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**Parents between Work and Family:  
New Empirical Evidence  
from Industrialised Countries**

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**Dissertation**

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# 1

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**Introduction:  
Family Policy is Economic Policy**

This dissertation addresses the topical issue of parents' reconciliation between work and family life from an economist's perspective. The main objective of this dissertation is to contribute to the empirical economic literature on the relationships between family policy, parents' childcare and paid work, and fertility in Germany as well as other industrialised countries. Within this broad definition, first and foremost, new insights on the fathers' role are provided, since their role aside from having been seen as a source of financial security has long been neglected in economic research. Much more research has been conducted regarding the work-family nexus of women. Nevertheless, this dissertation adds empirical evidence by looking specifically at the relationship between the women's work sector and fertility in Germany, assuming that workplace characteristics are crucial factors for the reconciliation of work and family life that can be influenced by employers as well as by policy makers.

The topic is motivated by demographic (population) and labour market changes. The demographic change that many industrialised countries have been experiencing in the last decades is marked by below replacement fertility rate and increasing life expectancy. To be more precise, among Western European<sup>1</sup> countries, the average total fertility rate was 2.8 in 1960 and 1.7 in 2009 (Council of Europe 2005; Eurostat 2012a).<sup>2</sup> Average life expectancy at birth has increased from 74.3 years in 1980 to 80.7 years in 2009 (Eurostat 2012b).<sup>3</sup> Disregarding migration, these developments lead to a shrinking and ageing population. This, in turn, implies challenges for the economy, pension systems and hence welfare, especially for countries like Germany, where the improvement of living standards is based on the assumption of a young and growing population (Weil 1999; Rindfuss et al. 2003; Bloom et al. 2009). Therefore, it is crucial to identify the driving forces behind these population changes.

Economists have contributed to explaining historical population changes (e.g., Kremer 1993; Galor and Weil 2000; Hansen and Prescott 2002) as well as contemporary changes in fertility. Gary Becker's (1965, 1981) seminal work gave rise to the New Home Economics, marking the beginning of family economics, in which households are viewed not only as consumption but also as production units. Topics regarding fertility and the

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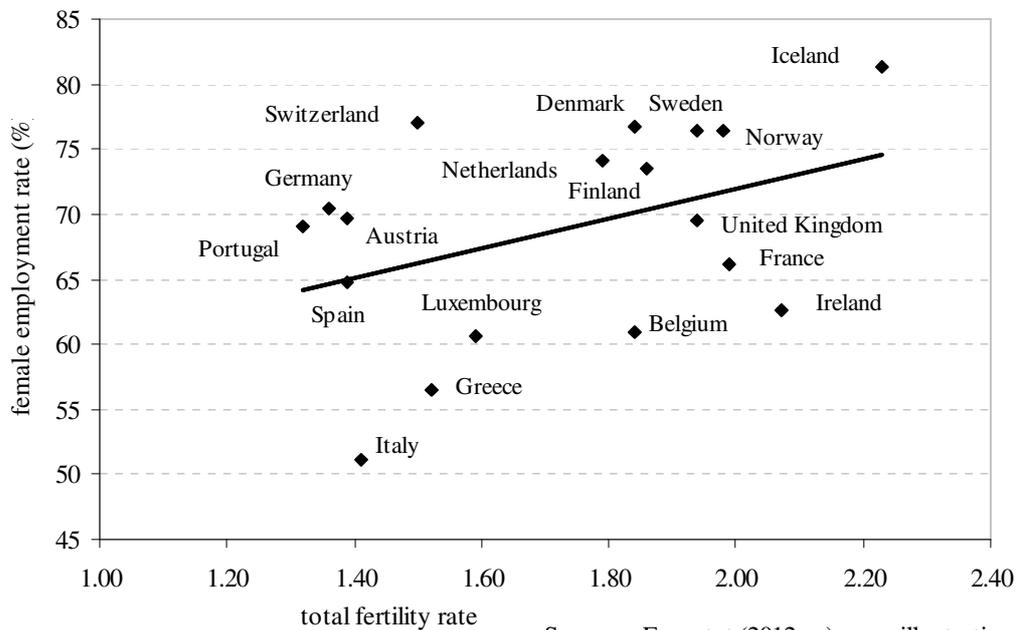
<sup>1</sup> Here: Western Europe comprises EU-15 countries, Norway, Iceland, and Switzerland.

<sup>2</sup> Countries included: Austria, Belgium, Denmark, Finland, France, Germany (West), Greece, Iceland, Ireland, Italy, the Netherlands, Norway, Portugal, Sweden, Spain, Switzerland, United Kingdom.

<sup>3</sup> Data only available for few countries for 1960. Countries included in 1980 and 2009: Austria, Belgium, Denmark, Finland, Germany (West), Greece, Iceland, Luxembourg, Norway, Portugal, Sweden, Spain, Switzerland, United Kingdom.

organisation of paid and unpaid work within a family had formerly mainly been dealt with in sociology. In short, according to Becker (1981), childrearing imposes direct costs as well as opportunity costs on a parent. While direct costs can be described as costs of food and clothing for the child, opportunity costs describe the loss of human capital and income by doing childcare instead of market work. Since women, until recently, were endowed with clearly less marketable resources (human capital) in comparison to their husbands, and since they are more suitable as caregivers due to their “biological advantage” (Becker 1981:21), the wife’s specialisation in childcare and household chores and her husband’s specialisation in market work optimised the family’s joint utility. Since women’s investments in human capital and hence their potential wages have risen during the last decades, childrearing has become more costly for them. Meanwhile, the increased rate of return of education changes the relative importance of ‘child quantity’ (number of children) and ‘child quality’ (education), strengthening the role of the latter. Despite the fact that children are seen as ‘normal goods’, whose demands rise with income growth, the outlined changes led to fewer but better educated children. In other words, the New Home Economics explanation for the drop in fertility rates that occurred between the 1960s and 1980s in the industrialised countries is the women’s rising human capital and the increasing importance of children’s education. From 1950 to 2000, as well as cross-sectional in the 1970s and 1980s, a negative correlation between female employment rate and total fertility rate was indeed observed across OECD countries and Western European countries. Since the 1990s, however, these parameters are positively correlated in the cross-section of countries (see Figure 1.1) (Apps and Rees 2004; Brewster and Rindfuss 2000; Del Boca 2002; Adserà 2005; Reich 2010; OECD 2012). In 2009, for example, less than 60% of women in Greece and Italy participated in the labour market, and fertility rates amounted to 1.52 and 1.41 in these countries. In contrast, more than 80% of Icelandic women were working, and had an average of 2.23 children. Germany had a medium female employment rate of 70.4%, and a comparatively low fertility rate of 1.36 children per woman.

**Figure 1.1: Total fertility rate and female employment rate in Western Europe, 2009**



Dynamic bargaining models provide a theoretical basis for explaining the outlined phenomenon. According to these models (e.g. Ott 1992; see also overview in Pollak 2005), a couple's partners maximise individual utility functions and bargain with each other over time allocation. Human capital is the determinant of each partner's bargaining power because it affects the wage, which, in turn, determines the magnitude of outside marriage options. As human capital and wages grow with labour market participation, these models can explain why women are eager to participate in the labour market even if they have the option of being a fulltime housewife. Yet, to which extent women manage to reconcile work and family life is likely to depend on the nature and magnitude of family policies promoting this reconciliation, as economists, sociologists, demographers and other researchers have pointed out. In stark contrast to Becker's theory, Chesnais (1996), Esping-Andersen (1996), McDonald (1997), Blossfeld and Drobnič (2001) and others argue that, nowadays, women are likely to choose employment instead of children in societies where the 'male breadwinner and female carer/housewife' model is promoted and hence measures to encourage the reconciliation of work and family life are underdeveloped. In this sense, theoretical microeconomic models have shown that public childcare provisions, child benefits, the taxation of couples as well as parental leave policies can positively (or negatively) affect both fertility and female employment at the same time (Ermisch 1989; Apps and Rees 2004; Erosa et al. 2005). Mischke (2011) uses a cluster analysis to support

this argument. Sweden and Denmark, the cluster of countries with the highest values for ‘dual-earner family policy’ and a medium support of ‘general family policy’, have a high fertility rate of 1.78 and a high female economic activity rate compared to men (86.5 employed women per 100 employed men).<sup>4</sup> In contrast, the cluster that includes Spain, Greece, Italy, the Netherlands, and Portugal has the lowest average total fertility rate (1.42) and the lowest female economic activity rate relative to male’s (62.6%), low ‘general family support’ and moderate ‘dual-earner support’.<sup>5</sup> Likewise, Hobson and Oláh (2006) find the largest “birthstriking effects” (Hobson and Oláh 2006:198) in countries with few measures supporting reconciliation of work and family and providing little protection against economic risks.<sup>6</sup> In other words, nowadays family policy measures that are likely to have a positive effect on fertility are also likely to affect women’s labour market participation positively. This is a key factor of successful policies, as it seems that most women today either want to or have to earn their own money in the labour market instead of being a mother and wife ‘only’. For Germany, for example, a recent study shows that in 52% of the families with children below the age of six the father works full-time, while the mother is not employed, but this constellation is only favoured by 6% of the respondents. At the same time, in 16% of the families both partners work full-time, but almost one third favour this dual-earner model (OECD 2001). Meanwhile, the share of women with a high educational level is constantly rising, and women have outnumbered men regarding graduation of tertiary education.<sup>7</sup> Against the background of demographic change, this eagerness of women to enter into (or return to) the labour market and women’s increasing educational level are of utmost importance. Firstly, population decline can lead to labour supply shortfalls in a quantitative manner, hence formerly untapped resources (like women) can increase the pool of potential employees. Secondly, due to the structural change in the labour market, with an increasing importance of the tertiary sector, more and more jobs are created for highly qualified persons. Regarding this qualitative change of

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<sup>4</sup> Mischke (2011) defines ‘dual-earner family policy’ as policies that promote mothers’ employment and fathers’ care work, while ‘general family policy’ does not target at women’s labour market participation. The indicators are derived from several family policy measures, described in detail in Mischke (2011:445-447).

<sup>5</sup> The fact that the cluster analysis grouped the Netherlands into the same group as Southern European countries may come at a surprise. Mischke (2011:450) explains that family policy according to her dimensions of ‘dual-earner family policy’ and ‘general family policy’ are indeed similar in Southern European countries and the Netherlands. She points out that the Netherlands is a special case, as this country has been classified in different welfare state categories throughout the literature.

<sup>6</sup> See also Boll et al. (2012) for this and the next paragraph.

<sup>7</sup> See, for instance, Eurostat (2012d), for the number of graduates for ISCED (International Standard Classification of Education) stages 5 and 6 (tertiary education) in industrialised countries according to sex.

labour demand, women's increasing education comes at the right cue. Hence, the integration of women into the labour market is one of the key strategies to tackle quantitative and qualitative challenges of the labour supply (Schröer and Straubhaar 2006). Thirdly, providing up to 20 years of free public education – as in the case of Germany from the first grade to a university degree – and not using this potential implies enormous sunk costs for the country. Furthermore, if a woman was to be out of the labour force for several years, implying human capital depreciation, and the financial support from family members was to cease (e.g., in case of divorce), this also would entail public financial assistance. As Boll (2010) calculated, a medium educated woman who gives birth at age 28, followed by a tri-annual leave, a tri-annual part-time period and a final return to full-time work, faces a 14% drop in the hourly wage, amounting to a wage loss of over € 200,000 until the age of 45. The amount of this income loss suggests that a low female employment rate implies a poverty risk for women, which can especially occur in case of a breakdown of the partner's financial support (Sellach 2010). Against this background, the lack of family policies that support mother's labour market participation is frequently discussed concerning fertility as well as female and child poverty.<sup>8</sup> These must not be seen as private fates, but have consequences for the economy and hence well-being of the total population.

While measures to support the reconciliation of work and family have long been targeted at women only (Schmitt 2004, 2005; BMFSFJ 2005; de Laat and Sevilla-Sanz 2011; Sigle-Rushton 2010), fathers have come into the spotlight recently. In fact, fathers' and mothers' paid work (market work) and unpaid work (housework and childcare) are strongly intertwined. It is not only public childcare provisions and professional cleaners that enable a woman to allocate more time to paid work, but the father can fill in for her, too. As de Laat and Sevilla-Sanz (2011) summarise, there is vast descriptive evidence that the expansion of female labour market participation is related to the rise of fathers' childcare time in OECD countries, especially those with a comparatively high fertility rate. Recent articles have shown that not only mothers profit from fathers' engagement with their children. It enhances fathers' social competences and work-life-balance (see overview in Hook 2006) as well as children's well-being (Palkovitz 2002; Carlson and McLanahan 2004). Moreover, it has a direct positive effect on fertility (Buber 2003; Oláh 2003; Duvander and Andersson 2006; Lappegård 2010; de Laat and Sevilla-Sanz 2011) and possibly an indirect effect as it improves marital stability and satisfaction (McHale and

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<sup>8</sup> See Sellach (2010) for a discussion of female poverty in Germany, as an example. See Mischke (2011) for a comparison of family policy, fertility rates, female labour force participation, and child poverty.

Crouter 1992; Greenstein 1995; Sanchez and Gager 2000; Oláh 2001; Wengler et al. 2008; Sigle-Rushton 2010).<sup>9</sup> In the 1990s, the Swedes were the first ones to introduce parental leave for both parents, and, shortly afterwards, parental leave weeks for fathers exclusively. In Germany, this measure was introduced in 2007, when the Parental Allowance and Parental Leave Act came into force.

The first article of this dissertation uses the introduction of this Parental Allowance and Parental Leave Act (*Bundeselterngeld- und Elternzeitgesetz, BEEG*) and deals with the predictors of fathers' parental leave use. The second article focuses on the impact of parental leave for fathers on their engagement in childcare across several countries. The third article deals with the methodological question of the proper estimation technique for father's childcare involvement and its predictors. The fourth article deals with another topical issue regarding women's reconciliation of work and family life: the role of the workplace. Indeed, not only family policy and fathers' engagement can possibly affect the compatibility between working and being a mother, but workplace conditions (e.g. public/private job sector) can be very important factors (Drobnič 2011). In light of the increasing demand for highly qualified labour due to the demographic as well as the structural economic change, companies will be better off giving their employees the opportunity to continue working while forming a family. Hence, the fourth article addresses the question of whether the number of children is significantly higher among women working in the public sector than in the private sector, since the public sector is likely to provide better working conditions for women once they become mothers. The articles of this thesis are summarised briefly in the following paragraphs.

**In the first article – ‘Predictors of Fathers’ Use of Parental Leave in Germany’ –** socio-economic and workplace-related predictors of the fathers' use of parental leave after the introduction of the BEEG in Germany in 2007 are identified for the first time. This reform implied a paradigm shift in German family policy and led to a strong increase in the share of leaves taken by fathers. Using data from the 2007 German Microcensus, three logistic regression models are evaluated for the following samples: (1) all fathers, (2) working fathers, (3) fathers in dual-earner couples. The dependent variable distinguishes between fathers who were on parental leave during the time of the interview and fathers who did not take this leave at that point in time. The results show, among other things, that the father's workplace characteristics matter, also in comparison to his partner's. First and

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<sup>9</sup> See Reich et al. (2012) for this survey.

foremost, mother's work status and income are of utmost importance. Interactions of the parents' work statuses – not employed, part-time employed and full-time employed – show that fathers are considerably more likely to take a parental leave if the mother has at least the same workload according to the work status. If the mother's income is higher, the likelihood that the father will take a parental leave is more than tripled, which is the largest effect in the regression models. Against the background of economic and sociological theories, the economic theory of relative resources is supported when comparing the partners, as they obviously compare the opportunity costs of parental leave with each other. Regarding the comparison between fathers making use of parental leave and those not taking this opportunity, the sociological assumption that highly educated fathers are more inclined to take part in childrearing is supported.

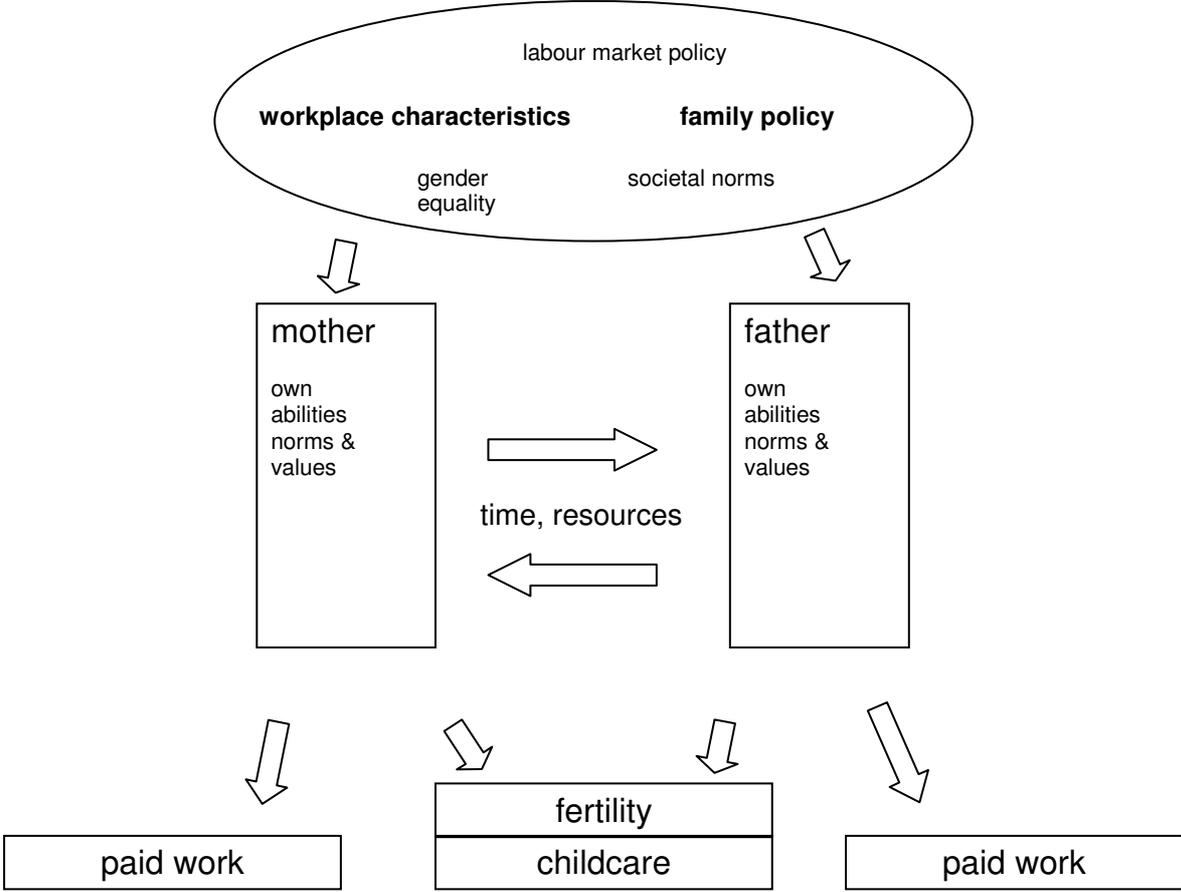
**The second article – ‘Fathers’ Childcare and Parental Leave Policies: Evidence from Western European Countries and Canada’** – is a joint paper with Christina Boll and Julian S. Leppin. It aims at reducing the knowledge gap regarding the relationship between parental leave policies for fathers and fathers' childcare time in industrialised countries. Individual-level diary data from 30 surveys of the Multinational Time Use Study, covering eight industrialised countries from 1971 to 2005, are linked to national parental leave characteristics. The main results are that (1) parental leave for both parents is not positively correlated with fathers' childcare time, (2) in the case of exclusive parental leave weeks for fathers the coefficient is positive but not significant throughout all model specifications, (3) the response to exclusive parental leave weeks for fathers depends on fathers' educational level, (4) low benefit rates are positive compared to no benefits, (5) the result of high benefit rates is ambiguous for several reasons. The result which is strongly significant and robust across all model specifications is the positive association between the duration of exclusive parental leave for highly educated fathers and fathers' childcare time. Thus, it is concluded that children of highly educated fathers are most likely to benefit from the introduction of exclusive parental leave for fathers. Furthermore, because of possible correlations between parental leave characteristics, it is concluded that they have to be interpreted collectively. For example, whether fathers take parental leave might depend on the type of leave (family right or individual right) in connection with the level of benefits. It would probably be best if all elements of family policy were geared into the same direction, making parental leave attractive for fathers.

**The third article – ‘Fathers’ Childcare: The Difference between Participation and Amount of Time’** – primarily addresses a methodological question: Whether and how predictors of fathers’ participation in childcare, defined as zero versus more than zero minutes of childcare, differ from predictors of participating fathers’ amount of time on childcare, measured as minutes on the survey day. It is inspired by Pacholok’s and Gauthier’s (2010) findings that non-participants differ substantially from participants in terms of their social, economic, and demographic characteristics, contradicting the assumptions and methodologies of earlier studies which interpreted non-participation as data artefact. While Pacholok and Gauthier (2010) had used several time categories, the article at hand clearly distinguishes between childcare participation and time. In addition, data from different countries at different points in time are used, whereas their study uses one Canadian survey only. Results confirm that there are remarkable differences between factors influencing participation in childcare and factors associated with participating fathers’ time spent with children in all of the ten countries analysed. Besides the age of the youngest child, which has a negative effect on both participation and minutes, the results suggest that participation in childcare is mainly a question of education, which can also be interpreted as variations in gender roles by social class, while the number of minutes is a question of time availability, reflected by the work status and the day being a weekday or a weekend day. The results call for caution regarding findings from existing studies not distinguishing participation from participating fathers’ childcare minutes.

**The fourth article – ‘Public Sector Employment and Fertility in Germany’** – addresses the importance of workplace characteristics for fertility. It is hypothesised that, among working women in Germany, the number of children is significantly higher for those employed in the public sector than for those working in the private sector, as working conditions are more family-friendly in the public sector. This relationship has been shown for other countries and in cross-country comparison, but a detailed analysis for Germany was missing. Data from the 2005 Generation and Gender Survey are used to estimate the relation between the work sector and the number of children of working women. The results show that public sector employment does not correlate significantly with the number of children in this sample, nor in the following subgroups of working women: women with high/medium/low educational level, mothers. However, working in the public sector is positively correlated with the number of children among working women in partnerships. Moreover, estimating predictors of the number of children for each work sector separately reveals that the negative gradient of the educational level on fertility is

not evident in the public sector among women in partnerships. It is concluded that a job in the public sector alone is not enough reason for women to have more children, but that only in combination with a partner – who could provide additional financial security and assume childcare and housework tasks – a significant result for fertility is visible.

**Figure 1.2: The scope of this dissertation from institutional factors to family outcomes in terms of paid work, fertility and childcare**



Source: Own illustration.

All four articles have in common that they address the current discourse of reconciliation of work and family life which is a core strategy to overcome major challenges faced by industrialised countries due to the demographic change (low fertility rate, labour shortage). They contribute to the empirical economic literature on parents’ challenge to work in the labour market and to be involved with their children at the same time, providing grounds for the development of economic theory. In particular, as described in Figure 1.2, two

aspects of macro-level circumstances that can affect parents' fertility as well as their participation in childcare and paid work in the market, are singled out: *workplace characteristics* and *family policy*. These affect both *mothers* and *fathers*, and parents are assumed to mutually *exchange time and other resources* which, in turn, affect the analysed outcomes in terms of *fertility*, *childcare* and *paid work*. One exceptional feature of this dissertation is that fathers are explicitly taken into account.

Each article's main research question addresses a unique aspect within the topical matter of parents' reconciliation of work and family life. Furthermore, they differ concerning the geographical focus, the methodology and the data sources. While the first and the fourth article focus on Germany, the two others offer a comparison between several industrialised countries from Western Europe and North America. Different regression methodologies have been acquired to answer the research questions: Logistic regression models (Logit and Probit models) for dichotomous dependent variables, OLS and Tobit models for metric data, and Poisson as well as Ordered Probit models for count data with non-negative values. Three different data sources are handled, because each of them features the specific variables needed to answer the research questions: The German Microcensus, providing information on fathers' parental leave in Germany after the introduction of the new legislation in 2007, the Multinational Time Use Survey which includes to-the-minute diary data for numerous industrial countries at many different points in time from the 1970s to 2005, and the Gender and Generations Survey with rich information on fertility-related topics. Furthermore, for the second article, information on national parental leave policies for fathers in industrialised countries has been collected from various sources.

The results of this dissertation contribute to the advancement of economic theory. Firstly, they call for the systematic inclusion of fathers and their characteristics in the development of theories on the gendered division of paid and unpaid work as well as on fertility. Their inclusion should go beyond the view that fathers are a mere financial parameter. Fathers can allocate time resources to childcare, improving their children's outcomes in later life and enabling mothers to continue working in the labour market. Secondly, the results suggest a deeper investigation of the mechanisms behind fathers' childcare time decisions, as the third article suggests that it's not only time constraints and the children's age that have an effect on fathers' engagement with their children. Thirdly, workplace characteristics aside from wages, e.g. job sector and flexibility of work hours, need to enter economic theories modelling the interdependence between parents' employment and

fertility. Finally, theoretical contributions that allow female labour market participation and fertility to rise simultaneously have to become more prominent in mainstream economic theory.

The contributions of this doctoral thesis to the empirical economic literature are manifold. The first two articles directly analyse fathers' response to parental leave policies, calling for the inclusion of fathers in the empirical evaluations of family policies. The third article's results challenge the prevalent assumption that all fathers are participants in childcare and, hence, suggest a redefinition of econometric methodologies for fathers' childcare as a dependent variable. All of the first three articles' results imply that the reconciliation of work and family life is not solely a women's issue, but that fathers should be included in empirical research on this topic. The last paper confirms the relevance of the mother's work sector for fertility. In sum, all articles point out that both parents' workplaces are crucial factors for decisions regarding children (fertility/childcare) and paid labour. Thus, empirical economic research would benefit from factoring in both parents' workplace characteristics when dealing with questions of the reconciliation of work and family life.

In this context it should be emphasised that the subject at hand – the relationship between parents' paid work, childcare and fertility – lies at the crossroads of different disciplines of sciences. Not only economists, but also sociologists, demographers, psychologists, and other scientists provided beneficial theoretical ideas and empirical evidence. These ideas were conducive for gaining comprehensive academic knowledge on the mechanisms behind the empirical results obtained in the present dissertation. Consequently, this highlights the advantage of acknowledging the interdisciplinary nature of this topic which researchers should utilise to broaden their horizon and to derive practicable policy recommendations.

