welfare states and industries and tested their impact on extraordinary turnover. So far,

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knowledge about the influence of different institutional settings, namely welfare states (socially oriented versus liberally oriented) and industrial settings (classic industry versus technology industry), on the provision of work-family practices as well as their impact on extraordinary turnover has been limited. The theoretical framework was, on one hand, based on institutional theory and stressed the importance of taking different institutional settings into account. On the other hand, the turnover approach of the efficiency wage models proposed that work-family practices reduce extraordinary employee turnover in a country and an industry. First, the results showed statistically significant differences in the provision of work-family practices across welfare states and industries; for example, companies operating in socially oriented states and classic industries are more likely to offer benefits such as daycare services. Second, the findings supported a statistically significant relationship between some practices, such as providing daycare services, and extraordinary employee turnover. Possible endogeneity problems were addressed using a longitudinal dataset.

Chapter 5 provided a deeper insight into the relationship between parenthood and research productivity from a personnel economics perspective. In addition to the relationship between research productivity and *if* researchers have children, the relationship between research productivity and *when* researchers have children was also considered. Concerning the "if" of parenthood, this chapter empirically detected a somewhat-counterintuitive positive relationship between motherhood and research productivity for female researchers. Concerning the "when" of parenthood, the findings indicated that giving birth in a later career stage increased the research productivity of female researchers. These findings supported the idea of positive (incentive) effects of childbearing for female researchers, or, more likely, there was a positive process of self-selection in which only the more productive female researchers decided to become mothers.

The findings of the individual chapters have important practical implications. Without mandated gender quotas and without any restrictions of the supply side of qualified and eligible women willing to serve on corporate boards, female representation in the range of 30+ percent has firm performance–enhancing effects. However, if gender quotas are mandated in the future (see ADAMS/KIRCHMAIER 2013), the demand for women will increase and potential female board members will be able to choose which boards they join. Signaling a female-friendly culture via winning a working mother

award can give companies a chance to attract potential female board members. If companies face difficulties in filling their boards with qualified female board members, they can consider investing in work-family practices to obtain a nomination for a working mother award.

This dissertation further deepened the issue of work-family practices. It showed the importance of external pressures such as a specific welfare state or a specific industry on the provision of work-family practices such as daycare services. These findings suggested that institutional pressures might be helpful for the organizational provision of family-friendly benefits. Furthermore, the findings implied that the provision of work-family practices such as daycare services might be beneficial in terms of reducing turnover for companies. The finding that women with children in academia are more productive in terms of journal publications than women without children gave further support to the provision of work-family practices. A sufficient provision of work-family practices might help to reduce the dual burden of work and family.

Although this doctoral thesis revealed important implications about gender, work-family practices, and productivity, some general limitations should be considered. The individual chapters of this dissertation used data from different countries. While chapter 5 used data from Germany, Austria, and the German-speaking part of Switzerland, the data used in chapters 3 and 4 contained information about four different European countries (Germany, Sweden, Italy, and the United Kingdom). Chapter 2 was restricted to German data. Considering the different datasets used in this dissertation, missing data was a recurring issue that might bias the results. In chapter 5, the dataset contained results from a survey of 419 researchers, and some researchers declined to provide all information. Chapter 2 dealt with a hand-collected dataset of 151 German companies, and missing values are due to outliers or information that was not publicly available. The information in the dataset used in chapter 3 and 4 was collected from Thomson Reuters and contains a large number of observations with some missing information, such as the percentage of female employees, the percentage of female managers, and employee turnover. Because this information was reported on a voluntary basis by companies in their annual reports, information is not available for all companies. Hence, the results are potentially biased, and the results should be generalized with caution.

The most challenging issue in all chapters was reversed causality. I addressed this point in each chapter according to the data and the variables. In chapter 5, I was not able to identify causality due to the cross-sectional dataset. In chapter 2, the analysis was based on a balanced panel with a period of five years. Here the random effect estimator was used because, for more than a third of the firm's population, the main explanatory variable, gender diversity, did not change over time. In chapters 3 and 4, my findings were based on longitudinal panel data covering a time span of ten years. In chapter 4, I also presented the results of the random effect estimator. In chapter 3, I addressed potential heterogeneity problems by using a fixed effects estimator and established a causal link by lagging my central explanatory variable by one year as well as by three years. However, although I could not fully rule out endogeneity problems for unobservable variables that change over time, by using the FE estimator, I controlled for all unobservable factors that are time-invariant.

Further research might address additional gaps in the literature on gender issues in the workplace. Several researchers have stressed the importance of institutional and cultural context when analyzing gender diversity and its effects (see SCHNEID et al. 2015). Hence, further research should investigate cross-country analyses in more detail. Moreover, my findings were based on quantitative empirical data. While these findings provide the first tentative implications for a corporate strategy, they also call for more qualitative research in this area. Qualitative research is needed to understand how a society can bridge the gender gap in academia and business. By recording their attitudes and behaviors, qualitative interviews with female employees about their motivation to pursue a career in top corporations or to stay in academia can provide information for deeper analyses. Combining qualitative and quantitative insights seems to be a fruitful step for further research.

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