Regarding policy implications, this dissertation suggests a more systematic inclusion of fathers in the design of family policy. When incentives for increasing fathers' family engagement are discussed, the possible inequality regarding human capital and income resources between the mother and the father should be taken into account. Moreover, policy makers should be aware of the fact that a certain measure targeted at one parent possibly influences both parents' time allocation of unpaid and paid labour. At the same time, the results suggest that family policy with all parameters consistently promoting fathers' involvement with their children is important to enable fathers to make a

behavioural change. The good news is that these 'top-down' actions seem to normatively legitimise fathers taking part in childcare and thus indeed have an impact on fathers' behaviour. In this respect, policy makers have to bear in mind that parents' engagement with their children can be measured in many different ways. Their task is to identify the most appropriate indicator for the particular background in which they use it. Finally, collaboration between policy makers and employers is desirable in order to make progress in the encounter of various challenges in the family/work dimension. In other words, not only public policy, but also employers are responsible for making changes that help people see that they do not have to choose between work, on the one hand, and children, on the other, but that they can manage both. This perception is the basis for industrialised countries in order to be able to raise female labour market participation and fertility simultaneously, thus addressing major challenges emanating from the demographic change, which would imply negative economic consequences under a laissez-faire scenario, since family policy is economic policy.

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# 2

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## **Predictors of Fathers' Use of Parental Leave in Germany**

### *Publications*

Reich, N. (2011). Predictors of fathers' use of parental leave in Germany. *Population Review* 50(2):1-22.

Reich, N. (2010). Who cares? Determinants of the fathers' use of parental leave in Germany. *HWWI Research Paper* 1-31.

### *Related Publications*

Reich, N. (2009). Arbeitsplatzbezogene und sozio-ökonomische Merkmale der familienaktiven Väter, Studie im Auftrag des Bundesministeriums für Familie, Senioren, Frauen und Jugend (BMFSFJ). Unpublished.

Reich, N. (2010). Väter und Elternzeit: Erwerbstätigkeit der Partnerin und Sicherheit des Arbeitsplatzes entscheidend. *HWWI Update* 08.

### *Presentations*

Conference: 10 Jahre Forschungsdatenzentren der Statistischen Ämter des Bundes und der Länder, in Berlin (Germany), 12-13 July 2012.

25th Annual Conference of the European Society of Population Economics (ESPE), in Hangzhou (China), 16-18 June 2011.

1st ifo-Workshop Labour Market and Social Policy, in Dresden (Germany), 4-5 March 2011.

Institut National D'Etudes Démographiques (INED), Division « UR 9 – Démographie économique », in Paris (France), November 2010.

European Population Conference, in Vienna (Austria), 1-4 September 2010.

Seminar: Demografie und Wirtschaft – drittes gemeinsames Forschungsseminar des Rostocker Zentrums zur Erforschung des Demografischen Wandels und des Hamburgischen WeltWirtschaftsinstituts gGmbH (HWWI), in Hamburg (Germany), 23 June 2010.

XV Spring Meeting of Young Economists (SMYE), in Luxembourg (Luxembourg), 15-17 April 2010.

6th International Student Conference, Empirical Studies in Social Sciences, Izmir University of Economics, in Izmir (Turkey), 14-15 April 2010.

Doctoral Seminar: Prof. Sonja Drobnič, PhD., Universität Hamburg, Institut für Soziologie, Lehrstuhl für Methoden der empirischen Sozialforschung, in Hamburg (Germany), 26 January 2010.

XXXV Chaire Quetelet, Population Policies in Europe and in North America, Université catholique de Louvain, in Louvain-la-Neuve (Belgium), 18-20 November 2009.

Doctoral Seminar: Prof. Dr. Straubhaar at HWWI, in Hamburg (Germany), 10 November 2009.

## Abstract 2

The aim of this study is the identification of socio-economic and workplace-related predictors of the fathers' use of parental leave after the introduction of the Parental Allowance and Parental Leave Act in Germany in 2007. This reform implied a paradigm shift in German family policy and led to a sharp increase in the share of leave taken by fathers. Using the 2008 German Microcensus database, three logistic models are developed, including all fathers, working fathers, and fathers in dual-earner couples, respectively. The dependent variable distinguishes between fathers who were on parental leave at the time of the interview and those who were not. Many of each father's personal characteristics and workplace-related variables as well as some of his partner's attributes increase the odds of using parental leave significantly. Especially the female partner's full-time employment and income have a strong positive impact. Overall, the findings are in part consistent with existing empirical studies from Scandinavian countries and Germany under the former legislation.

*JEL Classification:* D13, J13, J18, J22

*Keywords:* Childcare, fatherhood, family policy, gender, parental leave, time allocation

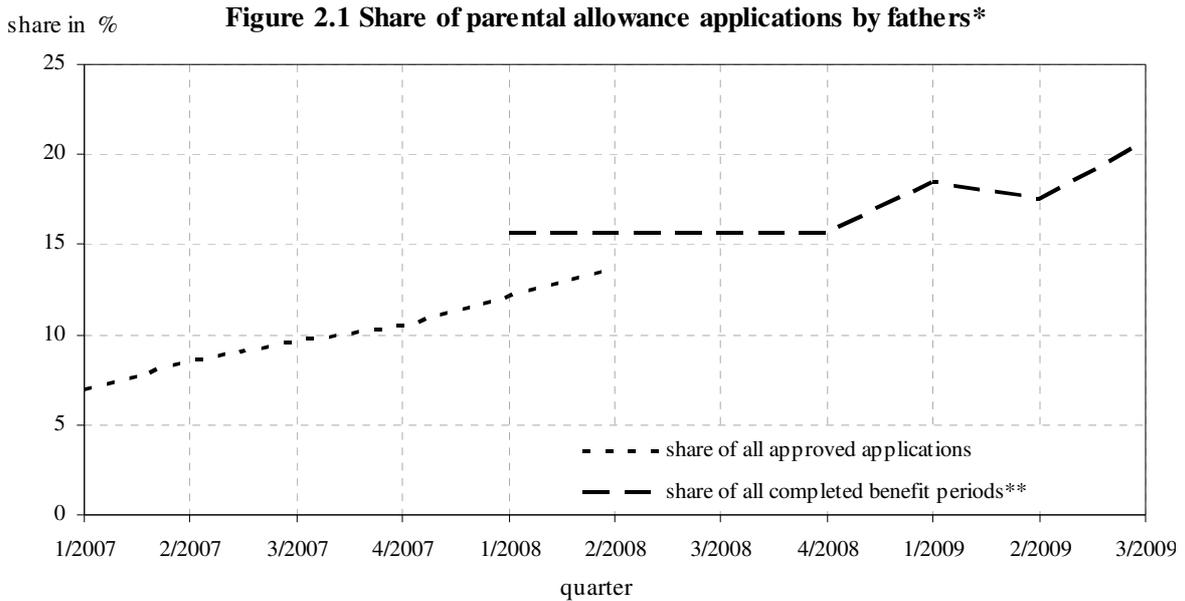
## 2.1 Introduction

Since the 1980s, many European countries have given fathers the possibility to take leave after the birth of their child. Some of them have even reserved some part of parental leave for fathers exclusively. In Germany, from 1996 to 2006, the Federal Child-Raising Allowance Act (*Bundeserziehungsgeldgesetz, BErzGG*) was in place. According to this law, parents could share child-raising leave for up to three years after the birth of a child while receiving a means-tested benefit if the income was below a certain threshold. Although the BErzGG implied that fathers could stay home to take care of their newborn child for the first time, the rates at which they did so stagnated between 2.1% and 3.3% (Federal Statistical Office 2009a). Regarding the impact on the labour market participation of mothers, statistical analyses show that the actual number of working hours among employed mothers decreased, due to several extensions of the possible leave duration (Merz 2004). Meanwhile, the total fertility rate remained between 1.33 and 1.37 in the past decade, and therefore substantially below the replacement level of 2.1 children per woman on average (Eurostat 2009).

The replacement of the BErzGG by the Parental Allowance and Parental Leave Act (*Bundeseltern- und Elternzeitgesetz, BEEG*) in 2007 implied a paradigm shift with regard to German family policy. The BErzGG promoted the male-breadwinner family model. On the contrary, the aim of the BEEG is that no parent should be dependent on their spouse or governmental support in the long run. According to this law, which is inspired by the Swedish family policy model, parents can take 14 months of parental leave.<sup>10</sup> The parental leave benefit equals 67% of monthly net income, but at least € 300 and at most € 1,800 per month. Parents can share their months of parental leave amongst each other, however, following the ‘use-it-or-lose-it’ system, two months are reserved for the other parent (usually the father). One result which is already visible is the sharp increase in participation rates among fathers to over 20% in 2009 (see Figure 2.1).

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<sup>10</sup> In order to distinguish between the leave under the Federal Child-Raising Allowance Act and under the Parental Allowance and Parental Leave Act, ‘child-raising leave’ is used for leave under the first, ‘parental leave’ for leave under the latter legislation.



\* Change in the official statistical records 2008/09: Approved parental allowance applications in the application month are no longer recorded, but completed benefit periods in the month of the end of the benefit period instead.

\*\* Average for the year 2008.

Sources: Federal Statistical Office (2009b); own illustration.

In 2007 and 2008, which are explored in this study, more than 178,000 fathers took parental leave with benefits (Federal Statistical Office 2008a, 2009b). In other words, about 8.8% of children born in 2007 and over 17% of those born in 2008 had fathers that took parental leave (Federal Statistical Office 2010).

If parents share the parental leave months and take them successively, the mother can be absent from work for a shorter period. An analysis on the labour market participation of mothers who had given birth to a child after the introduction of the BEEG shows that mothers whose partner has taken parental leave have a 20 percentage point higher employment rate during the observed time span between six months and three and a half years after the child's birth (Kluge and Tamm 2009). This entails interesting effects both on the micro and the macro level. On the micro level, a reduction of the leave period reduces a mother's loss of human capital and income induced by the birth of a child.<sup>11</sup> This can possibly promote equal opportunities for mothers with regard to job applications and wages and that can in turn reduce the poverty risk of mothers and their families.<sup>12</sup> In this

<sup>11</sup> Boll (2009) finds that in Western Germany, a woman who takes three years of leave plus three years of part-time work at the age of 28 loses between 29 and 36% of the maximum wage (depending on the education level) until the age of 45. If she only takes one year of parental leave and two years of part-time employment, the income loss is halved.

<sup>12</sup> In Germany, the poverty risk of families in which both parents work full-time is substantially lower than in families in which one or both parents work less than full-time or are not employed at all. Across European countries, there is a negative descriptive correlation between the employment of mothers and the poverty risk of children (BMFSFJ 2010).

context, it is noteworthy that the fathers' involvement in childcare is associated with higher marital satisfaction and stability (McHale and Crouter 1992; Greenstein 1995; Sanchez and Gager 2000; Oláh 2001; Wengler et al. 2008). Furthermore, analyses from several European countries show that it can raise a couple's actual or desired number of children (Buber 2002; Oláh 2003; Cooke 2003; Duvander and Andersson 2006; Lappegård 2008a). On the macro level, Germany would especially profit from the mothers' stronger attachment to the labour market and higher fertility rates. They could diminish the lack of qualified workers both at present (the mothers) and in the future (the children), given that the labour supply matches the demanded job specifications.

The aim of this study is the identification of the predictors of fathers' use of parental leave in Germany after the introduction of the BEEG. Knowledge about these factors and the comparison to findings in other European countries can be applied to the formulation of policy recommendations that further promote fathers' taking parental leave. In the first step of this study, economic theories and international literature referring to the predictors of the fathers' use of parental leave are evaluated. After the description of the data and methodology employed in this study, descriptive results and the results of three binary response models using data from the 2008 German Microcensus are presented. The dependent variable distinguishes between fathers that were on parental leave at the time of the interview and fathers who were not availing themselves of this opportunity at that point in time. The first model includes all fathers, regardless of their own and their partner's work status, in order to capture an overall picture of parental leave predictors for fathers, including the differences between the partners' work statuses. The second model focuses only on working fathers. It therefore allows an analysis of work-related predictors. The third model is restricted to fathers in dual-earner relationships, so that the influence of differences between the spouses with regard to workplace-related features can be assessed. In addition, the third model allows for a comparison of results to the empirical literature focussing on working parents. At the end, the results are summarised and discussed.

## **2.2 Fathers' use of parental leave: Theoretical and empirical background**

### **2.2.1 Theoretical background**

In current microeconomic theory, two strands of literature about intra-family time allocation are generally accepted: time-allocation models of New Home Economics and game-theoretic bargaining models. In models of the allocation of time, a household forms one consumption and production unit (Becker 1965, 1981). In other words, both spouses maximise a joint utility function. One important constraint for this joint utility function is the assumption that the main breadwinner is altruistic. This spouse is made better off by actions that raise both spouses' utility. Utility can be derived from 'commodities', which are produced and consumed by the household. These commodities include children. Commodities which are produced using time and goods as inputs do not have market prices. Instead, they have shadow prices that are equal to the cost of production. The demand for commodities depends on their shadow prices, which are in turn based on direct and time costs. The total available time equals the sum of working and consumption time, which includes parental leave. An individual's division of time depends on the opportunity costs of the different options. The opportunity costs consist of foregone earnings and human capital depreciation. The higher the opportunity costs of consumption time, the lower the amount of time spent on consumption. A higher income implies higher opportunity costs and thus a higher relative price of consumption time. Consequently, as the income rises, a rational individual increases the time spent on work and reduces the time for consumption. Becker (1981:21) claims that due to the "biological commitment" of women for child "production" and care, they are more productive in the household, even if both spouses are endowed with the same human capital. In addition, early specialisation of women into household tasks as well as limited career advancements and lower wages further contribute to the gender-specific distribution of market work and non-market work. In the end, the maximisation of the joint utility function entails the wife's specialisation in home production and the husband's specialisation in full-time market work.

Becker's model has been criticised for several reasons, above all for his assumptions about the altruistic spouse. Firstly, he assumes that the breadwinner behaves altruistically, in spite of his greater power due to his higher market income. Secondly, he uses the masculine pronoun for the altruist and the feminine pronoun for the beneficiary (Becker 1981:278). In traditional families, the male partner is indeed the breadwinner. But

assuming that he is the altruist is not in line with empirical evidence that reveal a stronger tendency of women to care for family members than of men (England and Farkas 1986; Blossfeld and Drobnič 2001). Moreover, in the incidence of marital dissolution or the breadwinner's death, the implicit economic dependency of one partner on the other in Becker's approach implies an asymmetric risk to the partner who has specialised in household production and childcare (Blossfeld and Drobnič 2001). Therefore, contrary to Becker's conception, household bargaining models assume the maximisation of an individual utility function to each spouse (e.g. Ott 1992), in which neither spouse agrees to do so. Both are eager to spend some time in paid work. But each partner's allocation of time as well as the division of goods within the household are the result of bargaining and depend on their individual bargaining position. This, in turn, is positively related to individual income and human capital resources. As a lower level of human capital in the future will result in a worse bargaining position (in the future), the eagerness to work in the labour market holds even in relationships that are assumed to be stable. However, from the start, the spouse with the relatively higher work-related resources concentrates on market work and does less housework and childcare, while the other one does less paid work but the lion's share of household and childcare tasks. To sum up, the outcome of this model is not as 'radical' as in Becker's approach, even though both microeconomic models' results depend strongly on the economic power of each spouse.

However, empirical findings suggest that there are more factors that influence the allocation of time between spouses. Several studies argue that even if the female partner exhibits a higher human capital endowment and income, or works as many hours as her partner, she is still responsible for most of the housework and childcare (Beblo 1999; Yamada et al. 1999; Stancanelli 2003; Lauk and Meyer 2005). At the same time, it is widely observed that there is hardly any difference in time for household chores of 'traditional' and 'modern' men, especially when a couple has children, despite very different views in regard to the gendered division of labour (Schulz and Blossfeld 2006; Wengler et al. 2008; Zerle and Krok 2008).

For this reason, sociologists claim that not only rational considerations but also cultural factors, especially gender role expectations, are important factors that determine intra-family time allocation. England and Kilbourne (1990) argue that culture imposes an altruist value system on women and a rather self-interested one on men. In unions formed between partners, the gendered value system implies that the man negotiates harder, so that the

outcome of bargaining exceeds what it would be in an arrangement based solely on a husband's and wife's respective income and human capital resources.<sup>13</sup> According to the 'doing gender' approach, also referred to as the 'gender display' approach, cultural norms hamper the role reversal of men and women, so that women have to display that they are women and men that they are men (West and Zimmermann 1987; Brines 1994). If traditional views are prevalent in a society, this theory implies that when a woman's earnings capacity exceeds that of her husband, both spouses are eager to retain traditional behaviour in terms of housework and childcare in order to show that they are 'proper' wives and husbands. Similar results are assumed in the identity-formation model (Bielby and Bielby 1989) and in the gendered moral rationalities approach (Duncan and Edwards 1997). Akerlof and Kranton (2000) utilised the suggestion that female labour market participation threatens the identity of husband and wife and therefore enhanced the bargaining model through the variable 'identity'. As a result, a woman's paid work implies a loss of utility. This, in turn, is compensated for by a female partner through stereotypical behaviour concerning household tasks, which probably results in stereotypical behaviour on the male partner's side.

In this context, Blossfeld and Drobnič (2001) point out that collective beliefs about the correct division of labour within a couple do not only vary between societies, but also between social classes, as the motivation for mothers' labour market participation differs between them. However, from this point of view, predictions of the gendered division of childcare are not straightforward. On the one hand, men's participation in childcare is likely to increase with his level of education and, hence, his income. On the other hand, the higher his income, the lower the incentives for his wife to work in the labour market, so that she possibly spends more time on childcare. As it will be presented in the next section, the majority of empirical analyses support the first mentioned alternative.

## **2.2.2 Empirical background**

Most multivariate empirical studies on the fathers' use of parental leave have been conducted in Scandinavian countries, as they were the first to introduce 'daddy months'

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<sup>13</sup> According to England and Kilbourne (1990:163), once the wife has taken the structural role of the homemaker, her bargaining position further declines not only because of human capital depreciation, but because of the cultural devaluation of traditional family work, the fact that the beneficiaries of much domestic work are children rather than men, some of the investments in domestic work are specific to a particular relationship, and the fact that even 'general' investments in domestic skills are only useful while being in a relationship.

and parental leave for both parents in the second half of the twentieth century. There is only one major German study on the use of the child-raising leave of fathers between 1999 and 2005, i.e. before the parental leave reform (Geisler and Kreyenfeld 2009).

Looking at specific variables, most studies find that both the father's and his female partner's education and income level have positive effects on the father's taking parental leave.<sup>14</sup> However, in Bygren's and Duvander's (2006) model, the mother's income has a negative effect and the father's education is not shown to have any significant effect. Furthermore, in Lappegård's (2008b) study, fathers are more likely to take leave if his partner's income is only slightly lower than his own, compared to a much lower income or a higher income of the mother than of the father. The result that fathers are less likely to take parental leave if his income is considerably higher hints that a couple's choices are subject to economic constraints. It is in line with the main conclusion of surveys investigating women's and men's attitudes towards taking child-raising leave in Germany. They show that the omnipresent fear of income losses deterred fathers from using this leave (Beckmann 2001; Rost 2002; Institut für Demoskopie Allensbach 2005; Kassner and Rüling 2005). Studies that took the nationality into account agree that the likelihood of a father's taking a leave is higher if he is home country national (Geisler and Kreyenfeld 2009; Hoem 1995) or, more generally, from a Western country (Naz 2007), respectively. In Germany, fathers living in the eastern part of the country had higher odds of taking child-raising leave under the old system in place before 2007 (Geisler and Kreyenfeld 2009).

However, the literature is divided on the impact of marriage and the number of children. While married fathers seem to have higher odds of using parental leave than cohabiting men in Sweden (Sundström and Duvander 2002) and in Norway (Naz 2007), they had lower odds in Germany under the old legislation (Geisler and Kreyenfeld 2009). As to the number of children, Naz (2007) as well as Geisler and Kreyenfeld (2009) suggest that the father's use of parental leave is higher in families with more children. In contrast, Sundström and Duvander (2002) as well as Hoem (1995) find a positive effect if it is the firstborn child.

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<sup>14</sup> Father's education: Hoem 1995; Sundström and Duvander 2002; Naz 2007; Lappegård 2008b. Father's income: Sundström and Duvander 2002; Bygren and Duvander 2006. Female partner's education: Sundström and Duvander 2002; Bygren and Duvander 2006; Lappegård 2008b; Geisler and Kreyenfeld 2009. Female partner's income: Sundström and Duvander 2002; Naz 2007.

Regarding father's workplace characteristics, employment in the public sector, a permanent contract, a large company as well as the existence of a large share of women in a profession are all positively associated with a father's using parental leave.<sup>15</sup> Lappegård (2008b), who compared characteristics of the father's workplace with those of his female partner, concludes that the father's use is highest if both partners work in the public sector, in a medium-sized company or in a male-dominated profession. In this context, Haas et al. (2002) point to the importance of the organisational culture of firms. They show that a company's commitment to caring values, the level of 'father friendliness', the support for women's equal employment opportunities, the fathers' perception of support from senior managers as well as a rewarding system that is geared to task performance instead of the number of attended hours are crucial factors for a father deciding whether to take parental leave. Similarly, German surveys identified career disadvantages as well as the fear of stigmatisation and job-loss as important reasons why fathers did not go on child-raising leave (Beckmann 2001; Institut für Demoskopie Allensbach 2005).

After the introduction of the new parental leave scheme in Germany in 2007, only one German study was conducted on the characteristics of the fathers who used parental leave. Pfahl and Reuyß (2009) conducted a descriptive and explorative analysis with a sample of 624 fathers that took part in a survey launched on the internet. This sample consisted of 0.7% of all fathers who used parental leave in 2008. The results show that the majority are comparatively old (mean age: 36.8 years)<sup>16</sup>, hold a university degree, live in large cities and have a partner who is working. About two thirds of fathers have more than one child. Almost two thirds work in the public sector or in other service branches. Three fourths are employed in companies with more than 100 employees. As a decisive factor for the decision to take parental leave, the fathers in the sample specify the amount of their income in comparison to their partner's as well as their workplace situation, including the flexibility of work schemes. However, because of the method of drawing the sample, this study is not representative, so that the results have to be treated with caution. Besides, the authors did not use multivariate statistical methods to test for significant effects under control of important covariates.

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<sup>15</sup> Public sector: Hoem 1995; Bygren and Duvander 2006. Permanent contract: Geisler and Kreyenfeld 2009. Large company: Bygren and Duvander 2006. Share of women in the profession: Bygren and Duvander 2006; Naz 2007.

<sup>16</sup> In the study of Pfahl and Reuyß (2009), 36% of fathers using parental leave are younger than 35, and 29% are at least 40 years old. In contrast, in the official statistics, 47% are younger than 35, while only 21% are 40 or older (Pfahl and Reuyß 2009).

## 2.3 Data and methodology

In this study, a representative sample – the German Microcensus – is used to analyse the factors that influence a father’s going on parental leave with multivariate regression models. The German Microcensus has been conducted annually in western Germany since 1957 and in eastern Germany since 1991 (Federal Statistical Office 2008b). This survey is a 1% representative sample of the German population and comprises about 370,000 households with about 820,000 individuals in each wave. The questionnaires reveal whether a father is taking parental leave and receiving leave benefit or not (Research Data Centres 2010). Besides its representativeness, further advantages of the Microcensus include the provision of data collected after the parental leave reform of 2007 and the inclusion of enough cases for multivariate analyses of fathers with young children due to the large sample size. In fact, these prerequisites – the presence of both data from 2007 or later and a sufficient number of fathers – make the German Microcensus the single database currently available that can be used to address the research question. Moreover, the German Microcensus contains few missing data, because the response to most questions is mandatory.

However, there are a few drawbacks. Firstly, the respondents are only asked whether they are currently – meaning in the survey week, which is always in April – on parental leave and receive parental leave benefits. The questionnaire does not record whether they have already taken parental leave, or whether they intend to do so. Therefore, the group of fathers not currently on parental leave is biased by those that have completed their parental leave or have not started it yet. Thus, the fact that this database provides only information on a particular time (a snapshot) of the respondents’ lives, implying that fathers *currently taking parental leave* are compared to fathers *currently not on this leave*, calls for caution with regard to the results and their interpretation. Throughout this study, fathers that were using parental leave in the survey week are defined as fathers ‘taking parental leave’, whereas fathers who were not using this leave in the survey week are defined as ‘not taking parental leave’, respectively. Likewise, the discussion of the results of the models refers to ‘having higher odds of taking a leave’ and ‘having lower odds of taking a leave’, without stating in every sentence that it applies to the time of the interview.

Secondly, married and cohabiting couples can be identified, but as biological kinship between family members is not accounted for, it is not clear whether a child is the biological offspring of both partners or of only one of them. Therefore, the sample includes

married as well as cohabiting men with at least one child born in 2007 or 2008, although some of them may not be the biological or legal father of the child. This probability is higher among men who are currently not on parental leave, as only the biological or the legal father of a child is eligible for parental leave. The missing information on biological kinship also implies that the age group has to be limited to men and women that can possibly be the parents of the child in their family. In this study, couples with one partner under the age of 18 are excluded. The upper boundary for men is set at 53 years, as the number of men reporting to have a child below the age of two in the family markedly drops at this threshold. In particular, the restriction on men aged 18 to 53 years excludes less than 0.4% of men who reported having a child born in 2007 or 2008 in the family. Besides, couples in which the woman is older than 45 are excluded, as this marks the end of the childbearing age in Germany (Dorbritz 2008).

Summing up, this sample includes all men who live with a female spouse in the same household and report to have a child born in 2007 or 2008 in the family. It is further restricted to men between 18 and 53 years of age whose spouse is between 18 and 45 years old. Three logistic regression models are applied. The dichotomous dependent variable  $Y$  takes the value 1 if the father is on parental leave and 0 if not. The selection of the independent variables ( $X$ ) is based on the empirical literature on the determinants of the fathers' use of parental leave, as summarised in Section 2.2.<sup>17</sup>

There is one particularly noteworthy difference between the BEEG and parental leave systems in other countries, namely the fact that not only parents who had been working prior to the birth of their child, but in fact all parents are eligible for parental leave with parental benefit. Therefore, model I includes *all* men of the sample previously described: In particular, besides men who are classified as employed (among them men that reduce their work hours to zero while on parental leave), it includes unemployed men and those that are neither registered as employed nor unemployed, e.g. students and homemakers. Among the independent variables are personal characteristics and the partners' employment status, as depicted in the estimation equation:

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<sup>17</sup> Geisler and Kreyenfeld (2009) consider the degree of urbanisation in their study on the former child-raising leave. As sensitivity analyses have revealed the insignificance of this variable in the analyses at hand, it has been excluded in the models presented in this article.

$$\begin{aligned} \text{logit}(Y_{1/0}|X) = & \alpha + \sum_{i=1}^2 \beta_{1,i} \text{agecat}_i + \beta_2 \text{citizen} + \beta_3 \text{cohab} + \beta_4 \text{kids} \\ & + \sum_{i=1}^2 \beta_{5,i} \text{edu}_i + \beta_6 \text{inc} + \beta_7 \text{incsqu} + \beta_8 \text{east} + \sum_{i=1}^5 \beta_{9,i} \text{workdif}_i \end{aligned} \quad (2.1)$$

As to personal characteristics, age categories (*agecat*), family status (*cohab*), nationality (*citizen*), number of children at preschool age (*kids*), the level of education (*edu*), the monthly net income (*inc*) and its square (*incsqu*) as well as the region (*east*) are included in the model. *Cohab* is a dummy variable that takes the value 0 if the father is married and 1 if he is cohabiting. Three age categories are defined, from 18 to 29, from 30 to 41, and from 42 to 53.<sup>18</sup> The dummy variable *citizen* distinguishes between fathers with a German or other European passport on the one hand and fathers with citizenship from a non-European country on the other.<sup>19</sup> The level of education is classified into three categories. Persons with nine years or less schooling are defined to have a low educational level. In the model, dummy variables for medium educational level (ten or eleven years of schooling) and high educational level (twelve to thirteen years of schooling, i.e. technical college or university entrance qualification) are included.<sup>20</sup> The variable for income is a metric variable, consisting of the mid-value of the class interval of 24 income groups and denoting zero in case of no income. Furthermore, the dummy variable *east* denotes whether a person lives in the eastern or western part of Germany.<sup>21</sup> This variable is included because of the different historical backgrounds of these two regions. The variable *workdif* captures the partners' differences in the employment status and includes all possible combinations of the three work statuses: not employed, part-time employed, and full-time employed. A summary of the variables for model I is presented in Table A.2.1 in the appendix. In all models,  $\alpha$  denotes the axis intercept and  $i$  denotes the value of the dummy variables which equals the number of categories minus the reference category.

Model II is restricted to men who are classified as employed in the survey; among them are men who reduce their weekly working hours to zero in order to take parental leave while

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<sup>18</sup> As sensitivity analyses have revealed that the variables age and age squared would not be significant in models I and II, because the underlying functions do not capture the increased use of leave for the oldest fathers, three age categories have been inserted into the models I and II instead.

<sup>19</sup> Models that distinguish between German and other European countries have shown that there is no significant difference between these two categories.

<sup>20</sup> For the educational level, only the level of schooling is used, because younger fathers might not have completed higher education (e.g. apprenticeship or university). In this case, they would hold a low ISCED (International Standard Classification of Education) degree, however, this would only be due to the age.

<sup>21</sup> Berlin belongs to eastern Germany in this study.

on an ongoing work contract (in following: ‘working fathers’). In addition to the variables in model I, model II allows an assessment of the influence of the workplace. It accounts for the following work-related characteristics, each being composed of one or several dummy variables: type of work contract (*temp*), firm size (*fsize*), sector affiliation (*public*) and the sex ratio of the profession (*sratio*). Moreover, a variable that captures the female partner’s work status is included (*femwork*). The estimation follows the equation:

$$\begin{aligned} \text{logit}(Y_{1/0}|X) = & \alpha + \sum_{i=1}^2 \beta_1 \text{agecat}_i + \beta_2 \text{citizen} + \beta_3 \text{cohab} + \beta_4 \text{kids} + \sum_{i=1}^2 \beta_{5,i} \text{edu}_i \\ & + \beta_6 \text{inc} + \beta_7 \text{incsqu} + \beta_8 \text{east} + \sum_{i=1}^2 \beta_{9,i} \text{femwork}_i + \beta_{10} \text{temp} + \beta_{11} \text{public} \\ & + \beta_{12} \text{fsize} + \sum_{i=1}^2 \beta_{13,i} \text{sratio}_i \end{aligned} \quad (2.2)$$

The variable *temp* denotes whether a person holds a permanent contract or not, and *fsize* captures whether or not there are more than 50 employees working at the specific establishment. For the classification of the sex ratio of the profession, an analysis was conducted on the basis of the German Microcensus in order to find the sex ratio of occupations listed in the ISCO<sup>22</sup> classification list. Following Leitner (2001), female-dominated occupations feature a share of women above 50% of all employed persons, male-dominated occupations a share of less than 30% and balanced occupations are between these two groups. A summary of the variables of model II is presented in Table A.2.2 in the appendix.

Finally, model III comprises only dual-earner couples<sup>23</sup> so that the differences between the partners’ socio-economic and work-related background can be estimated. The independent variables include personal characteristics of the fathers as well as differences between the partners as to age (*agedif*), income (*incdif*), educational level (*eddif*), employment sector (*pubdif*), firm size (*sizedif*), work contract (*condif*) and the sex ratio of the professions (*ratiodif*). They are included in the model as dummy variables. Precisely, age differences are captured through three categories: male partner is more than five years old, less than five years difference, female partner is more than five years old. Similarly, three categories for educational differences indicate whether the male or the female partner hold the higher level of schooling or whether they hold the same level; three income categories indicate if

<sup>22</sup> International Standard Classification of Occupations.

<sup>23</sup> That means that model III includes the men and women who are currently employed, or who are employed but reduced their working hours up to zero hours while using parental leave.

the male or the female partner has a higher income (mid-value of class interval) or if they have the same; and the categories for the firm size show if one partner is working in a larger firm or whether their firms have the same number of employees. The categories for differences in the sector and work contract each account for all possible combinations of private and public sector and accordingly, permanent contract versus temporary contract or self-employment, resulting in four categories each. Finally, six categories account for the differences between the sex ratios in the partners' professions, which cover all possible combinations of female-dominated, male-dominated and balanced. Further details on the variables of model III are provided in Table A.2.3 in the appendix. For each variable, all categories but one which serves as the reference category are inserted into the model. The equation for model III is:

$$\begin{aligned} \text{logit}(Y_{1/0}|X) = & \alpha + \beta_1 \text{age} + \beta_2 \text{citizen} + \beta_3 \text{cohab} + \beta_4 \text{kids} + \beta_5 \text{inc} + \beta_6 \text{east} \\ & + \sum_{i=1}^2 \beta_{7,i} \text{agdif}_i + \sum_{i=1}^2 \beta_{8,i} \text{eddif}_i + \sum_{i=1}^2 \beta_{9,i} \text{incdif}_i + \sum_{i=1}^3 \beta_{10,i} \text{pubdif}_i \\ & + \sum_{i=1}^2 \beta_{11,i} \text{sizedif}_i + \sum_{i=1}^3 \beta_{12,i} \text{condif}_i + \sum_{i=1}^4 \beta_{13,i} \text{ratioidif}_i \end{aligned} \quad (2.3)$$

Before the results of the estimations are presented, a closer look is taken at some descriptive statistics in the next section.

## 2.4 Descriptive results

For a better overview on the fathers using parental leave, it is valuable to examine significant differences in the share of fathers taking parental leave in the survey week as a percentage of all fathers in each category of the variables. This distribution and the significance according to the chi-square test are displayed in Table 2.1 for samples of all fathers, working fathers, and fathers in dual-earner couples.

First to age, where there is a significant difference between the three categories. The highest fraction of fathers on parental leave can be found in the oldest aged group. The portion of fathers taking parental leave is also significantly higher for married than for cohabiting fathers. Concerning educational level, there is a significant increase in parental leave being taken at the time of the interview across the levels of schooling in the samples of working fathers and fathers in dual-earner couples. In contrast, the distribution across the father's monthly net income resembles a U-shaped pattern. Parental leave is claimed at

the highest rates by fathers earning below € 500 per month, and the least by fathers earning between € 2,600 and € 4,000, but it is higher again for fathers with a monthly income of at least € 4,000.

Outstandingly high differences between fathers taking advantage of parental leave in the survey week and fathers who did not are found when taking differences between the partners' work statuses into account. The lowest share of fathers on leave can be found in couples with a composition that is typical for Germany: a father who is employed full-time and a mother part-time.<sup>24</sup> The share of leave is highest for couples in which the mother works full-time while the father is not employed or works part-time. It is also very high when she is employed part-time and he is not employed. Going on leave occurs at a medium rate when both parents have the same employment status. Remarkably, compared to 'typical' couples, the rate of participation is also higher if the woman works fewer hours than her male partner in a 'non-typical' composition (she is not employed, he is employed full-time or part-time). To sum up, couples with the typical composition of the partners' employment status appear to be the most traditional, whereas in couples in which the mother works more hours than the father, the share of fathers using parental leave is highest.

With regard to workplace-related variables, the share of fathers going on parental leave is substantially higher in the public sector or with a permanent contract. Moreover, participation is notably high in balanced professions and small firms.

Recalling the suggestions of the theoretical models and empirical literature, it is expected that the fathers taking parental leave differ from the reference group with respect to their differences to their partners, especially in dual-earner couples. Looking at income differences, the use of parental leave by fathers is clearly higher if their female partner earns the higher wage. Concerning the educational differences, the fraction of fathers using leave is high in couples in which both have the same level of education or the mother has enjoyed more years of schooling. Hence, fathers who take parental leave have on average a higher level of schooling than other fathers, but compared to their partners, they have the same, if not a lower level. With regard to workplace related variables, the share of fathers taking parental leave is especially high if both partners are employed in the public sector, the female partner is employed in the larger firm, only the male partner or neither partner

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<sup>24</sup> In 2007, 40% of couples in western Germany and 28% of couples in eastern Germany showed this composition, and its share had been growing in both parts of Germany between 1990 and 2007 (Hans Böckler Stiftung 2010).

holds a permanent contract or if the female partner works in a male-dominated profession while the male partner is employed in a female-dominated or balanced profession. In contrast, the share of fathers on parental leave is small if only the female partner is employed in the public sector, if she is the only partner holding a permanent contract, if the father is employed in the larger firm or if both partners work in professions that are typical for their sex. In the next section, the results of three logistic models are presented, which reveal whether the significance of the discussed characteristics hold true in multivariate analysis.

**Table 2.1: Share of the fathers on parental leave in the survey week as percentage of all fathers in each category of the variables**

		sample sample 1	sample 2	sample 3
		all fathers	working fathers	fathers in dual- earner couples
<b>N (total number of fathers in the sample)</b>				
		6,995	6,305	2,660
	using parental leave	294	239	115
	using parental leave (%)	4.20%	3.79%	4.32%
<b>Share of fathers using parental leave of all fathers in the category (%)</b>				
<b>personal characteristics</b>				
<b>age</b>	18 - < 30 years	<b>3.49</b>	<b>3.46</b>	<b>2.47</b>
	30 - < 42 years	<b>4.08</b>	<b>3.58</b>	<b>4.40</b>
	42 - < 54 years	<b>6.17</b>	<b>5.54</b>	<b>6.40</b>
<b>citizenship</b>	German or other European	4.31	3.82	1)*
	non-EU country	3.37	3.55	1)*
<b>marital status</b>	married	<b>4.63</b>	<b>4.18</b>	<b>4.66</b>
	cohabiting	<b>2.42</b>	<b>1.97</b>	<b>3.06</b>
<b>number of children below the age of seven</b>				
	one	4.04	3.72	4.44
	two	4.26	3.76	4.04
	three or more	5.31	4.49	4.95
<b>education (schooling)</b>	low	3.73	<b>3.17</b>	<b>2.96</b>
	medium	3.89	<b>3.55</b>	<b>3.63</b>
	high	4.85	<b>4.42</b>	<b>5.43</b>
	no answer	2.78	<b>3.13</b>	<b>0.00</b>
<b>monthly net wage</b>	€ 0 – 500	<b>5.73</b>	<b>7.14</b>	<b>12.50</b>
	€ 500 – 1300	<b>6.64</b>	<b>6.30</b>	<b>10.29</b>
	€ 1300 – 2600	<b>3.78</b>	<b>3.51</b>	<b>3.49</b>
	€ 2600 – 4000	<b>2.81</b>	<b>2.65</b>	<b>1.50</b>
	€ 4000 or more	<b>3.04</b>	<b>3.04</b>	<b>2.11</b>
	no answer	<b>3.90</b>	<b>2.91</b>	<b>4.55</b>
<b>region</b>	western Germany	4.30	3.95	4.30
	eastern Germany	3.77	2.99	4.42
<b>differences between the spouses' employment statuses</b>				
	both fulltime	<b>4.83</b>	<b>4.83</b>	<b>4.83</b>
	female: full-time, male: part-time	<b>18.37</b>	<b>18.37</b>	<b>18.37</b>
	female: full-time, male: not employed	<b>19.81</b>		
	female: part-time, male: full-time	<b>2.75</b>	<b>2.71</b>	<b>2.71</b>
	both part-time	<b>11.11</b>	<b>11.11</b>	<b>11.11</b>
	female: part-time, male: not employed	<b>12.73</b>		
	female: not employed, male: full-time	<b>3.29</b>	<b>3.29</b>	

	female: not employed, male: part-time	<b>5.96</b>	<b>5.96</b>	
	both not employed	<b>5.10</b>		
<b>female partner's employment status</b>				
	not employed	<b>3.62</b>	<b>3.40</b>	
	part-time employment	<b>3.56</b>	<b>3.13</b>	<b>3.13</b>
	full-time employment	<b>6.25</b>	<b>5.28</b>	<b>5.28</b>
<b>work-related characteristics</b>				
<b>sector affiliation</b>	public sector	<b>5.43</b>	<b>8.12</b>	
	private sector	<b>3.31</b>	<b>3.73</b>	
<b>firm size</b>	small: less than 50 employees	<b>4.39</b>		4.7
	large: at least 50 employees	<b>3.40</b>		4.04
	no answer	<b>2.00</b>		3.33
<b>type of work contract</b>	temporary or self-employed	<b>3.62</b>		<b>4.11</b>
	permanent	<b>3.82</b>		<b>4.34</b>
	no answer		1)*	1)*
<b>sex ratio of the profession</b>	male-dominated: share of women < 30 %	<b>3.29</b>		<b>3.16</b>
	balanced: share of women between 30 and 49,9 %	<b>4.60</b>		<b>5.66</b>
	female-dominated: share of women > 50 %	<b>4.02</b>		<b>4.85</b>
<b>differences between the spouses</b>				
<b>age</b>	male partner is more than 5 years older	4.23	3.7	*
	less than 5 years age difference	4.16	3.81	*
	female partner is more than 5 years older	5.66	4.65	*
<b>income differences</b>	male partner has a higher income	<b>3.28</b>	<b>3.05</b>	<b>2.26</b>
	same income category	<b>4.11</b>	<b>4.15</b>	<b>4.46</b>
	female partner has a higher income	<b>12.52</b>	<b>15.08</b>	<b>20.45</b>
	no answer	<b>3.96</b>	<b>2.81</b>	<b>4.43</b>
<b>educational level</b>	male partner has higher educational level	3.23	3.10	<b>2.43</b>
	same educational level	4.42	3.97	<b>4.73</b>
	female partner has the higher educational level	4.41	3.86	<b>4.77</b>
	no answer	*	*	*
<b>sector affiliation</b>	only male partner is employed in the public sector			<b>6.67</b>
	both are employed in the public sector			<b>9.60</b>
	only female partner is employed in the public sector			<b>3.69</b>
	both are not employed in the public sector			<b>3.97</b>
	no answer			<b>0.00</b>
<b>firm size</b>	male partner is employed in the larger firm			<b>3.43</b>
	same firm size category			<b>4.31</b>
	female partner is employed in the larger firm			<b>6.49</b>
	no answer			<b>1.43</b>
<b>work contract</b>	female: temporary or self-employed, male: permanent			<b>7.19</b>
	both permanent			<b>3.90</b>
	both temporary or self-employed			<b>6.81</b>
	female: permanent, male: temporary or self-employed			<b>2.80</b>
	no answer			*
<b>sex ratio of the profession</b>	both employed in a profession with a similar share of women			<b>5.22</b>
	female: male-dominated profession, male: female-dominated or balanced profession			<b>10.53</b>
	female: balanced, male: male-dominated			<b>6.02</b>
	female: balanced, male: female-dominated			<b>3.67</b>
	female: female-dominated, male: male-dominated or balanced			<b>3.16</b>

Results in **bold** are significant at the 10 % level according to the chi<sup>2</sup> test.

\* publication prohibited by the providers of the Microcensus because of too few cases in each category

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

## 2.5 Regression results

Tables 2.2 and 2.3 provide the results of the three different logistic models for the assessment of which predictors exist in decisions to take parental leave by fathers. For reasons of interpretation, the results of the estimations are shown in terms of odds ratios. The tests for the models' goodness of fit show that all three models contribute to the explanation of the dependent variable. To be precise, model III shows the best results as to McFadden's Pseudo  $R^2$  and the log likelihood of the final model. This is not surprising, because the models feature three different samples, and workplace-related variables, also in comparison to the partner, could only partly be integrated in models I and II due to the sample definition. Sensitivity analyses have confirmed the robustness of the results, even for independent variables that are likely to be highly correlated with each other, such as the educational level and income, for instance. Reduced models that contain only the significant variables have been estimated as well, but in order to show differences to other empirical studies, the full models are presented.

According to model I, which controls both for the father's personal characteristics as well as both partners' work status, fathers of the oldest age category have significantly higher (71%) odds of using parental leave than those in the youngest age group. Holding non-European citizenship decreases the odds of leave-taking significantly, by 43%. Furthermore, the odds are significantly reduced by 58% if the father is not married but lives in a consensual union, and they are reduced by 27% if he lives in the eastern part of Germany. As to the educational level, fathers' odds of using the available leave seem to increase with their education. However, only the difference between the lowest and the highest educational group is significant. Fathers in the highest educational group have 64% higher odds using leave. In contrast, the odds are negatively correlated with the income and its square, but the results are very small in terms of odds ratios.

**Table 2.2: Results of the logistic regression models I and II (all fathers and working fathers)**

		model I all fathers		model II working fathers	
dependent variable: using parental leave in the survey week or not					
		odds ratio	std. err.	odds ratio	std. err.
<b>personal characteristics</b>					
<b>age</b>	18 - < 31 (ref.)	1.00		1.00	
	31 - < 42	1.15	(0.194)	1.00	(0.186)
	42 - < 53	1.71 **	(0.370)	1.61 **	(0.386)
<b>citizenship</b>	German or other European (ref.)	1.00		1.00	
	Non-EU country	0.57 **	(0.130)	0.77	(0.190)
<b>marital status</b>	married (ref.)	1.00		1.00	
	cohabiting	0.42 ***	(0.864)	0.41 ***	(0.097)
<b>children below the age of 7</b>		1.16	(0.113)	1.20 *	(0.129)
<b>educational level</b>	low (ref.)	1.00		1.00	
	medium	1.21	(0.212)	1.27	(0.249)
	high	1.64 ***	(0.272)	1.71 ***	(0.341)
<b>monthly net income</b>		1.00 ***	(0.000)	1.00 ***	(0.000)
<b>monthly net income squared</b>		1.00 ***	(0.000)	1.00 ***	(0.000)
<b>region</b>	western Germany (ref.)	1.00		1.00	
	eastern Germany	0.73 *	(0.132)	0.62 **	(0.131)
<b>differences between the spouses' employment statuses</b>					
	both fulltime	1.79 ***	(0.405)		
	female: full-time, male: part-time or not employed	5.34 ***	(1.637)		
	female: part-time, male: full-time (ref.)	1.00			
	female: part-time, male: part-time or not employed	3.23 ***	(1.208)		
	female: not employed, male: full-time or part-time employed	1.26	(0.261)		
	both not employed	1.44	(0.449)		
<b>partner's employment status</b>					
	not employed			1.24	(0.250)
	part-time employment (ref.)			1.00	
	full-time employment			1.88 ***	(0.407)
<b>workplace characteristics of the father</b>					
<b>work contract</b>	temporary or self-employed (ref.)			1.00	
	permanent			1.38 *	(0.259)
<b>sector affiliation</b>	private sector (ref.)			1.00	
	public sector			1.72 ***	(0.337)
<b>firm size</b>	less than 50 employees (ref.)			1.00	
	50 or more employees			0.72 **	(0.107)
<b>sex ratio of the profession</b>					
	male-dominated: share of women < 30% (ref.)			1.00	
	balanced: share of women between 30 and 49,9%			1.40 *	(0.245)
	female-dominated: share of women > 50%			1.00	(0.185)

p<0.10: \*; p<0.05: \*\*; p<0.01: \*\*\*. Reference categories have the value 1.00.

Model 1: Goodness of fit: McFadden's Pseudo R<sup>2</sup> 0.056; number of iterations: 4; Log likelihood (null model): -1156.486; Log likelihood (final model) -1093.303; LR chi<sup>2</sup>: 126.37; Prob chi2 (likelihood ratio test): 0.000\*\*\*,

Goodness-of-fit Test Person's chi<sup>2</sup>, Prob>chi<sup>2</sup>: 0.2134; Hosmer-Lemeshow Test, 5 groups, Prob>chi<sup>2</sup>: 0.196. N (total number of fathers in the sample): 6619; using parental leave: 279. Sample: men aged 18-53 who live in a heterosexual partnership with a woman aged 18-45 and have at least one child born in 2007 or 2008.

Model 2: Goodness of fit: McFadden's Pseudo R<sup>2</sup> 0.049; number of iterations: 4; Log likelihood (null model): -965.421; Log likelihood (final model) -918.043; LR chi2: 94.76; Prob chi2 (likelihood ratio test): 0.000\*\*\*, Goodness-of-fit Test Person's chi2, Prob>chi2: 0.002\*\*\*, Hosmer-Lemeshow Test, 5 groups,

Prob>chi<sup>2</sup>: 0.291. N (total number of fathers in the sample): 5903; using parental leave: 228. Sample: employed men aged 18-53 who live in a heterosexual partnership with a woman aged 18-45 and have at least one child born in 2007 or 2008.

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

The difference between the partners' work statuses has the greatest impact. Compared to the reference category (mother employed part-time, father full-time), the odds of taking leave are more than quadrupled if the mother works full-time and the father works part-time or does not actively participate in the labour market. If she works part-time instead and he is not employed, they are more than tripled. If both partners work full-time or part-time, the odds are still significantly increased. Even if the female partner or both partners are not working in the labour market, the results tend to be higher than in the reference group with the 'typical' composition. The number of children below the age of seven and the type of region are not significant in this model.

Model II includes only working fathers and accounts for their personal characteristics as well as work-related variables. The results for the personal features and the partner's work status are mainly congruent with those of model I, with two exceptions. First, holding non-European citizenship is not significant in this model. Second, the father's use of parental leave is positively correlated with the number of children below the age of seven. Only if the woman works full-time are the odds significantly increased (by 88%) compared to part-time employment, while there is no significant difference between the latter category and no employment. Regarding workplace characteristics, the odds are 38% higher of leave being taken if the father has a permanent contract. They are 72% higher if the father is employed in the public sector. They are also significantly higher for fathers working in professions that exhibit an about equal share of both sexes, in comparison to male-dominated professions, while there is no significant difference between male-dominated and female-dominated professions. This result is astonishing, as are the findings regarding firm size: The odds are significantly lower if the father is employed in a company with 50 or more employees.

Model III is restricted to dual-earner couples. It accounts for the differences between the partners and important personal characteristics. Among the latter, age, citizenship, marital status as well as income remain significant. With respect to the differences between the partners, the result for income differences stands out. The odds of taking parental leave are more than tripled if the father earns less than his partner in comparison to partners whose income is of the same category. Surprisingly, fathers in the latter category are not more likely to use parental leave than fathers whose partner earns the lower income. Furthermore, the odds are significantly reduced if only the mother (63%) or neither of the partners (57%) is employed in the public sector compared to couples of which both are employed in the

public sector. However, compared to the same group of couples, there is no significant difference to couples in which only the father is employed in the public sector. The odds are almost doubled if only the father has a permanent contract, and they are significantly reduced by 60% if only the mother has a permanent contract, in comparison to couples in which both have permanent contracts. Remarkably, there is no significant difference between couples where both have a permanent contract in comparison to couples where none hold a permanent contract.

Concerning the differences in the share of women in both partners professions, the odds are almost doubled if the mother works in a male-dominated profession and the father works in a female-dominated or balanced profession compared to couples in which the mother works in a job that is typical for women and her partner in a profession that is typical for men or has a balanced share of sexes. This model does not show significant results regarding age and educational differences.

To sum up, the first two models show that fathers' odds of taking parental leave are not only influenced by personal features and the characteristics of his workplace, but also strongly by his partner's employment status in comparison to his own. The model for dual-earner couples (model III) especially points to the importance of the differences between the partners' income, the type of work contract and the sectoral affiliation.

**Table 2.3: Results for the logistic regression model III (dual-earner couples)**

dependent variable: using parental leave in the survey week or not

		odds ratio	std. err.
<b>personal characteristics</b>			
<b>age</b>		1.05 **	(0.023)
<b>citizenship</b>	German or other European (ref.)	1.00	
	Non-EU country	0.24 *	(0.186)
<b>marital status</b>	married (ref.)	1.00	
	cohabiting	0.53 **	(0.159)
<b>children below the age of 7</b>		1.00	(0.185)
<b>monthly net income</b>		1.00 ***	(0.000)
<b>region</b>	western Germany (ref.)	1.00	
	eastern Germany	0.87	(0.238)
<b>differences between the spouses</b>			
<b>age differences</b>	male partner is more than 5 years older	0.76	(0.226)
	less than 5 years age difference (ref.)	1.00	
	female partner is more than 5 years older	1.78	(1.421)
<b>income differences</b>	male partner has higher income	0.56	(0.242)
	same income level (ref.)	1.00	
	female partner has the higher income	4.29 ***	(1.876)
<b>educational level</b>	male partner has higher educational level	0.73	(0.256)
	same educational level (ref.)	1.00	
	female partner has the higher educational level	0.98	(0.241)
<b>sector affiliation</b>	only male partner employed in the public sector	0.93	(0.450)
	both employed in the public sector (ref.)	1.00	
	only female partner employed in the public sector	0.36 **	(0.164)
	both employed in private sector	0.43 **	(0.155)
<b>firm size</b>	male partner employed in the larger firm	1.00	(0.289)
	same firm size category (ref.)	1.00	
	female partner employed in the larger firm	1.46	(0.421)
<b>work contract</b>	female: temporary or self-employed, male: permanent	2.06 **	(0.610)
	both permanent (ref.)	1.00	
	female: permanent, male: temporary or self-employed	0.40 **	(0.153)
	both temporary or self-employed	1.59	(0.576)
<b>sex ratio of the profession</b>	female: female-dominated, male: male-dominated or balanced (ref.)	1.00	(0.205)
	female: balanced, male: male-dominated	1.18	(0.410)
	female: balanced, male: female-dominated	0.42	(0.282)
	female: male-dominated profession, male: female-dominated or balanced profession	2.93 *	(1.530)
	both employed in a profession with the same share of women	1.24	(0.310)

**p<0.10: \*; p<0.05: \*\*; p<0.01: \*\*\*. Reference categories have the value 1.00.**

Goodness of fit: McFadden's Pseudo R<sup>2</sup> 0.189; number of iterations: 6; Log likelihood (null model): -439.781; Log likelihood (final model) -356.574; LR chi<sup>2</sup>: 166.41; Prob chi<sup>2</sup> (likelihood ratio test): 0.000\*\*\*, Goodness-of-fit Test Person's chi<sup>2</sup>, Prob>chi<sup>2</sup>: 0.000\*\*\*; Hosmer-Lemeshow Test, 5 groups, Prob>chi<sup>2</sup>: 0.726.

N (total number of fathers in the sample): 2453, using parental leave: 107.

Sample: men in dual-earner couples, aged 18-53 who live in heterosexual partnerships with a woman aged 18-45 and have at least one child born in 2007 or 2008.

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

## 2.6 Summary and discussion

Using data from the 2008 German Microcensus, this paper provides insights into the predictors of the fathers' use of parental leave after the introduction of the new parental leave scheme in Germany that is designed based on the Swedish family policy model. Fathers who were on leave in the survey week are compared to fathers who were not taking advantage of the leave at that time.

The fathers in this sample who used parental leave in the survey week are overrepresented in the oldest age group and in the group of married fathers. They are also more common among European fathers than non-European fathers and among fathers living in the western part of Germany instead of the eastern part. Many of them have reached a high level of schooling, yet they do not necessarily have a higher income. This study shows further that fathers using leave are more frequently employed in the public sector and hold a permanent contract. A large portion also has a partner who is employed full-time and is the main breadwinner of the family.

The binary regression models are in line with most of the results of the descriptive analysis, but point to the fact that especially differences between the work statuses of the partners as well as their income disparity play an important role. In many families, the father's use of parental leave seems to require that the mother works at least roughly the same hours in paid work as the father or earns the higher income. In addition, in dual-earner couples the variables that are related to job security (sector affiliation, type of work contract) and the sex ratio of the profession are correlated with the father's parental leave. Fathers in the public sector have higher odds of using parental leave if partner's employment is also in public sector. On the contrary, a father with a permanent contract is more likely to use parental leave if his partner does not enjoy the same level of job security. Noteworthy is also the finding that the result of model II, that fathers in balanced professions have the higher odds of using leave, holds true in dual-earner couples (model III) if the mother works in a male-dominated profession.

It is important to compare the results with those of the empirical studies discussed in Section 2.2. With regard to the father's education, citizenship, sector affiliation and work contract as well as the mother's income and the sex ratio of her profession, the results are consistent with those of most empirical studies. Furthermore, they are in line with studies that propose a positive effect of a higher number of children and of being married.

Regarding the unrepresentative German study under the new legislation (Pfahl and Reuyß, 2009), the present analysis supports the findings that fathers using parental leave are likely to be comparatively old, have a high level of education, work in the public sector and have a partner that is employed fulltime. However, it does not support the view that fathers in larger companies are more likely to take this opportunity. In comparison with Scandinavian studies, the study at hand differs as to the fathers' firm size and the sex ratio of his profession. Moreover, the results depart from the German study on the use of the former child-raising leave by Geisler and Kreyenfeld (2009) with regard to age differences and the residence in eastern or western Germany. The latter difference is astonishing, as also other authors propose that men in the eastern part of Germany are more inclined to do unpaid family work than their western German counterparts (e.g. Gille and Marbach 2004; Cooke 2006). Overall, the findings of this study are partly consistent with other empirical studies.

When comparing the results to the theoretical approaches presented, it becomes clear that the economic theory of relative resources is widely confirmed in the comparison *between the partners*. Two partners obviously compare the opportunity costs of parental leave between them in light of their income and job security, or rather, the negative economic effects of this timeout. The finding that a part-time job does not clearly improve the mother's bargaining position in couples in which the father works full-time, as compared to mothers' not working in the labour market, is remarkable. One explanation might be the self-selection of family-oriented mothers into the typical German composition of 'father full-time – mother part-time', as these couples have the lowest odds of sharing parental leave. Likewise, family-oriented fathers might have chosen part-time work in order to focus mainly on childcare in case of a birth. In this case, too, the number of working hours is influenced by parental leave decisions and not vice versa. Of course, this pattern of self-selection may also be the root of the results regarding sector affiliation and the sex ratio of the profession. For example, on the one hand, mothers and fathers working in professions with a higher share of women could have discovered ex post that they can generally better reconcile themselves with household and caring tasks (Jacobs 1995; Datta Gupta and Smith 2000), while male-dominated professions are associated with higher costs of taking parental leave (Polachek 1981; Jacobs 1995). On the other hand, family-oriented individuals might have chosen professions with lower opportunity costs of parental leave intentionally, while work-oriented individuals might have chosen different professions. Hence, the results have to be treated with caution in terms of the causal relationship.

Regarding the comparison *between fathers using leave and fathers not using it*, the results support the microeconomic rationale of opportunity costs for the impact of the sector affiliation and firm size, with, again, self-selection mechanisms that might play a role. Moreover, considering education, the results follow the sociological view that collective beliefs about the correct division of labour within a couple vary between social classes, as men with more years of schooling, who are most likely to hold modern gender role models, are more likely to have an equal division of parental leave. However, they do not necessarily have a high income. One explanation could be the parental leave benefit cap at € 1,800: It implies that fathers whose monthly net income exceeds € 2,686 do not receive the usual share of 67% but rather less of their monthly net income.

The results for the age and the marital status call for a detailed explanation in view of the theoretical approaches. The results for age contradicts microeconomic theory, which predicts that older men are more likely to earn a higher income and thus to have higher opportunity costs when taking parental leave. However, the family formation age rises with the educational level, so that highly educated men could be overrepresented in the oldest age group. According to sociological approaches as well as empirical studies (e.g. Wengler et al. 2008) higher educated men are, firstly, more likely to share domestic tasks. Secondly, they are more likely to have a highly educated partner (Teckenberg 2000; Wirth 2000; Blossfeld and Timm 2003). Thus, their partners are probably characterised by a high income, which, in turn, strengthens their bargaining position. According to this argumentation, the increase of the share of fathers using leave across the age group comes at no surprise. As to marital status, according to microeconomic theory, the specialisation of partners is higher for married couples, which would result in a lower percentage of fathers using leave among this group. In contrast, predictions of sociological approaches are not straightforward (Sundström and Duvander 2002; Naz 2007). On the one hand, cohabiting couples are said to pay more attention to an equal division of labour. On the other hand, marriage can be an indicator for a relatively strong family-orientation of the father, which can serve as an explanation of the findings here.

Finally, it is noteworthy to mention that, due to the shortcomings of the German Microcensus as discussed in Section 2.3, it would be interesting to repeat this analysis once other data sources suitable for the research question addressed in this paper are available. It might be valuable to compare fathers that have ever been on parental leave with those that have never taken this opportunity. This is not possible with the German Microcensus, as

only fathers currently on leave can be compared to fathers that were not. Other surveys would not be subject to seasonality, whereas the German Microcensus only captures the fathers' situation in the survey week which is always in April. Besides, retrospective surveys would not share the disadvantage of this study that fathers using a small share of parental leave have a lower probability to be included as using parental leave. The implementation of these suggestions is left for further research.

## References 2

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## Appendix 2

**Table A.2.1: Summary statistics of the sample for model I (all fathers)**

	obs.	mean	std. dev.	min.	max.
age categories	6619	1.9000	0.5725	1	3
citizenship	6619	0.1186	0.3233	0	1
marital status	6619	0.1958	0.3984	0	1
children below the age of 7	6619	1.5144	0.6478	1	*
educational level	6619	2.0692	0.8348	1	3
region	6619	0.1840	0.3875	0	1
monthly net income	6619	2127.1190	1547.0350	0	19000
monthly net income squared	6619	6917590	19800000	0	361000000
difference in the employment status of the spouses	6619	3.8507	1.6970	1	6

\* publication prohibited by the providers of the Microcensus for reasons of anonymisation.

Definition of the variables: age categories: 18 to <30, 30 to <42, 42 to <54; citizenship: 0 = German or other EU citizenship, 1= non-EU citizenship; marital status: 0 = married, 1 = cohabiting; educational level: 1 = 'Hauptschulabschluss' or less (<= 9 years of schooling), 2 = school-leaving certificate 'Realschulabschluss' or 'Oberschule der DDR' (10-11 years of schooling) , 3 = school-leaving certificate 'Fachhochschulreife' or 'Abitur' (12-13 years of schooling); region: 0 = western Germany, 1 = eastern Germany; monthly net income: mid-value of class interval of 25 income groups; partner's employment status: 1 = both fulltime, 2 = female full-time, male part-time or not employed, 3 = female part-time, male full-time, 4 = both part-time or female part-time, male not employed, 5 = female not employed, male full-time or part-time, 6 = both not employed. Full-time employment is defined as at least 30 working hours per week, part-time is defined as between 1 and under 30 working hours a week, not employed are persons who are classified as such in the German microcensus. The definition follows the ILO classification.

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

**Table A.2.2: Summary statistics of the sample for model II (working fathers)**

	obs.	mean	std. dev.	min.	max.
<b>personal characteristics</b>					
age categories	5903	1.9180	0.5569	18	53
citizenship	5903	0.1008	0.3011	0	1
marital status	5903	0.1774	0.3820	0	1
children below the age of 7	5903	1.5125	0.6397	1	*
educational level	5903	2.1116	0.6397	1	3
region	5903	0.1699	0.3756	0	1
monthly net income	5903	2268.1310	1525.9190	0	19000
monthly net income squared	5903	7472452	20100000	0	361000000
partner's employment status	5903	2.3427	0.8334	1	3
<b>work-related variables</b>					
type of work contract	5903	0.8032	0.3977	0	1
sector affiliation	5903	0.1206	0.3257	0	1
firm size	5903	0.5763	0.4942	0	1
sex ratio of the profession	5903	1.6677	0.7890	1	3

\* publication prohibited by the providers of the Microcensus for reasons of anonymisation.

Partner's employment status: 1 = employed full-time, 2 = employed part-time, 3 = not employed. Definition of the other personal characteristics see table 1.

Work-related variables: type of work contract: 0 = temporary contract or self-employed, 1 = permanent contract; sector affiliation: 0 = not in the public sector, 1 = public sector; firm size: 0 = <50 employees at the location, 1 = >= 50 employees at the location; sex ratio of the profession: 1 = male-dominated, share of women < 30 %, 2 = balanced, share of women between 30 and > 50 %, 3 = female-dominated, share of females >= 50 %.

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

**Table A.2.3: Summary statistics of the sample for model III (fathers in dual-earner couples)**

	obs.	mean	std. dev.	min.	max.
<b>personal characteristics</b>					
age	2453	34.8300	5.5966	*	53
citizenship	2453	0.0514	0.2208	0	1
marital status	2453	0.2097	0.4059	0	1
children below the age of 7	2453	1.4000	0.5749	1	*
monthly net income	2453	2278.7100	1554.3350	0	1900
region	2453	0.2018	0.4014	0	1
<b>differences between the spouses</b>					
age	2453	1.7896	0.4403	1	3
income	2453	1.2740	0.6410	1	3
educational level	2453	2.0893	0.6720	1	3
sector affiliation	2453	2.9484	0.7058	1	4
firm size	2453	1.8928	0.6207	1	3
work contract	2453	2.2487	0.8258	1	4
sex ratio of the profession	2453	3.3481	1.8115	1	5

\* publication prohibited by the providers of the Microcensus for reasons of anonymisation.

Definition of the personal characteristics see table 1. Differences between the spouses: age: 1= male is > 5 years older, 2 = 5 years or less age difference, 3= female is > 5 years older; income differences: 1 = male has higher income category, 2 = same income category, 3 = female has higher income category; educational level 1 = male has higher educational level, 2 = same educational level, 3 = female has higher educational level; sector affiliation: 1 = only male in public sector, 2 = both in public sector, 3 = none in public sector, 4 = only female in public sector; firm size: 1 = male in larger firm, 2 = same firm size, 3 = female in larger firm; work contract: 1 = female temporary contract or self-employed, male: permanent contract, 2 = both have a permanent contract, 3 = both have a temporary contract or are self-employed, 4 = female permanent contract, male temporary contract or self-employed; sex ratio of the profession: 1 = same share of women, 2 = female: male-dominated, male: female-dominated or balanced profession, 3 = female: balanced, male: male-dominated, 4 = female: balanced, male: female-dominated, 5 = female: female-dominated, male: balanced or male-dominated.

Sources: Research Data Centres of the Federal Statistical Office and the Statistical Offices of the Länder (2011). Microcensus 2008; own calculations.

# 3

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## **Fathers' Childcare and Parental Leave Policies: Evidence from Western European Countries and Canada**

*(with Christina Boll and Julian S. Leppin)*

### *Submissions*

Submitted to *Review of Economics of the Household* in January 2012, 'revise and resubmit' notice received in April 2012, resubmitted 20 June 2012, request to make minor changes received 23 August 2012.

### *Publications*

Reich, N., Boll, C., Leppin, J. (2012). Fathers' childcare and parental leave policies: Evidence from Western European countries and Canada. *HWWI Research Paper 115*.

### *Related Publications*

Boll, C., Leppin, J., Reich, N. (2012). Einfluss der Elternzeit von Vätern auf die familiäre Arbeitsteilung im internationalen Vergleich, Studie im Auftrag des Bundesministeriums für Familie, Senioren, Frauen und Jugend (BMFSFJ). Unpublished.

Boll, C., Leppin, J., Reich, N. (2012). Einfluss der Elternzeit von Vätern auf die familiäre Arbeitsteilung im internationalen Vergleich. *HWWI Policy Paper 59*.

### *Presentations*

33rd Conference of the International Association for Time Use Research (IATUR), in Oxford (United Kingdom) 1-3 August 2011. (Presentation by Christina Boll)

Seminar: Demografie und Wirtschaft – viertes gemeinsames Forschungsseminar des Rostocker Zentrums zur Erforschung des Demografischen Wandels und des Hamburgischen WeltWirtschaftsinstituts gGmbH (HWWI), in Hamburg (Germany), 28 June 2011 (Presentation von Christina Boll)

Doctoral Seminar: Prof. Dr. Straubhaar at HWWI, in Hamburg (Germany), 19 April 2011.

1st ifo-Workshop Labour Market and Social Policy, in Dresden (Germany), 4-5 March 2011. (Presentation by Christina Boll)

## Abstract 3

During the last decades, several countries introduced parental leave policies for fathers, but its effect on fathers' childcare has not been analysed in detail. Thus, the study at hand pursues the following question: How are national parental leave arrangements related to fathers' childcare participation and childcare time? To answer this question, we estimate fathers' minutes per day spent on childcare and control for the following parental leave characteristics: duration of parental leave available to both parents, duration of exclusive parental leave weeks for fathers, and benefit rates. We merge time-use data from the Multinational Time Use Study (MTUS), covering 30 surveys from eight industrialised countries, with national parental leave characteristics. The main results are that (1) parental leave for both parents is not positively correlated with fathers' childcare time, (2) in the case of exclusive parental leave weeks for fathers the coefficient is positive but not significant throughout all model specifications, (3) the response to exclusive parental leave weeks for fathers depends on the father's educational level, whereby the strongly positive result for high-skilled fathers is the most robust result obtained in this study, (4) low benefits rates are positive compared to no benefits, (5) the result for high benefit rates is ambiguous for several reasons. We conclude that it would be best if all elements of family policy and related policies are geared into the same direction in order to promote fathers' childcare time.

*JEL Classification:* D13, J13, J18

*Keywords:* childcare, fatherhood, parental leave, time use

### 3.1 Introduction

During the last decades, economists and other scientists have identified numerous advantages of fathers' engagement in childcare on the individual, the family and the macroeconomic level. Among these are children's well-being (Palkovitz 2002; Carlson and McLanahan 2004), fathers' gaining of social competences and work-life balance (see overview in Hook 2006), higher fertility (Buber 2003; Oláh 2003; Duvander and Andersson 2006; Lappegård 2010; de Laat and Sevilla-Sanz 2011), as well as higher marital stability and satisfaction (McHale and Crouter 1992; Greenstein 1995; Sanchez and Gager 2000; Oláh 2001; Wengler et al. 2008; Sigle-Rushton 2010).

In order to support fathers' engagement with their children, the European Union legislation demands a minimum of three months of parental leave for both parents and the European Commission states that "men should be encouraged to assume an equal share of family responsibilities, for example they should be encouraged to take parental leave" (UNICE et al. 1996) in the 1996 framework agreement on parental leave. Meanwhile, all European and most other industrialised countries have established parental leave for both parents. This institution can possibly have an impact on the amount of parents' time with their children during early childhood years, which is crucial because, in the absence of incentives for fathers to take leave, the birth of the first child often leads to the traditional division of paid and unpaid work even between egalitarian-oriented partners, and this re-traditionalisation is most likely to be intensified in the long run (Schulz and Blossfeld 2006). Yet, parental leave policies and other laws affecting women's and men's allocation of time vary considerably between countries, providing different incentives and disincentives for men and women to share childcare tasks (Sullivan et al. 2009). At the same time, a great cross-national variation in the time fathers spend with children is observed (Stancanelli 2003). Hence the question arises of how parental leave policies should best be constructed in order to promote fathers' time investment in their children.

The aim of this article is the analysis of the correlation between parental leave characteristics and fathers' childcare time. In detail, we suggest that parental leave policies have a fourfold effect on fathers' childcare. Firstly, they can lead to fathers' higher participation in parental leave resulting in higher childcare participation rates and a higher number of minutes spent with the baby. As Haas and Hwang (2008) show for Sweden, the number of leave taken by fathers had positive effects on several indicators of participation in childcare. Secondly, parental leave policies may have long-lasting effects on the father's

time with this child. Thirdly, positive within-family spill-over effects and, fourthly, out-of-family spill-over effects may evolve: Within the family, fathers' take-up of leave may result in a higher childcare productivity as well as in an increased interest in spending time with all children. Out-of-family positive effects are also likely to arise, since even fathers who did not use parental leave themselves might become more engaged with their children if policies actively promote fathers' engagement in such activities, thereby reducing fathers' loss of identity or negative stigma when performing childcare tasks (see also Hook 2010). Indeed, economic (Akerlof and Kranton 2000) as well as sociological theories (West and Zimmerman 1987; Brines 1994) point to the power of societal circumstances for individual behaviour. A recent article by de Laat and Sevilla-Sanz (2011) supports this assumption of a "social externality effect" (de Laat and Sevilla-Sanz 2011:110). They found that across OECD countries, men's individual contributions to home labour depend positively on men's average amount of home labour in their country.

We formulate the following hypotheses on which our empirical investigation is based. Firstly, we assume that a more generous duration of parental leave that is a family right – i.e., it can be taken by either the mother or the father – hinders fathers' engagement in childcare. The reason is that, according to economic theories of specialisation (e.g., Becker 1965, 1981) and bargaining between the spouses (e.g., Ott 1992), the partner with lower market resources will forgo earnings in order to care for the child, which is the mother in most cases. Secondly, we suggest that parental leave exclusively devoted to fathers is positively associated with fathers' childcare time. If this leads to shared parental leave among the parents, and if this is accompanied by shared breadwinning, exclusive parental leave weeks for fathers can result in a dual-earner/dual-carer strategy in the long run. Thirdly, highly educated fathers should respond more intensive to exclusive father weeks than lower educated fathers, because highly skilled fathers exhibit not only higher take-up rates of parental leave (Reich 2011) but also a more extensive engagement in childcare than their less educated counterparts (Ishii-Kuntz and Coltrane 1992; Chalasani 2007). Fourthly, wage replacement during leave should play a role: We expect that a positive parental leave benefit stimulates fathers' minutes of childcare, because they imply lower opportunity costs of childrearing. Nevertheless, a high benefit may result in ambiguous findings, depending on the partner's relative resources.

To test the theoretical assumptions, we exploit time-use data from the Multinational Time Use Study (MTUS, Gershuny and Fisher 2010) for the eight industrialised countries

Canada, Finland, Germany, Italy, the Netherlands, Norway, Sweden and the United Kingdom from 1971-2005. We link these data to parental leave data for fathers gathered from different sources in order to analyse the relationship between parental leave characteristics for fathers and fathers' minutes of childcare. To this end, we undertake a multivariate analysis of fathers' childcare time, relating the observed micro-level behaviour to the relevant metadata of family policy legislation and of further macro-level factors.

This study contributes to the existing literature on the role of family policy for fathers' childcare time which focused on whole policy packages as well as some parental leave characteristics for fathers. Bygren et al. (2011) showed that an index consisting of fiscal and cash child benefits supporting the traditional male breadwinner model has a negative impact on fathers' childcare time. Conversely, their index based on earner-carer policies has a positive impact on fathers' childcare time. Smith (2001) and Smith and Williams (2007) showed that the score in a father-friendly policy index is positively correlated with fathers' childcare. Regarding parental leave characteristics, wage compensation and leave that can be taken in fragments was positively correlated with fathers caring 28 hours or more per week (Smith 2001). In Hook's (2006) analysis, weeks of parental leave were negatively correlated and parental leave available for men were positively correlated with the number of minutes per day fathers spend in unpaid work. However, the author did not distinguish between household chores and childcare. In addition, she did not test for parental leave benefits and exclusive weeks for the father. As leave policies with different regulations as to entitlement, flexibility and personal transferability set different behavioural incentives, additional research has to be devoted to this aspect.

The study at hand makes a threefold contribution to the empirical literature. Firstly, it directly addresses distinct parental leave policies in cash and kind instead of dealing with policy packages or indices. Secondly, regarding the leave entitlement, we distinguish between transferable rights between the parents and individual rights for the father. Thirdly, we focus on childcare and do not lump it together with other elements of unpaid domestic work.

The article is structured as follows. In Section 3.2, the institutional background of parental leave policies is discussed. Next, in Sections 3.3 and 3.4, the data as well as the econometric specification is presented. Section 3.5 provides the results and Section 3.6 concludes.

### 3.2 Institutional background

Between 1970 and 2000, almost all industrialised countries introduced some sort of parental leave policies. *Parental leave* is defined as a country-specific legislation that allows parents to stay at home to care for their child after maternity leave. *Maternity leave*, i.e. leave for mothers typically covering some weeks before and after the child's birth, is usually paid at 100% of the former wage. Similar to maternity leave is *paternity leave*, defined as a few days or weeks for the father to take leave during the mother's maternity leave and which is also usually paid at 100% of the wage. Neither maternity nor paternity leaves are considered in the analysis, since they are not expected to have a long-term effect on fathers' childcare time.<sup>25</sup> While parental leave is unpaid in some countries, parents receive *parental leave benefits* in others. To a varying extent in a cross-country comparison, the benefits compensate parents for foregone wage income. The benefit can be a flat-rate payment, either means-tested for families in need, or the same amount of benefits to all parents using leave. Alternatively, it can be related to the amount of income received from paid work prior to the birth of a child. Across industrialised countries, parental leave benefits range from zero to full wage compensation. In fact, high benefit rates are one of the strategies which Nordic countries use to promote the uptake of parental leave by fathers. Countries also differ with respect to mothers' and fathers' *eligibility*. Parental leave weeks can be an individual right for either the mother or the father, or it can be a family right, so that parents are free to choose who is going to take the leave. For the assessment of the relationship between parental leave and fathers' involvement in childcare, it is important to distinguish between these types of leave.

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<sup>25</sup> See, for example, OECD (2011) for an overview on maternity and paternity leave characteristics in OECD countries.

**Table 3.1: Countries, survey years and parental leave policies for fathers**

	CA	FI	IT	GE	NL	NO	SW	UK
1971-1975	1971 family right: 0 father weeks: 0 benefit: 1	1979 family right: 29 father weeks: 0 benefit: 2			1975 family right: 0 father weeks: 0 benefit: 1			1974 family right: 0 father weeks: 0 benefit: 1
1976-1980					1980 family right: 0 father weeks: 0 benefit: 1			
1981-1985	1981 family right: 0 father weeks: 0 benefit: 1				1985 family right: 0 father weeks: 0 benefit: 1	1981 family right: 3 father weeks: 0 benefit: 3		1983 family right: 0 father weeks: 0 benefit: 1
1986-1990	1986 family right: 0 father weeks: 0 benefit: 1	1987 family right: 26 father weeks: 0 benefit: 3	1989 family right: 0 father weeks: 13 benefit: 2		1990 family right: 0 father weeks: 26 benefit: 1	1990 family right: 3 father weeks: 0 benefit: 3	1991 family right: 65 father weeks: 0 benefit: 3	1987 family right: 0 father weeks: 0 benefit: 1
1991-1995	1992 family right: 10 father weeks: 0 benefit: 3			1992 family right: 156 father weeks: 0 benefit: 2	1995 family right: 0 father weeks: 26 benefit: 1			1995 family right: 0 father weeks: 0 benefit: 1
1996-2000	1998 family right: 10 father weeks: 0 benefit: 3	1999 family right: 26 father weeks: 0 benefit: 3			2000 family right: 0 father weeks: 26 benefit: 1	2000 family right: 39 father weeks: 6 benefit: 3	2000 family right: 65 father weeks: 4 benefit: 3	2000 family right: 0 father weeks: 13 benefit: 1
2001-2005			2003 family right: 0 father weeks: 30 benefit: 2	2002 family right: 156 father weeks: 0 benefit: 2	2005 family right: 0 father weeks: 26 benefit: 1			2005 family right: 0 father weeks: 13 benefit: 1

family right: parental leave entitlement that is transferable between parents in weeks; father weeks: parental leave entitlement for fathers only in weeks; benefit categories: 1: no benefit; 2: flat-rate benefit or on average less than 60% of the wage; 3: at least on average 60% of the wage.

Sources: Bundesgesetzblatt (1985, 2012); Hall (1998); Gauthier/Bortnik (2001); Cregg et al. (2003); Rønsen (2004); van Selm (2004); Björklund (2006); Haataja and Mattila-Wiro (2006);

Moss and Wall (2007); Moss and Korintus (2008); Eurofund (2009, 2011); Columbia University (2011); Gauthier (2011); OECD (2011); Juris Das Rechtsportal (2012); own categorisation.

Table 3.1 depicts the parental leave legislation for fathers on which we are focusing in our analysis as it has been in force in the considered countries and points in time. Obviously, the parental leave characteristics used in our analysis vary considerably between countries and points in time. The duration of parental leave as a family right varies from zero (18 surveys) to 156 weeks in Germany in 1992 and 2002. Parental leave weeks for fathers only vary from zero weeks in 20 surveys to 30 weeks in Italy in 2003. In fact, exclusive parental leave weeks for fathers are available in only ten of the 30 surveys: Italy (1989, 2003), the Netherlands (1990, 1995, 2000, 2005), Norway (2000), Sweden (2000), United Kingdom (2000, 2005). As to the benefit category, we distinguish between no benefit, low benefit (i.e. flat-rate benefit or less than 60% of the wage), and high benefit (at least 60% of the wage). There is no parental leave benefit in a large number of surveys, especially in the earlier ones. Five surveys are in the low benefit category, and nine in the high benefit category.

We conduct our empirical analysis with the three aforementioned basic parental leave characteristics: duration of parental leave for both parents (family right), exclusive weeks for the father, and parental leave benefit. Other aspects of parental leave legislation, e.g., prerequisites for being able to use it or part-time working opportunities during leave, lack a common categorisation across countries. For example, the legislation concerning pre-birth employment requirements is very heterogeneous across countries and over time. Nevertheless, most men would probably meet these requirements due to the generally high labour market attachment of men. Another point to consider is the flexibility of parental leave entitlement according to the child's age. Firstly, there is evidence that parental leave is mostly taken shortly after the birth of the child even if a shift to later years is possible (see Moss and Wall 2007 for Sweden, for instance). Secondly, data limitations made it impossible to control for this parameter for all surveys 1971 to 2005. Instead, we use country and survey fixed effects to capture remaining policy variation across countries and over time.

### **3.3 Data and descriptive statistics**

This study is based on individual data from the Multinational Time Use Study (Gershuny and Fisher 2010), versions 5.52, 5.53 and 5.80. The MTUS provides representative samples of individual data with per minute diary records from 20 countries from the 1960s until the 2000s. A total of 69 different main activities are recorded. Childcare includes the

following activities with/for children: preparing meals, feeding, putting to bed, medical and body care, looking after the child, helping with homework, reading something to the child, playing. Thus, all kinds of activities primarily done for or with the child are considered childcare.

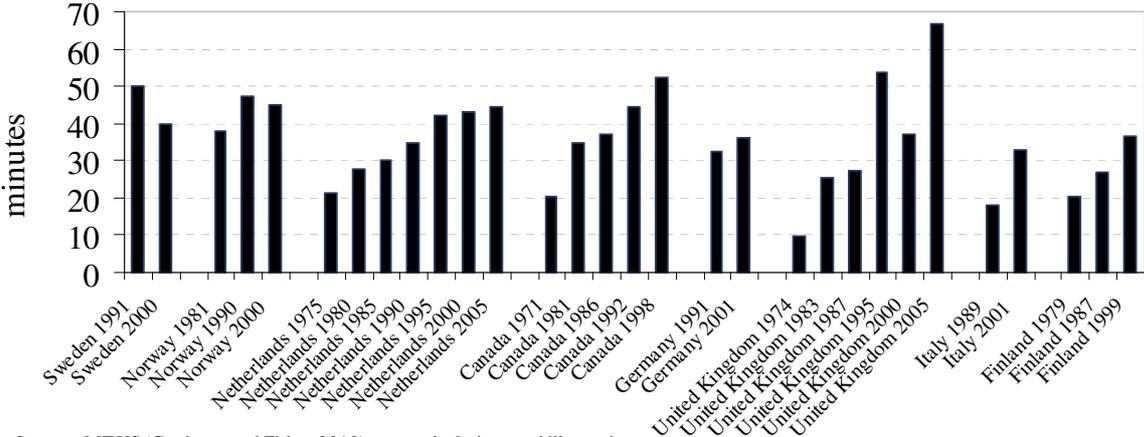
Time diaries are a valid method to measure frequently occurring activities (Cosper and Shaw 1985). Estimates derived from diary data are more accurate and more reliable than estimates derived from direct questions (Plewis et al. 1990). Stylised questions on time use, in contrast, tend to lead to inaccurate estimations of time use because of incomplete recall capability (Monna and Gauthier 2008) and the risk of social desirability bias (Presser and Stinson 1998; Niemi 1993; Kan 2008; Monna and Gauthier 2008). This is why time-use data are usually regarded as the best source of data on people's time allocation, especially with regard to unpaid work (Monna and Gauthier 2008; Frazis and Stewart 2012). Thus, the exploitation of the rich information contained in the harmonised national diary budgets yields a valid data set that enables us to analyse time-use trends in the special activity 'childcare' across countries as well as over time.

The analyses at hand are restricted to countries with at least two surveys per country at different points in time in order to capture changes over time. The following countries are analysed: Canada, Finland, Italy, Germany, the Netherlands, Norway, Sweden, and the United Kingdom. The number of surveys ranges from two (Italy, Germany, Sweden) to seven (Netherlands). The earliest survey was conducted in Canada in 1971, the latest surveys are from the Netherlands and the United Kingdom in the year 2005. For several countries, more than one diary day has been recorded. In order to account for the fact that some individuals are represented by several cases in the sample, individuals are clustered in the estimation procedure. The sample consists of fathers who live with their partner in the same household (whether married or not), who are between 20 and 55 years old and have at least one child below the age of 18 in the household. The overall sample size amounts to 58,864 fathers.

Our dependent variable is the *number of childcare minutes on the survey day*. The average number of childcare minutes of all fathers is presented in Figure 3.1 for all surveys. It reveals that it ranges from 10 minutes in the United Kingdom in 1974 to 67 minutes in the United Kingdom in 2005. Over time, childcare increased in all countries but Sweden. In the cross-country comparison, average minutes prove to be particularly low in Italy (1989: 18 minutes) and quite high ( $\geq 50$  minutes) in Sweden (2000), Canada (1998) and the

United Kingdom (1995, 2005). The number of observations throughout the surveys ranges from 2,897 cases (4.9%) in Norway to 16,208 cases (27.53%) in the Netherlands. The largest share of observations stems from Germany 2001(8.1%) whereas United Kingdom 1995 exhibits the lowest share (0.33%) of observations. For some countries only two surveys are available. This limits the interpretation of longitudinal trends in those countries.

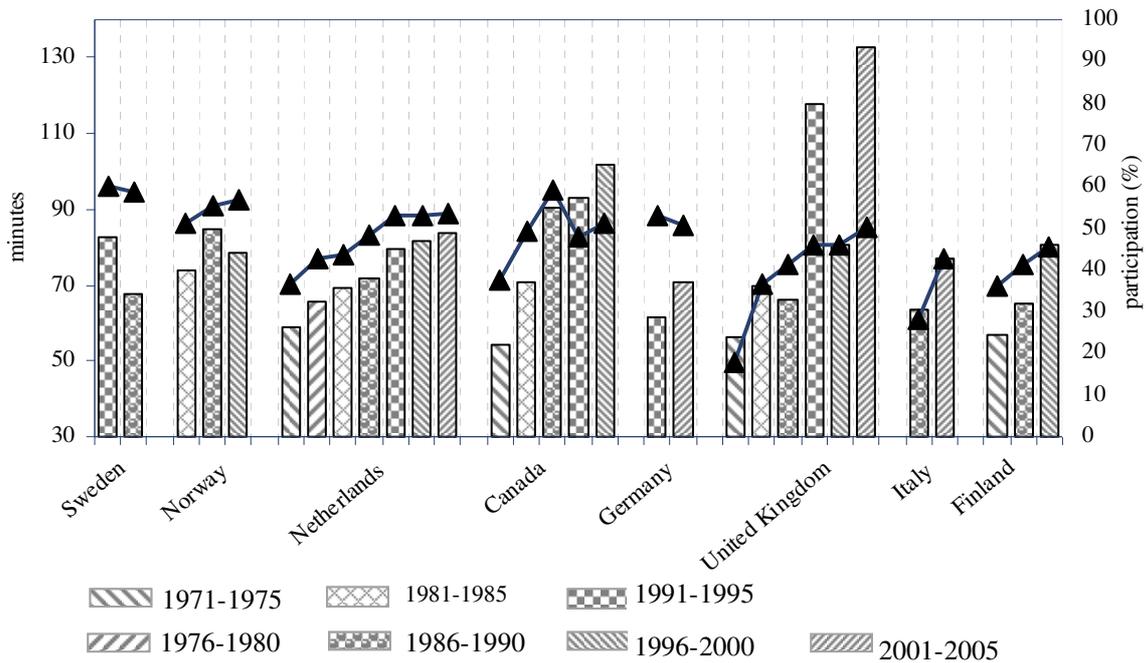
**Figure 3.1: Fathers' average minutes of childcare on the survey day**



Sources: MTUS (Gershuny and Fisher 2010); own calculations and illustration.

Amongst the almost 59,000 fathers in the sample, 26,435 fathers participate in childcare, i.e., devote more than zero minutes to childcare on the diary day. In relative terms, the percentage of participants varies from 18% in the United Kingdom in 1974 to 60% in Sweden in 2001. As Figure 3.2 shows, the participation rate has gradually increased over time in almost all countries except for Sweden and Canada. At the turn of the millennium the countries had reached different levels of participation. Participation is comparatively low in Italy (43%) and Finland (45%), but relatively high in Norway (57%) and Sweden (59%). Similar to the participation rates, the average number of minutes participating fathers spend in childcare has increased in most countries over time.

**Figure 3.2: Fathers' involvement in childcare: Share of participation and average minutes of childcare per day in case of participation 1971-2005**



Sources: MTUS (Gershuny and Fisher 2010); own calculations and illustration.

After discussing the dependent variable, we now turn to the independent variables used in the econometric procedure. The main independent variables are the following parental leave characteristics: *duration of parental leave for both parents (family right)*, *duration of exclusive parental leave weeks for the fathers*, and *parental leave benefits*, as described in Section 3.2. The duration of the two types of parental leave are measured in weeks. The family right captures all weeks of parental leave which may be transferred from one partner to another. This is not possible for exclusive father weeks: Here, the father has an individual right to take the leave that is lost if he refrains from doing so. Parental leave benefits are measured in three categories: zero benefits, flat rate benefit or less than 60% of the wage, and at least 60% of the wage. The value assignment of parental leave variables depends on the parental leave scheme at the time of the birth of the youngest child. As the data do not provide information on the use of parental leave, we refer to whether a father has been eligible for certain parental leave measures after the latest birth. The age of the youngest child is available in three categories: less than 5 years, 5 to 12 years, and 13 to 17 years. This means that we assign the father eligibility for the measure if it has come into force before the oldest child within the concerned age category had been born. Moreover,

if a particular leave arrangement was available in the majority of years of a certain category, fathers are coded to have been eligible for this measure.<sup>26</sup>

The choice of independent variables on the individual level is made according to their relevance for fathers' involvement in childcare as presented in related theoretical and empirical literature. The models account for the following individual-level variables: *number of children*, *age of the youngest child* (0-4, 5-12, 13-17 years), *age of the father and its square*, *his educational level*, *his work status*, and whether the diary refers to a *weekday or a weekend day*. Educational level is coded in three categories: lower than completed secondary education (not completed ISCED level 3), completed secondary education (ISCED level 3 or 4), and above secondary education (ISCED level 5 or higher). As to the work status, four categories are available in the data: not employed, part-time employed, full-time employed and employed with unknown working hours. These categories refer to the general employment status, not to the amount of work on the diary day.

In several models, *dummies for the countries and the decades* (1971-1979, 1980-1989, 1990-1999, 2000-2005) are included, in order to assess the impact of parental leave policies net of time and country fixed effects. In order to further ensure that the results for parental leave variables capture their pure effect, further macro-level factors that account for country- and time-specific differences that could possibly be related to fathers' participation and minutes of childcare are included in the model. Fathers' involvement is likely to depend on prevailing time cultures for paid and unpaid work in the country in the survey year. For example, a couple's average time for housework around the year 2000 was 155 minutes in Italy but 69 minutes in Sweden, and it was 101 minutes in the Netherlands in 1975 but 78 minutes in 2005 in the same country. Hence, workload calculations for different kinds of unpaid work have been done whereby the sum of the average number of minutes men spend in an activity and the average number women spend in the same activity in a particular country and survey year have been used to define the term 'workload'. The *workload for childcare* captures the time- and country-specific childcare time culture. The *workload for housework* (not including cooking) accounts for time-flexible, the *workload for cooking* for time-flexible housework time-use culture. This

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<sup>26</sup> Example: Parental leave with a duration of 13 weeks have been introduced in the United Kingdom in 1999. In the 2005 survey, coding is as follows: youngest child younger than 5 years old: duration=13; youngest child between 5 and 12: duration=0 because most fathers (age of youngest child >6) could not have taken parental leave; youngest child between 13 and 17: duration=0 because no parental leave was available in the birth years of these children.

distinction is important as time-inflexible housework like cooking limits time opportunities for other activities more than time-flexible tasks do (Hook 2010).<sup>27</sup> Finally, the *female employment rate*, as reported in the OECD Statextracts (2011), is used as an indicator for the ‘paid work culture’ as well as the presence of the dual-earner family model. Thus, it is also an indicator for the prevalence of modern gender roles and for women's bargaining power. This indicator is especially useful as the deployed micro-data for many surveys lack individual information on the mother's work status, which is usually assumed to have an impact on fathers’ involvement with their children. Summary statistics of all variables can be found in the appendix.

These macro-level variables are assumed to capture major differences in time cultures and gender roles. There might still be other factors influencing fathers’ childcare time, e.g. the share of children in public childcare, which would have to be accounted for on the regional level, because there is a large variety between regions in several countries.<sup>28</sup> Unfortunately, neither are data on this topic available on the regional level for all countries for every survey year between 1970 and 2005, nor are the regions where the individuals live specified in the MTUS data. As many studies showed (see, for example, Hoem 2008; Krapf 2009), not only leave policies but also childcare arrangements depend on normative settings on a regional level. Those settings (gender roles, attitudes and time budgets) are at least partially captured by the included macro-level variables (time and country fixed effects, female employment rate etc.). Hence, as we do not control for all macro-level factors possibly influencing fathers’ childcare time, we do not talk about causal effects in this article, but refer to correlations between parental leave characteristics and fathers’ childcare time.

### **3.4 Econometric specification**

The aim of this article is the analysis of the correlation between parental leave characteristics and fathers’ childcare time. The choice of the appropriate modelling technique for this research question is not trivial. The dependent variable – minutes of

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<sup>27</sup> Housework includes common housework chores such as washing clothes, vacuum cleaning etc. It does not include shopping and gardening. Cooking (including food preparation, baking, preserving food, setting table, washing dishes etc.) is distinguished from other household work as it is a time-inflexible chore and hence differs from other household chores in terms of its predictors.

<sup>28</sup> For regional differences in public childcare slots see Del Boca (2002) for Italy concerning children below the age of three, and Statistische Ämter des Bundes und der Länder (2007) for preschool children in Germany.

childcare on the survey day – theoretically ranges from zero to 1440 minutes on a 24-hour diary day. In our sample, it ranges from zero to 800 minutes, with a substantial share of zeros, i.e., fathers who did not participate in childcare at all. As an overall result from several model specifications tested with the data at hand it comes out that there is no optimum model specification. All options have their drawbacks.

In the context of time use data Tobit models are very common (Flood and Gråsjö 1998). The main assumption of the Tobit model is the existence of a censoring value for the dependent variable, in our case a censoring value of zero for the time used in childcare. The latent variable of interest is assumed to be continuous and not truncated at the censoring value. Thus, the Tobit model assumes a continuous distribution which includes negative values for persons not reporting any minutes. This inherent assumption of the Tobit model results in the production of negative predicted values. For this reason, these models are not perfectly suited for analysing minutes on the diary day (Hook 2010). Moreover, for those who report zero minutes the true value may be higher than zero, if the behaviour during the diary day does not match the average behaviour during the reference period. In the latter case the assumption of censored data does not hold and Tobit would be inappropriate. Last but not least, Tobit models imply that fathers who participate in childcare are not different from fathers not doing so. This has to be questioned, since Pacholok and Gauthier (2010) discovered that some fathers are ‘real’ non-participants who differ substantially from participants regarding social, economic and demographic characteristics.

In order to circumvent negative predicted values, Hook (2010) chose a Poisson regression model for analysing minutes of housework. Indeed, as the distribution of the dependent variable resembles a Poisson distribution in that the mean is close to zero, a Poisson model seems suitable at a first sight. However, since the mean does not match the variance of our endogenous variable, which is a crucial assumption of Poisson models, this model category appears to be inappropriate for our data. Alternatively, a zero-inflated non-negative binomial model (ZINB) could be considered. This model does not rely on the crucial equality of mean and variance and, furthermore, it controls for the high extent of zero values in participation. Nonetheless, Poisson and ZINB models are designed for count data with few values which indicate, for example, how many times something has happened (Long and Freese 2001). Hence they do not fit models for the number of minutes on a diary day.

In order to account for the differences in the predictions of participation in childcare and minutes of childcare, Pacholok and Gauthier (2010) use multinomial logistic regression models for categories of time intervals. A disadvantage of this model is the strong assumption of the independence of irrelevant alternatives, which is hard to meet (Long and Freese 2001). Another possibility for explicitly modelling ‘non-participants’ would be a selection model, as developed by Heckman (1979), for example. This type of model has been considered, but dismissed due to the lack of a proper selection variable which only affects participation, but not fathers’ minutes of childcare.

Finally, we decide to start with a simple ordinary least square (OLS) model. Like other estimation techniques, it also has its disadvantages. For example, it can predict negative values. Nevertheless, according to a recent analysis, the OLS model is superior to Tobit models, as only OLS models generate unbiased estimates, even if the fraction of zero-value observations is large on the diary day (Stewart 2009). Moreover, OLS models have successfully applied in time-use studies before (e.g., Kendig and Bianchi 2008; Craig and Mullan 2010). Tobit models are used in the second step to test the robustness of the OLS results.

The first model contains parental leave characteristics as well as individual-level variables, hence the equation is defined as

$$Y_{i,c,t} = \alpha_i + \beta_1 PL_{i,c,t} + \beta_2 IL_{i,c,t} + u_{i,c,t} \quad (3.1)$$

where  $Y$  denotes the number of childcare minutes on the survey day,  $\alpha$  the intercept,  $\beta$  the coefficients,  $PL$  a vector of parental leave variables,  $IL$  a vector of individual-level variables, and  $u$  the error term. The indices  $i$ ,  $c$ , and  $t$  show that the data is individual-level data from different countries and at different points in time. As fathers’ childcare minutes are likely to depend on country-specific norms and traditions, we additionally control for country fixed effects in the second model:

$$Y_{i,c,t} = \alpha_i + \beta_1 PL_{i,c,t} + \beta_2 IL_{i,c,t} + \beta_{i,t} CT_{i,t} + u_{i,c,t} \quad (3.2)$$

$CT$  denotes the country dummies. Next, we introduce dummies for the decade of the survey, in order to control for the overall long-term trend that father’s childcare time has increased in most countries. Therefore, the equation is

$$Y_{i,c,t} = \alpha_i + \beta_1 PL_{i,c,t} + \beta_2 IL_{i,c,t} + \beta_3 CT_{i,t} + \beta_4 DC_{i,c} + u_{i,c,t} \quad (3.3)$$

with  $DC$  as the survey decade. This model shows the effect of parental leave characteristics net of time (decade) and country fixed effects. Finally, as other factors on the macro-level can affect ‘time-use cultures’ and hence fathers’ childcare time, we control for additional macro-level variables ( $ML$ ) in the fourth specification:

$$Y_{i,c,t} = \alpha_i + \beta_1 PL_{i,c,t} + \beta_2 IL_{i,c,t} + \beta_3 CT_{i,t} + \beta_4 DC_{i,c} + \beta_5 ML_{i,c,t} + u_{i,c,t} \quad (3.4)$$

The latter model we name the ‘full’ model. In the following discussion of the main results, we refer to these four model categories varying by the specification of the independent variables in a stepwise extension. We begin with the model that only contains individual-level variables (model 1). This ‘pure’ model is succeeded by a model that additionally comprises country fixed effects (model 2), in turn followed by a model that also controls for time effects (model 3) and last but not least the ‘full’ model which, besides having individual, country and time effects, has some macro-level factors as its specialty. In particular, it controls for time and country-specific female employment rates as well as a couple’s average daily minutes for three categories of unpaid work in a given year and country: childcare, housework and cooking. As our main model is the OLS model, the prefix ‘O’ stands for the applied OLS-technique.

## 3.5 Results

### 3.5.1 Main results

The results for the main models of father's childcare time are presented in Table 3.2. With regard to parental leave policies, we find that the predictor of the leave duration variable for both parents (family right) is significantly positive only in the first model O1, which does not control for country and time fixed effects as well as other macro-level indicators. In other words, once taking differences between countries, time trends and specific variables addressing time-use cultures into account, no significant relationship is found. As to parental leave weeks reserved for the father, the results are positive and significant in the first three models O1-O3. In other words, even when controlling for country and time fixed effects, exclusive parental leave weeks are positively correlated with fathers’ childcare time. However, the impact is very small: One additional exclusive father week is

associated with only 0.29 additional childcare minutes per day. In model O4, the p-value equals 0.11, and thus slightly exceeds the threshold of significance. Instead, fathers' childcare time seem to be positively related to the female employment rate and the workload for childcare in the particular survey, as the coefficients of these newly introduced variables are positive and significant. Regarding the wage replacement rate, compared to no parental leave benefit, a 'low' wage replacement rate of below 60% is related to an increase in fathers' childcare minutes of 5 to 12 minutes per day. The positive significant effect is robust throughout all four model specifications. Interestingly, a high wage replacement of more than 60% displays a lower significance in the 'full' model and even loses significance in the third model. Only in the first model does the impact of a high wage replacement rate exceed that of a modest one.

Regarding individual-level variables in model O4, the father's age and the educational level affect fathers' childcare time positively. An additional year of age increases fathers' childcare time by round about two minutes. However, the negative effect of the squared age implies that the magnitude of the positive effect of his age declines with each additional year. High-skilled fathers spend 11.6 minutes more time with their children than their lower-educated counterparts. Furthermore, fathers spend 12.5 minutes more on childcare on weekends than on weekdays. Also the effects of children's age and fathers' employment status are highly significant and display the expected results: If the youngest child is between five and twelve years old instead of younger, fathers spend 31.7 minutes less on daily childcare. The negative impact amounts to 43.2 minutes if the child is a teenager, i.e., between 13 and 17 years of age. Compared to non-employment, part-time employment results in a decrease of childcare minutes by 12.7 minutes, full-time employment by 18.2 minutes, and work with 'unknown' work hours in a decrease by 23.4 minutes. Finally, the number of children does not affect father's childcare time.

**Table 3.2: Fathers' childcare time - main models**

OLS model, dependent variable: minutes of childcare  
beta-coefficients, standard errors in parentheses

		O1	O2	O3	O4
<b>parental leave characteristics</b>					
		0.033*** (0.011)	0.011 (0.013)	0.007 (0.013)	0.014 (0.014)
	parental leave, family right, weeks				
	duration of fathers' exclusive parental leave weeks	0.347*** (0.057)	0.571*** (0.070)	0.291*** (0.077)	0.148 (0.092)
	parental leave benefit				
	none	ref. 4.970*** (0.900)	ref. 12.354*** (2.135)	ref. 7.858*** (2.129)	ref. 8.952*** (2.250)
	low	9.425*** (1.092)	9.950*** (1.619)	1.330 (1.710)	3.150 (1.940)
	high				
<b>individual-level factors</b>					
	no. of children	0.200 (0.489)	0.115 (0.489)	0.353 (0.487)	0.455 (0.488)
	age of the youngest child				
	0-4	ref. -31.494*** (0.952)	ref. -30.250*** (0.953)	ref. -31.545*** (0.959)	ref. -31.736*** (0.979)
	5-12				
	13-17	-43.569*** (1.161)	-42.352*** (1.204)	-44.175*** (1.217)	-43.175*** (1.240)
	father's age	2.448*** (0.465)	2.424*** (0.462)	1.766*** (0.461)	1.813*** (0.459)
	father's age squared	-0.034*** (0.006)	-0.034*** (0.006)	-0.026*** (0.006)	-0.027*** (0.006)
	educational level				
	low	ref. 8.052*** (0.737)	ref. 7.422*** (0.764)	ref. 5.268*** (0.796)	ref. 4.595*** (0.812)
	medium				
	high	16.272*** (0.867)	14.116*** (0.903)	12.165*** (0.923)	11.552*** (0.932)
	employment status				
	not employed	ref. -15.424*** (2.700)	ref. -13.678*** (2.723)	ref. -13.374*** (2.706)	ref. -12.662*** (2.687)
	part-time				
	full-time	-20.727*** (2.284)	-20.095*** (2.272)	-18.685*** (2.269)	-18.209*** (2.259)
	unknown work hours	-23.969*** (2.707)	-21.894*** (2.699)	-22.559*** (2.700)	-23.2447*** (2.689)
	day of the week				
	weekday	ref. 12.517*** (0.588)	ref. 12.501*** (0.587)	ref. 12.480*** (0.586)	ref. 12.495*** (0.584)
	weekend day				

Table 3.2 continued

		7.923***	7.292***	-3.445
<b>country dummies</b>	Canada	(1.598)	(1.625)	(2.645)
	Netherlands	ref.	ref.	ref.
		5.757***	8.631***	-4.139
	Norway	(1.704)	(1.705)	(2.929)
		1.572	2.681**	0.002
	United Kingdom	(1.180)	(1.247)	(2.152)
		1.064	7.399***	-4.622
	Finland	(1.132)	(1.199)	(3.887)
		-12.255***	-6.357***	8.243*
	Italy	(2.455)	(2.450)	(4.559)
		1.788	4.171*	-8.710**
	Sweden	(2.272)	(2.279)	(4.069)
		-1.493	-3.670*	-5.076**
	Germany	(2.109)	(1.167)	(2.492)
<b>survey decades</b>	1971 - 1979		ref.	ref.
			9.846***	-3.669*
	1980 - 1989		(1.102)	(2.211)
			17.300***	-6.973*
	1990 - 1999		(1.295)	(3.891)
			19.000***	-6.624
	2000 - 2005		(1.372)	(4.590)
<b>other country-level factors</b>				
				0.368***
female employment rate				(0.130)
				0.027
workload housework				(0.037)
				0.296***
workload childcare				(0.041)
				-0.069
workload cooking				(0.047)
		15.241*	12.881	15.344*
constant		(9.273)	(9.209)	(9.140)
				-14.458
R <sup>2</sup>		0.1575	0.1605	0.1666
				0.1694

p<0.10: \*, p<0.05: \*\*, p<0.01: \*\*\*. N=58864.

Sources: MTUS (Gershuny and Fisher 2010); OECD Statextracts (2011); own calculations; sources of the parental leave variables see Table 3.1.

The results for the country dummies differ between the models O2 to O4, as the effect is strongly affected by the inclusion of the time (decade) dummies and additional macro-level factors. As expected, the inclusion of the time dummies in model O3 shows that fathers' minutes of childcare have significantly increased over time. However, taking additional macro-level variables into account (model O4), the significance is lost and the sign even reversed, concluding that changes in time-use cultures of paid and unpaid work are the driving forces behind the temporal change. Model O4 reveals that among the macro-level

factors for ‘time-use culture’ of paid and unpaid work, the female employment rate as well as a couple’s average daily childcare time in a specific country and survey has a slightly positive effect on father’s childcare time. By contrast, the average daily time for cooking and other housework does not affect fathers’ childcare time significantly.

The share of variance in childcare variation that is explained by the deployed variables in our analysis is quite low: The  $R^2$  displays values of not more than 17%. At least three aspects are important in this context. Firstly, the low  $R^2$  may be attributed to the availability of regressors. For example, we had to disregard some variables which are assumed to affect fathers’ childcare to a noticeable extent from a theoretical point of view (marital status, income, urbanisation level, partner information) because they were not available in all surveys. Secondly, addressing childcare of *fathers* is challenging. The empirical evidence shows that the share of explained variance is up to 30% or more if one extends the sample to both sexes (Craig and Mullan 2011). The third aspect refers to the use of diary data instead of survey data. Using only one diary day does not provide sufficient data on intra-personal variation of time use, and even the design of multiple-day time would not account for this since time use is often correlated between survey days (Frazis and Stewart 2012). Therefore, time use data are likely to take too much account of random variation, all the more as they are reported on an individual basis instead of population averages (Flood and Gråsjö 1998).

### **3.5.2 Robustness checks**

Several variations of the models have been estimated in order to test the robustness of the results. The models have been re-estimated, firstly, without the surveys from the United Kingdom from 1995 and 2005 because of their unusually high number of childcare minutes. Secondly, they have been estimated without the Swedish surveys due to the striking decrease in average childcare minutes from the first to the second survey. Thirdly, it has been tested whether the results remain the same for fathers whose youngest child is 12 years old or younger, instead of 17 or younger, as the main results have shown that fathers devote significantly more childcare time to younger children. All of these analyses qualitatively mainly support the results presented in the main models above.

**Table 3.3: Fathers' childcare time - Tobit models**

Tobit model, dependent variable: minutes of childcare  
beta-coefficients, standard errors in parentheses

	T1	T2	T3	T4
<b>parental leave characteristics</b>				
parental leave, family right, weeks	0.088*** (0.019)	-0.041* (0.023)	-0.073*** (0.024)	-0.067* (0.025)
duration of fathers' exclusive parental leave weeks	0.636*** (0.094)	1.013*** (0.117)	0.203 (0.131)	0.143 (0.162)
parental leave benefit				
none	ref.	ref.	ref.	ref.
low	15.156*** (1.742)	15.716*** (4.006)	0.505 (3.494)	3.323 (4.185)
high	23.887*** (1.993)	16.071*** (3.498)	-9.988*** (3.791)	-6.909* (4.164)
<b>individual-level factors</b>	yes	yes	yes	yes
<b>country dummies</b>	no	yes	yes	yes
<b>decade dummies</b>	no	no	yes	yes
<b>additional macro-level fa 5-12</b>	no	no	no	yes

p<0.10: \*, p<0.05: \*\*, p<0.01: \*\*\*. N=58864.

Sources: MTUS (Gershuny and Fisher 2010); OECD Statextracts (2011); own calculations; sources of the parental leave variables see Table 3.1.

Next, the main models presented in Table 3.2 have been re-estimated as Tobit models, which are widely used to analyse time-use data. The results are presented in Table 3.3. With regard to the variable specification, the models T1 to T4 refer to the OLS-models O1 to O4 already presented. According to the main subject of this study, Table 3.3 displays only the results for the leave policy variables. In all Tobit model specifications except the first one, a transferable leave entitlement is negatively associated with fathers' childcare. The variable is of a higher significance than in the OLS specification. The results for father's exclusive parental leave weeks derived from the OLS specification are confirmed in the Tobit specification, with an even stronger impact on childcare in models T1 and T2. However, this variable is not significant in the third and fourth model, T3 and T4. With regard to the parental leave benefits, significance is reversed: In the Tobit specification, a high wage replacement rate is significant at the 1%-level three models types and at the 10%-level in the 'full' model, whereas in the OLS models this applies only to two models. On the contrary, the low benefit rate that had been of the highest significance in all OLS model types loses its significance in the Tobit specifications T3 and T4. Moreover, in these two models, the predictors in the high benefit category turn out to be negative now,

whereas a low benefit rate remains to be positively associated with fathers' child care in all four Tobit models. In sum, comparing the results for the parental leave variables between the main OLS models and the Tobit models, the results are similar in tendency.

Besides variations in the estimation strategy, there are different ways to define parental leave characteristics, such as exclusive parental leave weeks for fathers. We first test the robustness of this variable's results by substituting the number of exclusive parental leave weeks for fathers with a dummy variable, indicating whether a father had access to exclusive parental leave weeks at the time of the youngest child's birth or not. The results are presented in Table 3.4. Model O1a provides the same set of regressors as model O1, except for the previously-mentioned specification of father weeks in parental leave. Similarly, model O2a refers to model O2 and so forth. The results show that the dummy specification of fathers' exclusive parental leave weeks is weaker than the metric one used in the main models in Section 3.1 (duration in weeks). For example, the result of model O2a suggests that the availability of exclusive parental leave weeks for fathers is associated with an increase to fathers' childcare time of almost 9 minutes. As the variable is not significant in models O3a and O4a, it is concluded that it is the duration of exclusive parental leave weeks for fathers that is more important for father's childcare minutes than the broader dichotomous specification.

As economic and sociological theories as well as empirical results have pointed to the different behaviour of fathers with different educational levels, it should also be tested whether the impact of exclusive parental leave weeks for the father differs according to the educational level. Therefore, interaction effects have been constructed out of these two variables. Because of the high explanatory power of the new variables, we are interested in checking their robustness in Tobit specifications as well. Therefore, Table 3.5 depicts the results for both OLS and Tobit models. Except for the interaction variables, the models presented in Table 3.5 contain the same regressors as the main OLS models and the Tobit models presented in Table 3.3, respectively (O1b corresponds to O1, T1b to T1 and so forth).

**Table 3.4: Fathers' childcare time -  
dichotomous variable for fathers' parental leave**

OLS model, dependent variable: minutes of childcare  
beta-coefficients, standard errors in parentheses

	O1a	O2a	O3a	O4a
<b>parental leave characteristics</b>				
parental leave, family right, weeks	0.009 (0.010)	0.005 (0.013)	0.002 (0.013)	0.014 (0.014)
fathers' exclusive parental leave: no	ref.	ref.	ref.	ref.
fathers' exclusive parental leave: yes	7.484*** (1.419)	8.700*** (1.475)	2.071 (1.646)	0.501 (1.847)
parental leave benefit				
none	ref.	ref.	ref.	ref.
low	7.547*** (0.777)	12.349*** (2.139)	7.102*** (12.146)	8.589*** (2.259)
high	8.943*** (1.098)	9.455*** (1.727)	0.421 (1.710)	3.029 (1.939)
<b>individual-level factors</b>	yes	yes	yes	yes
<b>country dummies</b>	no	yes	yes	yes
<b>decade dummies</b>	no	no	yes	yes
<b>additional macro-level factors</b>	no	no	no	yes

p<0.10: \*, p<0.05: \*\*, p<0.01: \*\*\*. N=58864.

Sources: MTUS (Gershuny and Fisher 2010); OECD Statextracts (2011); own calculations; sources of the parental leave variables see Table 3.1.

The results for the parental leave variable as a family right as well as for the benefit rates stay mainly the same. This also applies to the effects of educational level (not displayed in the initial Tobit model, but checked). Most importantly, for highly educated fathers, the duration of exclusive parental leave weeks for fathers is significantly positively correlated with fathers' childcare minutes in all four types of the OLS and the Tobit models. To be precise, exclusive parental leave weeks for fathers are only positive and significant in all models if combined with fathers' high educational level.

**Table 3.5: Fathers' childcare time -  
interaction between fathers' parental leave duration and educational level**

dependent variable: minutes of childcare  
beta-coefficients, standard errors in parentheses

	OLS model				Tobit model			
	O1b	O2b	O3b	O4b	T1b	T2b	T3b	T4b
<b>parental leave characteristics</b>								
parental leave, family right, weeks	0.029*** (0.011)	0.013 (0.013)	0.009 (0.013)	0.015 (0.014)	0.081*** (0.019)	-0.038(*) (0.023)	-0.069*** (0.024)	-0.066*** (0.025)
duration of fathers' exclusive parental leave weeks	0.012 (0.099)	0.251*** (0.112)	0.023 (0.112)	-0.086 (0.126)	0.009 (0.219)	0.438* (0.237)	-0.228 (0.230)	-0.192 (0.253)
parental leave benefit								
none	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
low	6.135*** (0.948)	12.633*** (2.136)	8.172*** (2.137)	9.093*** (2.254)	16.933*** (1.833)	16.085*** (4.003)	0.870 (4.044)	3.407 (4.188)
high	9.814*** (1.097)	10.128*** (1.620)	1.440 (1.715)	2.982 (1.953)	24.482*** (2.004)	16.351*** (3.498)	-9.871*** (3.794)	-7.404* (4.177)
<b>educational level</b>								
low	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
medium	7.011*** (0.836)	6.416*** (0.867)	4.657*** (0.878)	4.085*** (0.883)	21.465*** (1.909)	20.315*** (1.982)	15.960*** (1.970)	14.789*** (1.973)
high	14.165*** (0.926)	12.269*** (0.960)	10.467*** (0.961)	9.960*** (0.973)	36.567*** (1.987)	33.469*** (2.046)	28.127*** (2.027)	28.148*** (2.035)
<b>interaction effects</b>								
duration of fathers' exclusive parental leave	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
duration of fathers' exclusive parental leave weeks * medium educational level	0.308*** (0.113)	0.285** (0.113)	0.212* (0.117)	0.178 (0.119)	0.558** (0.238)	0.545** (0.235)	0.349 (0.236)	0.232 (0.238)
duration of fathers' exclusive parental leave weeks * high educational level	0.594*** (0.140)	0.531*** (0.143)	0.503*** (0.145)	0.467*** (0.145)	1.042*** (0.265)	0.877*** (0.264)	0.770*** (0.262)	0.693*** (0.262)
<b>individual-level factors</b>	yes	yes	yes	yes	yes	yes	yes	yes
<b>country dummies</b>	no	yes	yes	yes	no	yes	yes	yes
<b>decade dummies</b>	no	no	yes	yes	no	no	yes	yes
<b>additional macro-level factors</b>	no	no	no	yes	no	no	no	yes

p<0.10: \*, p<0.05: \*\*, p<0.01: \*\*\*. N=58864.

Sources: MTUS (Gershuny and Fisher 2010); OECD Statextracts (2011); own calculations; sources of the parental leave variables see Table 3.1.

Furthermore, the first and the second model type (O1b, O2b and T1b, T2b respectively) yield a positive and significant association also for fathers with a medium educational level. By contrast, the fact that the base variable (duration of fathers' exclusive parental leave weeks) is only significant in two of the four models, implies that this policy is not important for the behaviour of lower-educated fathers regarding childcare time. In sum, the correlation between exclusive parental leave weeks for fathers and fathers' childcare time depends on the fathers' educational level, with the strongest positive association for highly educated fathers. Their children seem to profit most from an expansion of individual parental leave weeks devoted to fathers.

### **3.6 Conclusion**

This article presents cross-national and cross-time analyses that contribute to the empirical evidence for the relation between parental leave policies and fathers' childcare time.

It is argued that parental leave policies for fathers have a fourfold effect on fathers' childcare: (1) they can lead to a higher participation in parental leave resulting in more childcare minutes spent with the baby; (2) they can have long-lasting effects, i.e. fathers taking parental leave can result in higher childcare productivity and increased interest in spending time with the child in the long run; (3) this behaviour may also spill over to siblings; (4) policies have a normative impact so that even fathers who did not take parental leave might become more engaged with their offspring.

In order to analyse the relation between fathers' childcare time and parental leave policies for fathers, characteristics of these policies at the time of the youngest child's birth are linked to individual data from the MTUS which provides diary data on the minutes fathers spend on childcare. In particular, the independent variable is minutes of childcare on the diary day, and the main independent variables are the duration of parental leave available to both parents (family right), the duration of exclusive parental leave weeks for fathers, and parental leave benefit categories. As fathers' behaviour can be affected by additional country and time specific factors, we estimated several models, step-by-step integrating country and time fixed effects as well as other macro-level variables.

The main results of our study, as found in the most comprehensive models (types 3 and 4), can be summarised as follows. Referring to the *duration of transferable parental leave*, the main OLS specification does not deliver significant results. The Tobit specification yields

negatively significant results. This is in line with the theoretical assumption. We conclude that the correlation between the duration of parental leave as a family right and fathers' childcare minutes is at least not positive, confirming our first hypothesis.

With regard to *parental leave exclusively devoted to fathers*, the effect is positive in the first three OLS models. But the coefficients are not significant in the 'full' OLS model ( $p=0.11$ ) and in the corresponding Tobit specifications. We conclude that the association is at least not negative, but the possibility of no association at all cannot be fully rejected. Thus, our hypothesis that parental leave for fathers only is positive for fathers' childcare time is supported only in tendency. Allowing this policy to interact with fathers' educational level shows the expected result: Highly-skilled fathers prove to react more sensitively to this policy than their lower-educated counterparts. This result is robust throughout all model specifications. In other words, children of highly-educated fathers benefit most from exclusive parental leave weeks for fathers. This is in line with the hypothesis that highly-educated fathers respond most to exclusive parental leave opportunities.

The low *benefit rate* proves to be significantly positive in the OLS models O3 and O4 but is not significant in the corresponding Tobit specifications. Overall, our fourth hypothesis tends to be confirmed for the low benefit rate. Regarding the high benefit rate, the considered models support the assumed ambiguous result. While the Tobit specifications yield negative predictors, they are partially positive in the OLS models, confirming the hypothesised ambiguity.

As the description of parental leave policies for fathers in Section 3.2 has revealed a strong correlation between the characteristics, and in view of the regression results, we propose viewing parental leave characteristics as small but important elements of a broad cultural and institutional framework that influences fathers' involvement in childcare. Countries with parental leave schemes that are attractive for fathers probably support fathers' childcare through other channels as well, so that single characteristics lose significance once controlled for country-specific effects in the analysis. Stated differently, changing one parameter within a certain cultural and institutional setting might not be sufficient to generate long-lasting effects on the gendered division of time. On the cultural side, fathers' involvement in childcare needs ideological support from society. On the institutional side, other family policies (e.g. tax system) have to support incentives for fathers to get involved with their children. In addition, career prospects for women could further encourage shared

breadwinning and childrearing. To sum up, we propose that a country's whole package of social, fiscal and labour market policies has to be geared to the same direction if aiming at changing the gendered division of childcare.

Since similar empirical studies differ from ours according to both exogenous and endogenous variables, as outlined in Section 3.1, they cannot be compared in detail. However, roughly speaking, our results are in line with earlier findings that parental leave for fathers and hence measures supporting the dual-earner/dual-carer family model are positively related to fathers' childcare, while a traditional approach (here: parental leave for both parents) does not show a positive result. In contrast to Hook's (2006) results, not the mere availability of parental leave for fathers is important, but the exclusive right to take leave.

This article delivers some new insights to the empirical literature on parental leave policies and fathers' childcare time. However, several questions remain unanswered. Firstly, the number of surveys has clearly been prioritised over the inclusion of certain independent variables. To be precise, some potential independent variables could not be included in the regression because they were missing in many of the surveys, as is the case with, for example, the marital status or the partner's characteristics. Secondly, the dependent variable – minutes of childcare as the main activity – has its limitations. Neither the intensity of care (which would need data on childcare as primary, secondary, ... activity), nor the quality of childcare (what fathers do specifically) is accounted for, two aspects that have been pointed out in the literature frequently (e.g., Zick and Bryant 1996; Folbre and Yoon 2007; You and Davis 2011). In particular, the analysis of the quality of childcare would be interesting in this context, as it is more important than the total time for children's development, which might decrease in the future due to the tendency of dual-earner couples to use public childcare slots (Kitterod and Pettersen 2006). Thus, the assumption of 'the more parents' childcare time, the better' has to be questioned. Thirdly, following Sayer et al. (2004), it would also be interesting to analyse the behavioural trends of fathers who are not cohabiting with their children, but they are not included in the data at hand. Finally, it cannot be tested through which of the four channels discussed above fathers alter their allocation of time. Specifically, it would need data on the individual parental leave history in order to test whether fathers' taking parental leave has a long-run effect on their behaviour, or if the mere policy change affects all fathers' childcare time. The response to these questions is left for further research.

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## Appendix 3

**Table A.3.1: Summary statistics**

	mean	std. dev.	min.	max.
childcare minutes	32.994	58.464	0	800
parental leave, family right, weeks	30.823	43.531	0	156
exclusive parental leave weeks for fathers	4.388	8.383	0	30
parental leave benefit: none	0.521	0.500	0	1
parental leave benefit: low	0.338	0.473	0	1
parental leave benefit: high	0.142	0.349	0	1
age of the youngest child: 0-4	0.420	0.493	0	1
age of the youngest child: 5-17	0.580	0.493	0	1
no. of children	1.862	0.847	1	9
father's age	38.934	7.191	20	55
father's age squared	1567.592	565.178	400	3025
educational level: low	0.345	0.475	0	1
educational level: medium	0.386	0.487	0	1
educational level: high	0.268	0.443	0	1
employment: full-time	0.831	0.375	0	1
employment: part-time	0.072	0.258	0	1
employment: unknown workhours	0.051	0.219	0	1
employment: not employed	0.047	0.212	0	1
weekend	0.370	0.483	0	1
Canada	0.072	0.258	0	1
Netherlands	0.275	0.447	0	1
United Kingdom	0.049	0.216	0	1
Norway	0.133	0.339	0	1
Finland	0.088	0.283	0	1
Italy	0.154	0.361	0	1
Sweden	0.074	0.261	0	1
Germany	0.156	0.362	0	1
1971 - 1979	0.117	0.321	0	1
1980 - 1989	0.291	0.454	0	1
1990 - 1999	0.291	0.454	0	1
2000 - 2005	0.301	0.459	0	1
female employment rate	59.229	11.409	31.70	81.10
workload housework	104.116	24.675	66.60	155.14
workload childcare	112.212	25.391	51.56	195.52
workload cooking	125.679	26.204	58.22	189.23
duration of fathers' exclusive parental leave weeks * medium educational level	1.187	4.379	0.00	30.00
duration of fathers' exclusive parental leave weeks * high educational level	1.059	4.845	0.00	30.00

N=58864. Sources: MTUS (Gershuny and Fisher 2010); own calculations.

# 4

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## **Fathers' Childcare: The Difference between Participation and Amount of Time**

### *Submissions*

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### *Publications*

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### *Presentations*

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Seminar : « Les Lundis de l'INED – Séance Jeunes Chercheurs », Institut National d'Etudes Démographiques (INED), in Paris (France), 23 January 2012.

Doctoral Seminar: Prof. Sonja Drobnič, PhD., Fakultät Wirtschafts- und Sozialwissenschaften, Institut für Soziologie, Lehrstuhl für Methoden der empirischen Sozialforschung, in Hamburg (Germany), 6 December 2011.

## **Abstract 4**

The main research question of this article is whether and how predictors of fathers' participation in childcare, defined as zero versus more than zero minutes of childcare, differ from predictors of participating fathers' amount of time on childcare, measured as minutes on the survey day. The sample is drawn from the Multinational Time Use Study (MTUS) and covers surveys from ten industrialised countries from 1987 to 2005. Results show that there are some similarities, but also notable differences between factors influencing participation in childcare and factors affecting participating fathers' time spent with children. For example, the educational level has a remarkable impact on fathers' participation, but not on the amount of time spent on childcare. In contrast, work hours and whether data refer to a weekday or a weekend day hardly affect participation, but strongly affect fathers' time for childcare. There are also differences between the countries and between different points in time with regard to factors influencing childcare participation and time. Results call for caution regarding findings from existing studies not distinguishing participation from participating fathers' childcare minutes.

*JEL Classification:* D13, J13

*Keywords:* Childcare, fatherhood, time use, censoring

## 4.1 Introduction

Fathers' involvement in childcare has increasingly attracted attention from researchers in various fields of the social sciences. Firstly, as mothers' labour market participation has risen in most industrialised countries over the course of the last few decades, the question arose whether and how this has an effect on fathers' involvement in childcare. Secondly, numerous studies have suggested that fathers' engagement with their children has positive effects on children's health, well-being and cognitive development (Palkovitz 2002; Carlson and McLanahan 2004; Benson and Mokhtari 2011; You and Davis 2011).

For the measurement of fathers' childcare time, time-use data, generated by respondents taking notes throughout the survey day, are more appropriate than data based on retrospective questions, as the latter are subject to a social desirability bias. Moreover, it is expected that parents spend at least a few minutes with their children every day. However, when fathers' childcare time is analysed using minutes of childcare on the survey day, this variable typically shows a large number of zeros. Zeros arise when fathers report not having spent any time on childcare during the day surveyed. Two reasons could theoretically account for this finding. Firstly, these fathers might usually be involved in childcare but missed doing so accidentally for several reasons, such as having had an unusually long work day. Consequently, non-participation would be a data artefact. Secondly, some non-participants might really be uninvolved in childcare. For example, in couples with a traditional specialisation between paid work and unpaid work (including childcare), fathers might not be involved in childcare at all (Pacholok and Gauthier 2010).

In the majority of previous studies, the first reason is assumed. These analyses feature Tobit and other models for censored data with a large number of zeros to explain fathers' childcare time, implying that the 'non-participants', that is, fathers having reported zero minutes of childcare, usually spent some time on childcare, but did not do so purely by chance during the survey period (e.g., Sayer, Bianchi, et al. 2004; Chalasani 2007; Romano and Bruzzese 2007; Kalenkoski and Foster 2008; Kalenkoski et al. 2009; Wang and Bianchi 2009). In other words, non-participants are therefore ignored or treated as an artefact of the data and hence included in regressions for minutes of childcare as the dependent variable (Pacholok and Gauthier 2010).

Pacholok and Gauthier (2010) take a closer look at fathers' participation in childcare. As a method, a multinomial logistic regression model distinguishing between no/low/medium/

high participation is applied. The results support the view that some cases of non-participation were caused by chance, as fathers or children were absent from home on the diary day more often among non-participants than participants. Nevertheless, non-participants differ substantially from participants in terms of their social, economic, and demographic characteristics. Hence, some of the fathers having reported zero minutes of childcare on the survey day are 'real' non-participants, that is, are generally not involved in childcare. These findings are based on Canadian data for one diary day at one point in time.

The article at hand goes beyond Pacholok's and Gauthier's (2010) work in several ways. Here, participation in childcare is clearly contrasted with all participants' childcare time. The main research question is whether and how predictors of fathers' participation in childcare, defined as zero versus more than zero minutes of childcare, differ from predictors of participating fathers' amount of time on childcare, measured as minutes on the survey day. If there were truly non-involved fathers among the non-participants, predictors would differ between these dependent variables. I employ a Probit model for participation in childcare and an OLS model for participating fathers' minutes of childcare for investigating the differences between fathers' participation in and amount of time spent on childcare in a more detailed way. These models are not subject to the so-called parallel regression assumption demanded by multinomial logistic models, which is frequently violated by important regressors (Long and Freese 2001; see also Oshio et al. 2012). I enlarge the geographic scope by looking at ten industrialised countries. The purpose here is not a detailed comparison between the effects of single predictors between countries. Instead, firstly, descriptive comparisons of fathers' childcare participation and participants' time across countries have not been conducted so far. Hence I conduct this comparison and interpret the findings against the background of common welfare state categorisations. Secondly, I want to find out whether differences between predictors for fathers' participation in childcare on the one hand and participating fathers' childcare time on the other hand, if found in one country, also hold in other countries. In other words, the question is whether there is a general pattern regarding predictors of the two dependent variables across industrialised countries. Furthermore, for some countries, two surveys are available from the last 25 years, so that changes over time from the same country are revealed. In addition, time diaries for more than one day are available for some of the countries, allowing checking as to whether the results hold for a larger reference period.

The findings of this article contribute to the empirical literature on fathers' childcare time and to the discussion on appropriate estimation techniques for its measurement. In addition, the practical application of different indicators of fathers' involvement in childcare time is debated. The sample is drawn from the Multinational Time Use Study 2010. The selected countries are Canada, Finland, France, Germany, Italy, the Netherlands, Norway, Sweden, the United Kingdom, and the United States.

This article is structured as follows. In Section 4.2, economic and sociological theories on fathers' childcare time and their application in empirical time-use studies are discussed. Section 4.3 presents a review of empirical literature on this topic. Then, the data, sample, model and variables are described in Sections 4.4 and 4.5. After that, descriptive findings (Section 4.6) and the results of the models for childcare participation and participants' childcare time (Section 4.7) are presented and discussed. Finally, the Section 4.8 concludes.

## **4.2 Childcare participation and amount of time: Theoretical background and application with time-use data**

Economic and sociological theories provide different frameworks for the explanation of the time allocation of family members. In this section, they are discussed within the context of participation and amount of time spent on childcare.

One of the most prominent economic theories on parents' allocation of time is Becker's New Home Economics (Becker 1981, 1985). According to this theory, spouses maximise a joint utility function. Utility is maximised if one spouse completely specialises in paid labour, whereas the other spouse specialises in household tasks, including childcare. In other words, one spouse would be involved in childcare while the other one – who works in the market – would not be involved in childcare. Specialisation – and hence involvement – is basically determined by education and experience: The spouse with the higher educational level and more work experience, that is, the higher marketable human capital, can achieve a higher income in the market (potential wage) and thus devotes his/her time to market work. Besides human capital, a spouse's sex does play a role in Becker's model, since he assumed that women have a “biological advantage” (Becker 1981:21) for raising children. To sum up, this approach is useful for predicting participation and non-participation on a diary day depending on relative human capital

parameters (educational level, work experience, work status, potential wage), and the spouse's sex.

Other theoretical approaches are less 'extreme' than Becker's theory, as complete specialisation is viewed as only one possibility of maximised utility of the spouses. In these models, specialisation is not ruled out, but the focus is on explaining which parent does *more* and which one does *less* unpaid work.

According to the Bargaining theory (e.g., Ott 1992), spouses bargain over time allocation regarding paid and unpaid work (including childcare). The spouse endowed with higher human capital does more market work and less unpaid work, while the other one focuses on unpaid work and works less in the market. Again, relative human capital would be the main predictor of each spouse's allocation of time.

A third economic model, developed by Akerlof and Kranton (2000), incorporates the sociological view that individuals' time use is influenced by social norms into a formal framework. According to this theory, time allocation depends on 'identity'. Acting out of line with prevailing norms and views in society implicates a loss of identity. Therefore, men aim at displaying masculine behaviour, while women aim at living up to the ideals of what is seen to make them 'good women'. Being endowed with less human capital and thus the lower (potential) wage than his female partner would harm a man's identity. As a consequence, and contrary to the results of the two theories presented above, he would avoid doing 'women's work', like childcare and housework, in order to compensate for his loss of identity. The related sociological approach is referred to as 'Doing gender' theory (West and Zimmermann 1987). A given spouse's relative human capital would have the opposite effect on childcare time compared to the Bargaining and the New Home Economics approaches.

Sociologists also provide reasoning explaining differences in time use between men (instead of between spouses). It is argued that egalitarian views are more prevalent among highly educated men than among their less-educated counterparts (Blossfeld and Drobníč 2001). Thus participation would be determined a-priori, with highly educated fathers being more inclined to participate in childcare due to their egalitarian values.

In short, economists and sociologists provide a variety of theoretical approaches for fathers' childcare participation and fathers' time for childcare. However, apart from Becker's model, which clearly refers to involvement versus non-involvement, most

theories treat childcare time as a continuous variable, referring to less and more childcare. Accordingly, existing empirical studies have ignored fathers' non-participation in childcare and treated it as an artefact, arguing that they constitute very few cases or that these non-participants are similar to participants (Pacholok and Gauthier 2010). Indeed, there are several reasons why fathers who did not participate in childcare during the survey period are not 'real' non-participants. Parents are much more a selected group today than even a few decades ago. The spread and increasing reliability of contraceptive devices have made parenting more voluntary, and the lower number of children per family could make each child more precious in the eyes of the parents (Sayer, Bianchi et al. 2004). In addition, changes in leisure activities over time and increased concerns about children's safety could result in parents spending more time accompanying their children today than in earlier times. Moreover, the father's role is changing in many societies, increasing the pressure on fathers to be a 'good parent', that is, to practise active fathering (Romano and Bruzese 2007). All of these developments lead to the assumption that all fathers normally spend at least a few minutes per day with their children. Zero minutes of childcare could only occur if fathers face severe time constraints or if the child is not available (due to school or other activities) when the father is at home. In other words, relatively few fathers would report having spent zero minutes of childcare on the diary day(s), and fathers' employment and whether the data refer to a weekday or a weekend day would be the sole predictors of fathers' childcare participation.

Existing studies do not support the assumption that all fathers are usually involved in childcare. Firstly, not only a few fathers but a considerable number of them report zero minutes of childcare on the diary day in numerous industrialised countries. The share of non-participants lies between 32% in Sweden and 76% in Latvia according to MTUS data for 16 countries around the year 2000. Secondly, in Canada at least, some fathers could legitimately be labelled as non-participants. In this case, not time constraints (e.g., weekend versus weekday, work hours) but demographic and socio-economic factors are the main predictors of a father's participation in childcare (Pacholok and Gauthier 2010). In line with this result, I hypothesise that in the countries analysed in this study, fathers participating in childcare are distinct from those not participating, so that, indeed, demographic and socio-economic differences can explain childcare participation, while childcare time should be dependent on time availability, mainly determined by the day of the week and work status.

Regarding the data at hand, for some countries surveys are available at two different points in time, more specifically, around 1990 and around 2000. Several reasons could lead to differences between these points in time with respect to fathers' childcare participation and time. Firstly, women's labour market participation has risen in many countries over the course of this decade (Eurostat 2012). Secondly, many countries have changed family policy legislation during the 1990s (e.g., Gauthier 2011; Institute for Child and Family Policy 2012). Thirdly, as explained above, having children is more voluntary today than it used to be, and fathers' role in society is changing. Thus, I expect that participation in childcare has risen over time. I also hypothesise that fathers' amount of childcare minutes has risen, although the expansion of public day-care facilities and the trend towards all-day schools in some countries could have shifted some childcare responsibilities from the family (both parents) to public institutions. Regarding cross-national comparisons, I expect that fathers' participation and participants' minutes of childcare is higher among countries generally labelled as 'social-democratic' countries, lower in 'conservative' countries, and somewhat in between in 'liberal' countries, due to the different macro-level institutions supporting fathers' active involvement with their children and related empirical research. As cross-country comparisons of (participating and non-participating) fathers' average childcare time reveals that it is indeed high in some social-democratic countries (Denmark, Norway, Sweden), medium to high in liberal countries (Australia, Canada, United Kingdom, United States) and medium to low in some conservative welfare states (France, Italy, Germany, Spain) (Stancanelli 2003; Sullivan et al. 2009; Craig and Mullan 2010; García-Meinar et al. 2011).

### **4.3 Predictors of fathers' childcare participation and time**

Empirical research widely demonstrated an increase in fathers' time for childcare during the course of the last decades (Sandberg and Hofferth 2001; Sayer, Bianchi, et al. 2004; Hall 2005; Chalasani 2007; Sullivan et al. 2009; Maume 2011;). In the United States at least, this increase was shown to be the result of both an increase in the share of participants and participant's minutes per day (Sayer, Bianchi, et al. 2004; Chalasani 2007).

In spite of these findings, most multivariate analyses of fathers' involvement with their children focus on the amount of time spent, not on fathers' participation in childcare. A notable exception is the recent article by Pacholok and Gauthier (2010), who apply a multinomial logit model to compare non-participants with fathers reporting low, medium

and high amounts of childcare time using Canadian data from 2005. They find that having a high educational level increased the likelihood of being in the participants' categories as opposed to the non-participant category, and argue that parenting and gender roles are the driving forces behind this result. Compared to the non-participants, the diary day being a weekend day increases the likelihood of spending a high amount of time on childcare, but fathers with low and medium childcare time actually have a lower likelihood of having filled the diary on a weekend day. This result further supports the assumption that non-participation is not solely a data artefact. In addition, for some categories, a positive effect is found for the number of children, the presence of a young child, few weekly working hours, and the female partner's employment. A negative impact for at least two categories of childcare participation is found for step-parent families and long work hours.

As to predictors of fathers' childcare time, in estimations that lump participating and non-participating fathers together, a clear positive impact is seen from fathers' time for housework, his female partners' time for childcare as well as being married instead of cohabiting, and being employed in the public sector (Volling and Belsky 1991; Gottmann 1994; Aldous et al. 1998; Stanca et al. 2003; Hook 2006; Sullivan et al. 2009).<sup>29</sup> Numerous studies also report that the educational level has a positive effect in many countries (e.g., Marsiglio 1991; Cooksey and Fondell 1996; Sayer, Bianchi et al. 2004; Sayer, Gauthier et al. 2004).<sup>30</sup> A recent study also suggests that an increase in the partner's wage has a positive effect on fathers' involvement, at least on passive childcare (Kalenkoski et al. 2009).

A negative effect on fathers' time for childcare is found for their level of involvement in market work, measured as the number of work hours or the employment status (full-time, part-time, no employment) (Ishii-Kuntz and Coltrane 1992; Aldous et al. 1998; Yeung et al. 2001; Stanca et al. 2003; Sayer, Bianchi et al. 2004; Sayer, Gauthier et al. 2004; Pleck 2007), as well as evening work hours (Rapoport and Bourdais 2008), but their wage does not seem to have a strong impact (Kalenkoski et al. 2009). Furthermore, the age of the youngest child, high costs and low availability of non-parental care as well as the presence of other adults in the household have a negative impact (Cooksey and Fondell 1996; Averett et al. 2000; Sayer, Bianchi et al. 2004; Sayer, Gauthier et al. 2004).

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<sup>29</sup> For an overview on social and economic determinants of fathers' and mothers' time for their children see also the review of Monna and Gauthier (2008).

<sup>30</sup> The educational level did not appear to be significant in Norway (Haas and Hwang 2008; Sayer, Gauthier et al. 2004).

Mixed results are found for the father's age, the number of children, and the child's sex (Ishii-Kuntz and Coltrane 1992; Snarey 1993; Cooksey and Fondell 1996; Stancanelli 2003, Sayer, Bianchi et al. 2004).<sup>31</sup>

To sum up, the existing empirical literature gives insights into predictors of fathers' childcare involvement. Nonetheless, several questions remain unanswered. Firstly, most studies focus on the predictors of participating fathers' time for childcare. Yet, as argued in the previous sections, predictors for participation in childcare can be very different from predictors for the amount of time. Secondly, fathers' participation and participating fathers' amount of time for childcare have not been analysed systematically across different countries. Thirdly, changes over time in fathers' childcare participation in a particular country have not been assessed in detail so far.

#### **4.4 Data and sample**

This study is based on data from the Multinational Time Use Study (MTUS) 2010, versions 5.52, 5.53 and 5.80 (Gershuny and Fisher 2010). The MTUS provides harmonised diary data with representative samples of individuals from 20 countries from the 1960s until the 2000s. The analysis is restricted to countries which feature the main variables that affect fathers' involvement in childcare according to related empirical literature. In particular, the variable 'partner's employment status' considerably reduces the number of surveys available for analysing the research question. The following surveys are included: Canada (1992, 1998), Finland (1987, 1999), France (1998), Italy (1989, 2001), Germany (1991, 2001), Netherlands (2000, 2005), Norway (1990, 2005), Sweden (1991, 2001), United Kingdom (2000) and United States (2003). In most countries only one day has been surveyed, hence one 24-hour diary was available. For five countries, two, three or seven diary days are recorded. For reasons of comparison, one diary day per person is randomly selected for all countries in order to make the results comparable. The mode of data collection and the time intervals varies slightly between countries and surveys. Diaries were filled out during the day as activities take place, at the end of the day, or on the next day. For matters of simplification, the terms 'diary day' and 'survey day' are used interchangeably for the day to which the diary refers. Required time intervals range from

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<sup>31</sup> Recently, some researchers have pooled data from several countries to investigate the impact of macro-level factors on fathers' participation in domestic work. But as this paper focuses on individual-level data, I refrain from reviewing literature on macro-level predictors in this article. For an overview of these factors for fathers' childcare see Reich et al. (2012).

free intervals of at least one minute to 15-minute-intervals. Biases arising from these differences are assumed to be rather small due to the relatively small intervals compared to the amount of time many fathers spend on childcare. In addition, successful cross-national comparisons have been carried out with these data before (Craig 2007; Sullivan et al. 2009; Hook 2010; Sayer and Gornick 2011).

The sample consists of fathers who are married or cohabiting, are between 20 and 55 years old and have at least one child below the age of 18 in the household. While the sample size was below 4,000 cases in eight of the ten countries, it was around 10,000 in Italy and the United States. As p-values become extremely small in very large samples, indicating significance even if the small size of the coefficients suggest little practical relevance, random subsamples of 3,500 cases are drawn from the Italian and the American samples for reasons of comparison. Thus, the final size of the samples used for the analyses ranges between 426 in the Netherlands to 3,915 in Germany.

## 4.5 Models and variables

The two dependent variables of interest are participation in childcare, defined as zero versus more than zero minutes of childcare on the survey day, and minutes of childcare on the survey day. Of the sixty-nine different main activities recorded in the MTUS data, ‘childcare’ is the one covering time with children. This is the activity from which the dependent variables are derived. It includes the following activities with or for children: preparing meals for children, feeding them, putting them to bed, medical and body care of children, looking after them, helping them with homework, reading something to them, playing with and talking to them. Thus, all kinds of activities primarily done for or with a child are considered to be childcare.

For participation, I apply a Probit model as empirical strategy (see, e.g., Long and Freese 2001). *Participation in childcare* is a binary variable, denoted as  $Y$ . The probability of participation in childcare, that is, that  $Y$  equals 1, is assumed to be a function of  $k$  explanatory variables  $X_1, \dots, X_k$  :

$$\Pr(Y = 1 | X) = F(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k) \quad (4.1)$$

The  $\beta_i$ -coefficients represent the effects of the variables  $X_1, \dots, X_k$ . The standard Probit model assumes that the function  $F(\cdot)$  follows a normal cumulative distribution, thus

$$\Pr(Y = 1 | X) = \Phi(X) = \int_{-\infty}^X \phi(z) dx \quad (4.2)$$

where  $\phi(z)$  is the normal density function of the standard normal distribution,

$$\phi(z) = \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-z^2}{2}\right) \quad (4.3)$$

For minutes of childcare, as stated above, many existing studies are based on Tobit models for all fathers regardless whether they participate in childcare or not. In contrast, in my analysis, the sample of participating fathers should be representative for the population of participating fathers only. Therefore, I apply ordinary least square (OLS) models for analysing father's minutes of childcare. This is the OLS equation:

$$Y = \beta_0 + \beta_1 X_1 + \dots + \beta_k X_k + u \quad (4.4)$$

The dependent variable  $Y$  is the *number of childcare minutes of participating fathers*.  $\beta_0, \dots, \beta_k$  are the parameters to be estimated,  $X_1, \dots, X_k$  are vectors of explanatory variables (i.e., independent variables), and  $u$  the unobservable error term. The choice of independent variables is made according to related theoretical and empirical literature on fathers' time for childcare. The models account for the *age of the youngest child* in three categories (0-4 years, 5-12 years, 13-17 years) because a continuous variable is not available for all countries. The models also include the *number of children*, the *age of the father and its square*, his *educational level*, his *employment status*, his *partner's employment status*, *weekday versus weekend day*, and a dummy for the *survey year* if more than one survey of a certain country is considered. In addition, *participation in housework*, defined as zero minutes versus more than zero minutes of housework on the survey day, is included in the participation model, while the *number of housework minutes* is included as an independent variable in the model for minutes of childcare. Housework is constructed using the MTUS activity codes for 'routine housework' (including washing clothes, vacuum cleaning, ..., but not: shopping, gardening) and 'cooking' (including food preparation, baking, setting table, etc.). With regard to housework participation, following

Becker's (1981, 1985) theory of specialisation, it is expected that socio-economic factors affect men's participation in unpaid work in general, and, thus, in childcare and housework at the same time. As to minutes of childcare and housework, the economic and sociological theories dealing with more or less unpaid work also lump childcare and housework time together, suggesting a positive relation between these variables. This is reasonable, since these activities can easily and efficiently be combined. For example, a parent who prepares a meal for a baby can do the dishes (for the whole family) while the baby food is heated on the stove.

Educational level is coded into three categories: lower than completed secondary education (not completed ISCED<sup>32</sup> level 3), completed secondary education (ISCED level 3 or 4), and post-secondary education (ISCED level 5 or higher). As to both parents' employment status, the distinction is made between not employed, part-time employment, full-time employment and employment with unknown work hours. This last category is only included in some of the surveys, and presumably covers mostly self-employed workers whose work hours show a lot of variation. Besides unemployed fathers, the group of fathers stated as being 'not employed' include those that were not working for any other reason, as students, retirees and homemakers, for instance.<sup>33</sup> Employment status refers to the usual work arrangement, not to the number of hours on the survey day. The dummy variable 'weekend' indicates whether the diary refers to a weekend day or a weekday.

Summary statistics for all fathers and participating fathers are presented in Tables A.4.1 and A.4.2 in the appendix. They indicate the minimum and maximum value of each variable, the range of the values for the mean and the standard deviations between the countries. Table A.4.1 also includes a detailed definition of all variables used in this study.

## **4.6 Descriptive findings on fathers' childcare participation and minutes**

In the following paragraphs, fathers' raw childcare participation rates and average minutes spent on childcare are presented for the countries analysed. For countries with two surveys at different points in time, calculations are conducted for each survey year separately, in

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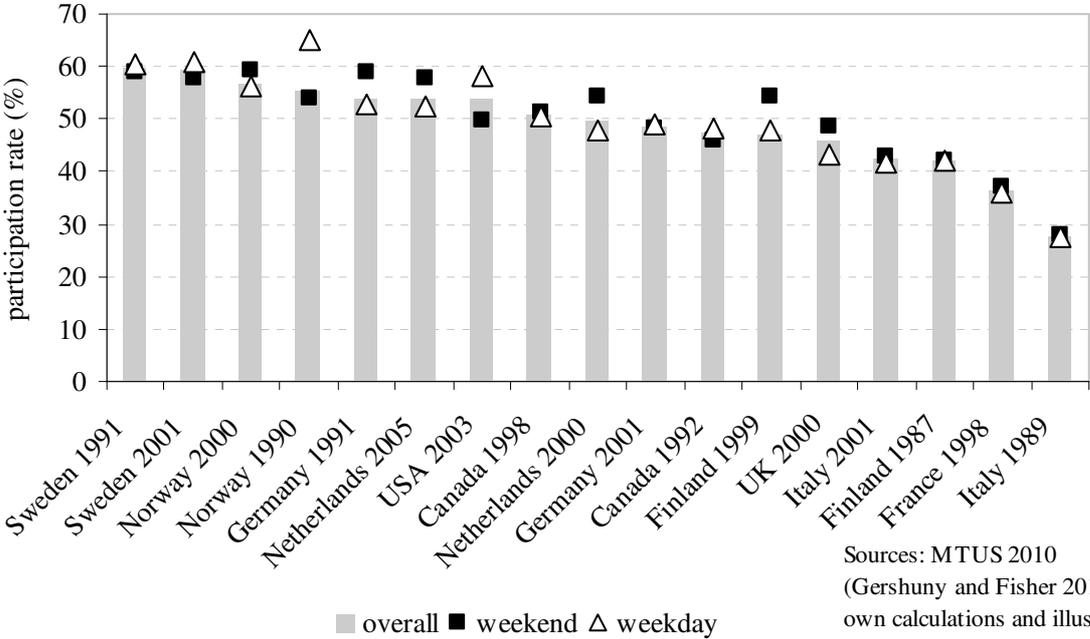
<sup>32</sup> International Standard Classification of Education.

<sup>33</sup> If students are working, they are not classified as not working, but belong to the other groups (part-time or full-time employment or employment with unknown work hours). The share of students in the category 'not employed' is below 12% in all countries but Finland (23.9%) and Norway (21.4%).

order to assess time trends of fathers' childcare participation and minutes. The MTUS provides representative data for the countries analysed, but the share of diaries having been filled on weekdays or weekend days varies between 28% in France and 51% in the United States. Moreover, fathers' childcare time has been shown to differ between weekdays and weekend days (Yeung et al. 2001; Maume 2011). This could make comparisons of samples with different shares of weekend and weekday diaries questionable, so that the overall values as well as those for weekdays only and weekend days only are presented.

Great variation in fathers' raw childcare participation rates and minutes spent on childcare is found between the countries analysed and between different survey years of countries for which two surveys were available. The participation rate ranges from 27.7% in Italy in 1989 to 59.7% in Sweden in 1991 (see Figure 4.1). Sweden, Norway and Germany (1991) are the countries with the highest participation rates, while Finland, France and Italy show the lowest rates.

**Figure 4.1: Fathers' average participation rate of childcare on the diary day in ten industrialised countries 1987-2005**



In Norway, the Netherlands, Canada, Finland and Italy, the participation rate increased from the first survey made around 1990 to the second survey made around 2000. This is in line with earlier findings on the development of the share of male participants in childcare in the United States (Sayer, Bianchi et al. 2004; Chalasani 2007). However, in Germany,

fewer fathers participated in childcare on the survey day in 2001 than in 1991. One reason for the decrease in fathers' childcare participation might be the expansion of the duration of parental leave during the 1980s and 1990s. As a result, mothers markedly reduced their hours of market work (Merz 2004), which could have had an impact on the gendered specialisation in unpaid labour at home.

In Norway and Sweden, participation rates were high in both surveys – 1990/1991 and 2000/2001 – and they differed less than one percentage point from one another. Participation rates on weekdays and weekends did not differ substantially in most countries and broadly support the overall order of surveys.

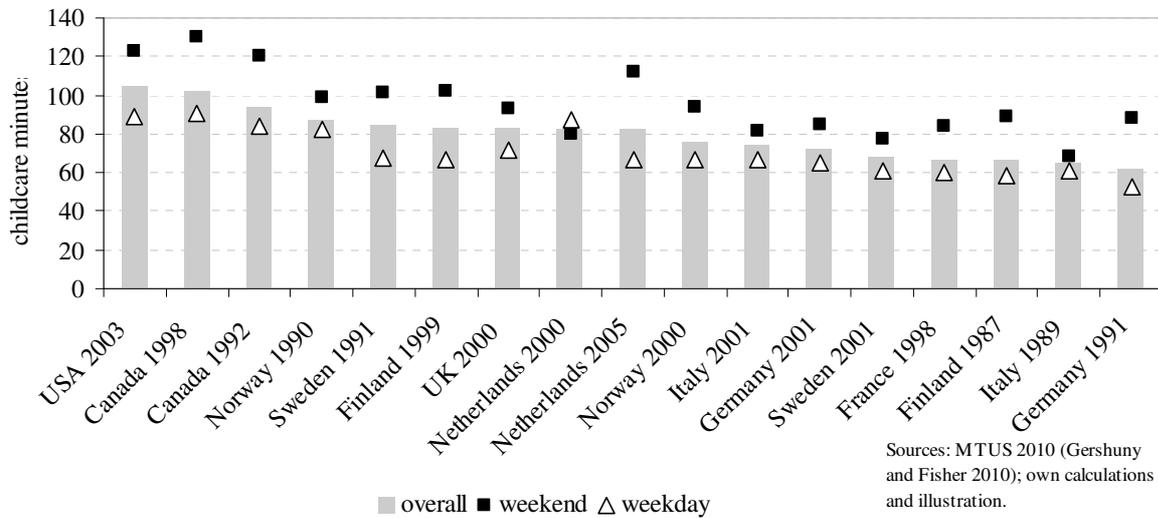
For the detection of an underlying structure of this distribution, it is evaluated against common classifications of countries. Researchers have grouped countries according to welfare state regimes, in terms of their general political institutions (Esping-Andersen 1990), family policy (Gauthier and Hatzius 1997; Korpi 2000; Mischke 2011), paid and unpaid work (Gornick and Meyers 2004) as well as gender relations (Korpi 2000; Galvez-Munoz et al. 2011). Generally, the Scandinavian countries are classified as social democratic welfare states, Germany, Italy and France (and other continental European countries) are referred to as conservative welfare states, and the United Kingdom, the United States and Canada belong to the liberal welfare states. The Netherlands is a hybrid case, sometimes referred to as a social democratic, sometimes as a conservative welfare state.<sup>34</sup> Here, it is regarded separately from the country clusters. In terms of these categories, there seems to be a division of social-democratic countries between Sweden and Norway with high participation rates on the one hand and Finland with low participation rates on the other hand. The liberal welfare states (United States, the United Kingdom and Canada) as well as the Netherlands, exhibit medium participation rates. France, Germany and Italy, – conservative welfare states – show medium and low participation rates.

Looking at the average number of minutes of participating fathers on the survey day, the order of countries turns out to be somewhat different from the order of participation rates (see Figure 4.2). The number of childcare minutes ranges from 62 minutes in Germany in 1991 to over 104 minutes in the United States.

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<sup>34</sup> See discussion in Mischke (2011).

**Figure 4.2: Average number of childcare minutes on the diary day of participating fathers in ten industrialised countries 1987-2005**



Canadian fathers (1998, 1992) show the second and third highest number of minutes, followed by Norway in 1990 and Sweden in 1991. Germany (1991), Italy (1989) and Finland (1987) show the lowest number of minutes of between 62 and 66. In Canada, Finland, Italy and Germany, the number of minutes was higher in the latest survey than in the earlier survey. In contrast, in Norway, the Netherlands, and Sweden, it was lower around the year 2000 than around 1990. One reason for the decrease in the amount of time Norwegian fathers spent with their children may be the extension of public childcare facilities, as Kitterod and Pettersen (2006) suggest for their country; and the situation might be similar in Sweden. In contrast to the participation rates, countries belonging to the liberal welfare states show overall a comparatively high number of fathers' childcare minutes. The social democratic countries and the Netherlands have medium, the conservative welfare states medium to low average daily minutes of childcare.

The average number of childcare minutes is considerably larger on weekend days than on weekdays in many countries. Participating Canadian (1998) and American (2003) fathers take the lead both on weekend days and on weekdays, spending on average more than 100 minutes of childcare on weekend days and about 90 minutes on weekdays. Swedish (2001) and Italian (1989) fathers show the smallest values (less than 80 minutes) on weekend days. Finish (1987) and German (1991) fathers are at the bottom end regarding average minutes on weekdays (less than 59 minutes). In the Netherlands (2005), Canada (1998, 1992) and Finland (1999), participating fathers spend on average more than 35 minutes more with their children on weekend days than on weekdays. Consequently, in contrast to

participation rates, the average number of childcare minutes differs substantially between weekend days and weekdays. Nevertheless, the broad picture that childcare minutes are relatively high in liberal welfare states, medium in social democratic welfare states and the Netherlands, and comparatively low in conservative welfare states is supported by the separate analysis of weekdays and weekend days.

Comparing fathers' average participation and minutes across countries, one could not conclude that high participation by fathers in childcare results in a larger amount of time spent on childcare by participating fathers. For example, the Norwegian survey from 2000 shows the third-highest participation rate, but only a medium number of minutes. In contrast, participation was quite high in Germany in 1991, but the amount of time was the lowest. These contrasts between participation and amount of time within one country, as well as the differences regarding weekday/weekend day averages between participation and minutes, lead to the question whether predictors for participation in and minutes of childcare are distinct as well.

## **4.7 Results on fathers' childcare participation and time**

### **4.7.1 Participation in childcare**

Table 4.1 presents the marginal effects for the Probit equation for fathers' participation in childcare in the countries analysed in this study. According to these results, the age of the youngest child is the only variable with a consistent negative effect across all countries. If the youngest child is between 5 and 12 years old instead of younger than 5 years, the likelihood of fathers participating in childcare is significantly reduced by between 15% (Italy) and 36% (Sweden). If the child is between 13 and 17 years old, the likelihood of participation is reduced by between 31% (Italy) and 58% (Netherlands, Norway).

Negative effects also arise from the fathers' employment, but only in four of the ten countries analysed. In the United States, participation is reduced significantly by 11% through part-time work as compared with no employment. Full-time employment reduces participation in Canada, France, Norway and the United States; the effect ranges from 7% in the United States to 17% in Canada. Employment falling under the category 'unknown work hours' reduces the likelihood of fathers participating in childcare by about 10% in France. Fathers' childcare time is independent from the work status in Finland, Germany, Italy, the Netherlands, Sweden and the United Kingdom.

Fathers participate less in childcare on weekend days than on weekdays in Canada, Sweden and the United States. For countries with two surveys, the likelihood of fathers' childcare participation is lower in the older survey in Canada, Finland and Italy, while there is no difference in Germany, Norway and Sweden.

In all countries but Norway and the United Kingdom, a high educational level compared to a low level positively affects fathers' childcare participation, the impact ranging from almost 5% in Germany to 26% in the United States. Even fathers with a medium educational level have a higher likelihood of childcare participation than their lesser-educated counterparts in five of the ten countries analysed (Canada, Finland, Italy, Sweden, United States).

The employment status of the female partner affects fathers' childcare participation in four countries only. In Sweden and the United States, the likelihood of participation is significantly increased if the partner is working part-time, in France, the Netherlands and Sweden if she is working full-time instead of not working. In the United States only, each additional child increases the likelihood of fathers participating in childcare by about 4% in the United States.

A consistent positive correlation is found for fathers' participation in housework, which increases the likelihood of childcare participation by about 17% in Italy and by almost 30% in the Netherlands. But contrary to the interpretation of the other variables, this finding might not reflect a causal relationship of housework participation affecting childcare participation. Firstly, the relationship can be spurious, if another factor (e.g., family-orientation) affects participation in both types of unpaid work positively, as suggested by economic and sociological theories. Secondly, it is likely that housework can be a result of childcare, as, for example, rooms in which children have played need to be tidied up.<sup>35</sup>

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<sup>35</sup> Sensitivity analyses have shown that the exclusion of this variable does not change the qualitative effect of the other covariates.

**Table 4.1: Probit estimates of fathers' participation in childcare**

participation equation, marginal effects, standard errors in parentheses  
dependent variable: childcare participation

		CA (N=2241) (1992, 1998)	FI (N=1344) (1987, 1999)	FR (N=2169) (1998)	GE (N=3915) (1991, 2001)	IT (N=3483) (1989, 2001)
age of the youngest child	0-4	ref. -0.269*** (0.026)	ref. -0.320*** (0.032)	ref. -0.235*** (0.025)	ref. -0.271*** (0.021)	ref. -0.147*** (0.022)
	5-12	-0.551*** (0.018)	-0.500*** (0.025)	-0.371*** (0.022)	-0.541*** (0.019)	-0.307*** (0.022)
	13-17	0.019 (0.015)	0.007 (0.020)	0.001 (0.013)	-0.011 (0.012)	0.016 (0.013)
no. of children	0.021 (0.017)	-0.017 (0.022)	0.016 (0.016)	0.009 (0.014)	-0.003 (0.015)	
father's age father's age squared educational level		-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)
level	low	ref. 0.139*** (0.037)	ref. 0.121*** (0.038)	ref. 0.037 (0.033)	ref. -0.045* (0.025)	ref. 0.115*** (0.024)
	medium	0.189*** (0.031)	0.141*** (0.041)	0.141*** (0.036)	0.046* (0.024)	0.195*** (0.036)
	high					
father's employment	not employed	ref. 0.224** (0.087)	ref. 0.038 (0.141)	ref. -0.105 (0.067)	ref. -0.009 (0.071)	ref. 0.033 (0.059)
	part-time	-0.169* (0.039)	-0.024 (0.067)	-0.098** (0.043)	-0.048 (0.038)	-0.027 (0.041)
	full-time	0.124 (0.147)	0.020 (0.089)	-0.100** (0.045)	0.118 (0.011)	-0.066 (0.043)
	unknown work hours					
partner's employment	not employed	ref. -0.033 (0.035)	ref. - (0.031)	ref. 0.020 (0.031)	ref. 0.010 (0.021)	ref. 0.018 (0.035)
	part-time	0.021 (0.027)	- (0.029)	0.058** (0.029)	0.011 (0.025)	0.038 (0.026)
	full-time		- (0.018)			
	unknown work hours	- (0.043)	0.018 (0.043)	0.034 (0.043)	0.044 (0.035)	0.008 (0.038)
day of the week	weekday	ref. -0.044* (0.026)	ref. 0.010 (0.033)	ref. -0.011 (0.024)	ref. 0.004 (0.020)	ref. 0.003 (0.017)
	weekend	0.227*** (0.023)	0.180*** (0.031)	0.193*** (0.022)	0.211*** (0.019)	0.166*** (0.018)
housework participation time of the survey	wave 1	-0.055** (0.024)	-0.125*** (0.042)	- (0.042)	0.025 (0.022)	-0.101*** (0.028)
	wave 2	ref.	ref.	-	ref.	ref.
Pseudo R <sup>2</sup>		0.2106	0.2409	0.1681	0.1927	0.1401

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

**Table 4.1: Probit estimates of fathers' participation in childcare (continued)**

participation equation, marginal effects, standard errors in parentheses  
dependent variable: childcare participation

		NL (N=426) (2000, 2005)	NO (N=930) (1990, 2000)	SW (N=1164) (1991, 2000)	UK (N=1110) (2000)	USA (N=3500) (2003)
age of the youngest child	0-4	ref. -0.339*** (0.063)	ref. -0.330*** (0.045)	ref. -0.362*** (0.040)	ref. -0.337*** (0.035)	ref. -0.192*** (0.021)
	5-12	-0.583*** (0.048)	-0.584*** (0.042)	-0.562*** (0.040)	-0.556*** (0.025)	-0.438*** (0.024)
	13-17	0.059 (0.037)	0.034 (0.026)	0.023 (0.021)	-0.007 (0.019)	0.035*** (0.011)
no. of children		-0.021 (0.047)	-0.030 (0.027)	0.002 (0.023)	0.022 (0.021)	0.032*** (0.011)
father's age		0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000*** (0.000)
father's age squared						
educational level	low	ref. 0.051 (0.082)	ref. -0.065 (0.065)	ref. 0.068* (0.040)	ref. 0.013 (0.040)	ref. 0.101*** (0.033)
	medium	0.140* (0.079)	0.035 (0.068)	0.130*** (0.041)	0.026 (0.045)	0.264*** (0.030)
	high					
father's employment	not employed	ref. -0.059 (0.168)	ref. -0.049 (0.119)	ref. 0.026 (0.115)	ref. -0.015 (0.116)	ref. -0.113* (0.060)
	part-time	-0.100 (0.107)	-0.131* (0.071)	0.008 (0.052)	-0.088 (0.063)	-0.067* (0.036)
	full-time					
	unknown work hours	-	-	-	-	-
partner's employment	not employed	ref. 0.038 (0.061)	ref. 0.032 (0.054)	ref. 0.106** (0.044)	ref. 0.031 (0.041)	ref. 0.081*** (0.024)
	part-time	0.170* (0.094)	-0.045 (0.055)	0.078* (0.045)	-0.069 (0.045)	0.023 (0.021)
	full-time					
	unknown work hours	-	-	-	-	-
day of the week	weekday	ref. 0.072 (0.062)	ref. -0.048 (0.041)	ref. -0.065** (0.032)	ref. 0.031 (0.033)	ref. -0.113*** (0.018)
	weekend	0.298*** (0.054)	0.260*** (0.044)	0.253*** (0.040)	0.245*** (0.035)	0.218*** (0.018)
housework participation			0.001	-0.001		
time of the survey	wave 1	-	(0.040)	(0.034)	-	-
	wave 2	-	ref.	ref.	-	-
Pseudo R <sup>2</sup>		0.2578	0.2756	0.2284	0.2328	0.1487

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

No dummy indicating survey years for the Netherlands due to the small sample size.

If childcare participation was only an artefact, and non-participants did not differ in terms of socio-economic characteristics, time availability – best captured by the dummy ‘weekend’ – would be the sole predictor of fathers’ participation. However, results from these estimates show that the survey day falling on a weekend day does not affect fathers’ participation in childcare in seven of the ten countries, and affects it negatively in three of them. Even fathers’ work status, which could also be interpreted as a time-availability indicator, has rather limited effects. Instead, firstly, the age of the youngest child is a strong predictor, indicating that fathers’ participation depended on the overall amount of childcare needed by a child, as this declines with increasing age. Secondly, the educational level has a strong effect in most countries, supporting the assumption that highly educated fathers were the forerunners of modern gender roles.

In the models presented above, all variables refer to differences between fathers. However, economic theories predict that parents' allocation of time depends on resources relative to their partner's. Therefore, estimates are carried out replacing father's work status and partner's work status by father's work status in relation to his partner's.<sup>36</sup> The following four categories are accounted for:

1. both not employed or part-time employment (reference)
2. father full-time or unknown work hours, partner not
3. partner full-time or unknown work hours, father not
4. both full-time or unknown work hours

Descriptive findings (not shown) reveal that there is a difference of up to 48 percentage points in fathers’ childcare participation across these four categories. Fathers’ participation is highest in category 1 or 3 in most countries, and lowest in category 4 in four of the ten countries. However, the multivariate results do not show significant differences in most countries, as seen from Table 4.2. In Canada, France and the United Kingdom, the likelihood of fathers’ childcare participation is smaller if only the father worked full-time or had unknown work hours, but the partner not (i.e., she was employed part-time or not employed), compared to the reference category. British fathers are less inclined to participate in childcare if only the mother works full-time or had unknown work hours. If both work full-time or unknown work hours, the likelihood of fathers participating in childcare is significantly lower in Norway and the United Kingdom. Hence fathers’

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<sup>36</sup> Inclusion of all variables - father's work status, partner's work status, and interaction effects of both - is not possible in all countries due to multicollinearity issues. In particular, the group of couples in which the partner works full-time or has unknown work hours, but the father not, is very small.

childcare participation is independent from their work status in relation to their spouse's in six of the ten countries analysed (Finland, Germany, Italy, the Netherlands, Sweden, the United States). This is in line with the assumption that time availability generally has a minor impact on fathers' childcare participation.

Several tests for the robustness of the results are conducted for all countries. For Germany, as an example, the results of this sensitivity analysis for fathers' childcare participation are displayed in Table A.4.3 in the appendix. As the literature suggests that predictors of fathers' childcare time are different on weekdays than on weekend days (Yeung et al. 2001; Maume 2011), sensitivity analyses have been carried out, first using only diaries from weekdays and then only diaries from weekends. The results for all countries turn out to be very similar to the ones presented in Table 4.1. The only major difference is that the negative effect of the fathers' work status is slightly more pronounced in the regressions from weekday diaries, and vanishes for weekend dairies, concluding that time availability only plays a role for fathers' childcare participation on weekdays in some of the countries analysed. In addition, for those countries for which two or more diary days are available, fathers' average childcare participation per day in this time span is analysed as well, with negligible differences in the results compared to the analysis based on 24-hour diaries presented above.

For countries for which two surveys are available, one around 1990 and another around the year 2000, fathers' childcare participation is estimated for each survey separately.<sup>37</sup> The results for the earlier surveys are largely the same as those of the newer surveys, but two points are worth reporting. Firstly, the number of children is insignificant in Canada in 1992 and in Italy in 1989, but has a positive impact in both countries in the more recent surveys. Secondly, in four countries (Finland, Germany, Italy, Sweden) the educational level has a strong effect on fathers' participation in childcare in the earlier survey, but not in the more recent survey.

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<sup>37</sup> These estimates have been carried out for Canada, Finland, Germany, Italy, Norway and Sweden, but not for the Netherlands due to the small sample size.

**Table 4.2: Probit estimates of fathers' participation in childcare - relative work status**

participation equation, marginal effects, standard errors in parentheses  
dependent variable: childcare participation

	CA (N=2241) (1992, 1998)	FI (N=1344) (1987, 1999)	FR (N=2169) (1998)	GE (N=3915) (1991, 2001)	IT (N=1483) (1989, 2001)	NL (N=426) (2000, 2005)	NO (N=930) (1990, 2000)	SW (N=1164) (1991, 2000)	UK (N=1110) (2000)	USA (N=3500) (2003)
reference: both not employed or part-time employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
father full-time or unknown work hours, partner not	-0.083** (0.041)	-0.054 (0.068)	-0.079* (0.042)	-0.028 (0.041)	-0.000 (0.037)	-0.109 (0.110)	-0.106 (0.069)	-0.050 (0.080)	-0.105† (0.060)	0.014 (0.043)
partner full-time or unknown work hours, father not	0.056 (0.068)	-0.059 (0.098)	0.010 (0.075)	0.043 (0.064)	0.121 (0.089)	0.046 (0.158)	-0.057 (0.112)	-0.080 (0.145)	-0.197† (0.096)	0.063 (0.056)
both full-time or unknown work hours	-0.055 (0.043)	-0.025 (0.070)	-0.342 (0.437)	-0.015 (0.043)	0.020 (0.032)	-0.022 (0.145)	-0.162** (0.072)	-0.042 (0.083)	-0.173*** (0.060)	-0.006 (0.043)
Pseudo R <sup>2</sup>	0.2102	0.2459	0.1672	0.1929	0.1403	0.2550	0.2706	0.2224	0.2302	0.1462

Control variables: age of the youngest child, no. of children, father's age, father's age squared, educational level, day of the week, housework participation, time of survey. No dummy indicating survey years for the Netherlands due to the small sample size.

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

### 4.7.2 Time for childcare

The results for the predictors of fathers' minutes spent on childcare per day are displayed in Table 4.3. For all countries, a consistent positive effect on fathers' childcare time is the 'weekend'. On weekends, fathers spend between 13 minutes (Italy) and 30 minutes (Netherlands) more with their children than on weekdays. A positive correlation is also found for the number of housework minutes in eight countries. Again, I refrain from interpreting this as a true causal relationship.

The number of children has a significant and positive impact only in Canada, Italy and the United States. With each additional child, fathers' childcare time rises between about 6 minutes in Italy and more than 8 minutes in Norway.

Contrary to the expectations derived from the results of studies that include participating and non-participating fathers in the minute estimation, the level of education does not have a universal impact on fathers' childcare time. Only in Italy do fathers with a medium level of education spend significantly more time with their children than those with low education. And in Italy as well as in France, Norway and the United Kingdom do fathers with high levels of education spend significantly more time with their children than their lesser-educated counterparts. The impact ranges between 15 minutes in France and 31 minutes in Italy. In other words, the father's educational level does not have an effect on childcare time in Canada, Finland, Germany, the Netherlands, Sweden, and the United States.

**Table 4.3: OLS estimates of participating fathers' minutes of childcare**

beta-coefficients, standard errors in parentheses  
dependent variable: minutes of childcare

		CA (N=1115) (1992, 1998)	FI (N=580) (1987, 1999)	FR (N=789) (1998)	GE (N=2022) (1991, 2001)	IT (N=1227) (1989, 2001)
age of the youngest child	0-4	ref. -37.69***	ref. -37.40***	ref. -19.45***	ref. -28.13***	ref. -8.17*
	5-12	(6.25) 9.39	(6.53) -55.80***	(4.74) -23.88***	(3.47) -36.94***	(4.58) -23.31***
	13-17	(52.05) 7.90**	(9.96) -1.18	(8.24) 0.32	(5.15) -1.21	(8.43) 5.62†
no. of children		(3.90) -4.33	(4.25) 3.09	(2.62) 3.84	(2.24) 1.02	(3.25) -1.39
father's age		(4.50)	(5.01)	(3.08)	(2.25)	(3.36)
father's age squared		(0.06)	(0.07)	(0.04)	(0.03)	(0.04)
educational level	low	ref. -1.85	ref. -0.10	ref. 8.46	ref. -3.33	ref. 15.18**
	medium	(10.36) 9.91	(7.30) 13.03	(6.65) 15.16**	(4.09) 1.47	(6.21) 31.46***
	high	(09.05)	(8.38)	(6.64)	(3.83)	(8.65)
father's employment	not employed	ref. -18.82	ref. -21.47	ref. -33.94***	ref. -9.40	ref. -1.23
	part-time	(22.43) -18.89*	(24.20) -20.72	(12.89) -33.85***	(12.10) -15.74**	(17.97) -20.69*
	full-time	(10.26)	(16.47)	(9.67)	(7.03)	(11.33)
	unknown work hours	-3.72 (29.72)	-39.79** (17.49)	-39.78*** (11.15)	-28.31 (21.91)	-29.56** (12.27)
partner's employment	not employed	ref. 6.99	ref.	ref. -3.12	ref. -2.56	ref. -10.39
	part-time	(13.09) -2.38	-	(5.57) 3.87	(3.47) -2.09	(6.49) -3.45
	full-time	(6.94)	-	(5.62)	(4.17)	(6.28)
	unknown work hours	-	4.76 (8.85)	-10.60 (6.46)	-2.00 85.27	-3.50 (9.19)
day of the week	weekday	ref. 29.09***	ref. 23.62***	ref. 21.76***	ref. 23.83***	ref. 12.90***
	weekend	(8.50) 0.17***	(7.12) 0.12†	(5.53) 0.06	(3.69) 0.17***	(3.64) 0.10*
minutes of housework		(0.06) -11.77*	(0.06) -23.21**	(0.04)	(0.03) -13.11***	(0.05) -0.15
time of the survey	wave 1	(7.01)	(9.72)	-	(3.74)	(7.94)
	wave 2	ref. 175.32**	ref. 59.17	- 15.22	ref. 78.08*	ref. 109.44
constant		(78.68)	(91.82)	(56.09)	(43.20)	(66.95)
R <sup>2</sup>		0.1133	0.1504	0.1088	0.1250	0.0751

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

**Table 4.3: OLS estimates of participating fathers' minutes of childcare (continued)**

beta-coefficients, standard errors in parentheses  
dependent variable: minutes of childcare

		NL (N=222) (2000, 2005)	NO (N=517) (1990, 2000)	SW (N=693) (1991, 2000)	UK (N=491) (2000)	USA (N=1861) (2003)	
age of the youngest child	0-4	ref. -31.61***	ref. -28.60***	ref. -28.43***	ref. -41.96***	ref. -36.23***	
	5-12	(9.95) -28.53	(6.37) -38.78***	(6.24) -33.07***	(7.98) -30.39*	(5.41) -71.69***	
	13-17	(28.20) 6.92	(9.22) 8.31**	(9.00) 2.12	(17-98) -0.01	(8.34) 3.06	
no. of children		(7.95) 0.57	(3.87) -0.62	(2.93) 1.85	(4.71) -0.77	(2.57) 4.30	
		(6.63) -0.02	(3.37) -0.00	(3.36) -0.03	(4.98) 0.01	(3.15) -0.05	
father's age squared		(0.08)	(0.04)	(0.04)	(0.07)	(0.04)	
	educational level	low	ref. 2.14	ref. 13.15	ref. 0.49	ref. 9.01	ref. 11.42
		medium	(12.66) 8.59	(9.57) 17.09†	(6.63) 1.38	(9.64) 26.60***	(11.94) 8.23
high		(11.68)	(10.04)	7.20)	(9.34)	(10.85)	
father's employment	not employed	ref. 32.15	ref. -3.83	ref. 5.74	ref. -39.16	ref. -16.10	
	part-time	(27.08) -0.75	(16.00) -13.81	(15.85) -7.06	(28.25) -57.24***	(16.75) -31.61***	
	full-time	(16.58)	(11.96)	(10.05)	(21.15)	(12.21)	
	unknown work hours	-	-	-	-	-	
partner's employment	not employed	ref. 5.11	ref. -2.86	ref. -13.08	ref. -3.46	ref. 0.05	
	part-time	(10.14) -2.01	(7.62) 4.65	(8.28) -3.20	(8.62) 1.64	(5.68) 8.45	
	full-time	(14.72)	(8.42)	(9.92)	(9.54)	(6.24)	
	unknown work hours	-	-	-	-	-	
day of the week	weekday	ref. 29.98***	ref. 18.97***	ref. 20.29***	ref. 18.67**	ref. 30.60***	
	weekend	(10.62) 0.44***	(7.01) 0.15***	(6.57) 0.15***	(7.32) 0.08	(5.11) 0.00	
minutes of housework time of the survey		(0.10)	(0.05)	(0.06)	(0.05)	(0.03)	
	wave 1	-	15.07** (6.08)	6.27 (5.65)	-	-	
	wave 2	-	ref.	ref.	-	-	
constant		50.61 (123.87)	77.91 (62.92)	41.84 (864.83)	144.96**	28.73 (58.07)	
R <sup>2</sup>		0.2246	0.1372	0.1128	0.1409	0.0725	

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

Full-time employment and employment with unknown work hours seem to be major obstacles for spending time with children in several countries. Full-time employment instead of no employment reduces childcare time in France (-15 minutes), Germany (-16 minutes), Italy (-21 minutes), the United Kingdom (-57 minutes) and the United States (-32 minutes). Unknown work hours have a negative impact on fathers' childcare time in France and Italy, but not in Canada (no data for the Netherlands, Norway, Sweden, the United Kingdom and United States). The female partner's employment status does not have an effect on fathers' childcare time in all of the countries analysed. Finally, among countries with surveys at several points in time, Canada, Finland and Germany show a significant difference between the surveys. In these countries, fathers' childcare time is significantly higher around the turn of the millennium than ten years earlier. This is not the case in Italy, Norway or Sweden.

Again, models are re-estimated to include fathers' work status in relation to their partner's. Descriptive comparisons show that the differences between father's average childcare minutes across the four categories lie between 13 and 47 minutes. The average number of childcare minutes is highest in category 1 (both not employed or part-time employed) in seven countries, and highest in category 3 (partner full-time or unknown work hours, father not) in three other countries. The values are lowest in category 4 (both full-time or unknown work hours) or 2 (father full-time or unknown work hours, partner not) in seven of the ten countries. Thus significant differences between these categories for the prediction of fathers' childcare time are expected. The findings from the regressions are presented in Table 4.4. Contrary to the results for childcare participation, the relative work status matters for fathers' childcare time in all countries but Sweden. In seven countries, fathers' minutes spent on childcare are significantly lower for couples in which only the father had a full-time job or had unknown work hours, compared to couples in which both worked part-time or do not work at all (not in Canada, Finland, Sweden). Canadian and Finnish fathers report significantly more childcare minutes if only their partner works full-time or has unknown work hours, but their Dutch counterparts do significantly less childcare minutes in the same circumstances. Results are not significant in the other seven countries.<sup>38</sup> If either parent works full-time or has unknown work hours, fathers' childcare minutes are significantly lower in four countries, namely France, Germany, Italy and the

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<sup>38</sup> Apart from content-related reasons, this could also be caused by the low share of couples in this category which ranges between 2% and 7% (see Table A.2).

United Kingdom. In sum, parents' relative work status does matter for fathers' childcare time in nine of the ten countries analysed excluding Sweden.

Sensitivity analyses on the robustness of the results are conducted for all countries, and the results for Germany as an example are displayed in Table A.4.4 in the appendix. As the day of the week has a major influence on fathers' childcare time, it is worth analysing predictors separately for weekdays and weekends. Results for the impact of the employment status are similar to this variable's effect on fathers' participation: The employment status matters more on weekdays than it does on weekend days in all countries analysed. Furthermore, while fathers' housework time is positively related to childcare time in the model presented above and in the regression for weekdays only, there is no significant correlation between them on weekends in any country besides Canada where the positive relationship persists. One interpretation for this could be that fathers who spend a comparatively large amount of time with their children during the week are generally more inclined to do unpaid work at home, while fathers who are generally less involved in household chores use the spare time on the weekend to spend some of it with their children. The comparison of the results with those for the average number of childcare minutes of all diary days from the countries where between two and seven days are available do not reveal noticeable deviations from the results of the main model presented above. In other words, the results hold even if more than one day (and up to seven days) in the fathers' lives was observed.

In addition, for the six countries with two surveys and a sufficient sample size, it is explored whether predictors of fathers' childcare minutes differ between two points in time in the same country. Similar to the results for fathers' childcare participation, the impact of the number of children changes in Canada, from not significant in the first survey to a positive effect in the second survey, and the impact of the educational level is positive in the first and not in the second survey in Finland, Italy and Sweden.

**Table 4.4: OLS estimates of participating fathers' minutes of childcare - relative work status**

beta-coefficients, standard errors in parentheses  
dependent variable: minutes of childcare

	CA (N=1115) (1992, 1998)	FI (N=734) (1987, 1999)	FR (N=789) (1998)	GE (N=2028) (1991, 2001)	IT (N=1227) (1989, 2001)	NL (N=426) (2000, 2005)	NO (N=578) (1990, 2000)	SW (N=697) (1991, 2000)	UK (N=513) (2000)	USA (N=1861) (2003)
reference: both not employed or part-time employed	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
father full-time or unknown work hours, partner not	-0.90 (8.72)	6.63 (10.58)	-20.92** (8.93)	-13.02* (7.33)	-29.25*** (10.92)	-31.11** (17.44)	-20.32* (11.32)	-20.86 (14.24)	-52.68*** (19.90)	-28.02** (14.10)
partner full-time or unknown work hours, father not	36.81** (18.44)	49.22** (23.80)	12.96 (19.03)	-1.92 (11.52)	-28.95 (19.91)	-58.54** (24.07)	-12.86 (14.58)	-16.42 (20.54)	-30.33 (20.92)	5.50 (17.88)
both full-time or unknown work hours	-7.09 (8.90)	9.28 (10.71)	-20.75** (8.71)	-14.04* (7.56)	-24.29** (10.56)	-26.36 (21.02)	-13.91 (11.81)	-14.77 (14.65)	-47.24* (7.09)	-19.33 (14.55)
R <sup>2</sup>	0.1191	0.1471	0.0961	0.1251	0.0726	0.2397	0.1294	0.1104	0.1405	0.0720

Control variables: age of the youngest child, no. of children, father's age, father's age squared, educational level, day of the week, minutes of housework, time of survey.  
No dummy indicating survey years for the Netherlands due to the small sample size.

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

## 4.8 Conclusion

This paper deals with the difference between fathers' participation in childcare, defined as zero minutes of childcare on the survey day, and the amount of time participating fathers spend with their children, measured in minutes on the survey day. It is expected that predictors of participation differ from predictors of participants' childcare time, because a recent article by Pacholok and Gauthier (2010) suggests that some of the fathers not participating in childcare on the diary day are generally uninvolved in childcare. Cross-country descriptive and multivariate analyses are conducted for fathers' childcare participation and participating fathers' minutes of childcare. Therefore, this article contributes to the empirical literature on fathers' involvement in childcare and promotes the discussion about appropriate target variables in empirical research. Moreover, the cross-national scope highlights differences as well as similarities regarding the two different childcare measurements. In addition, changes over time are accounted for. Time-use data from the Multinational Time Use Survey featuring surveys from ten industrialised countries from the last 25 years are used to test the hypotheses.

Descriptive analysis reveals that childcare participation and amount of time spent vary considerably between countries and survey years. As expected, in the majority of countries with two surveys at different points in time, participation and the number of minutes have increased. Moreover, countries exhibiting high participation rates do not necessarily show a large average number of minutes. The hypothesis that social democratic welfare states exhibit highest participation rates and average number of minutes is not fully supported. The share of participating fathers is highest in Sweden and Norway, medium in liberal welfare states and the Netherlands, and low in conservative countries as well as Finland. Broadly speaking, the average number of minutes of participating fathers is found to be highest in liberal welfare states, medium in social democratic states and the Netherlands, and medium to low in conservative states.

Regression results show that, firstly, predictors for both dependent variables differ between countries. For example, with regards to fathers' participation in childcare, compared to no employment, the female partner's full-time employment has a positive impact only in three of the ten countries analysed. Regarding participating fathers' childcare time, the number of children has a positive impact in the United States, but not in the other countries.

Secondly, the impact of certain variables varies over time, as sensitivity analysis reveals. For instance, the number of children has a positive impact on both dependent variables in Canada in 1998 and on fathers' childcare participation in Italy in 2001, but not in the earlier surveys from these countries. This could be interpreted as a decrease in the importance of gendered specialisation of childcare, as proposed by Becker's New Home Economics. Instead, an increase in the number of children and hence in the amount of childcare work seems to result in more engagement of fathers nowadays, at least in these two countries. In addition, the impact of the educational level on both fathers' participation and childcare minutes declined in several countries. Maybe less-educated fathers are catching up with highly educated fathers who were the forerunners of 'modern' fatherhood.

Most important, while the age of the youngest child affects both participation and participants' minutes of childcare, other predictors of fathers' childcare participation differ from predictors of participating fathers' childcare minutes. Results for the regression of fathers' participation in childcare show that instead of variables indicating time availability (weekday/weekend day, work status, partner's work status, relative work status), the age of the youngest child the fathers' educational level and his participation in housework are the main predictors. For this last variable, however, there are reasons for not interpreting this as a causal relationship. For example, a fathers' general family-orientation could influence the dedication in both childcare and housework. Interpreting the effect of the youngest child's age, fathers' participation is affected by the total time children need care, which decreases as they become older. Concerning the strong impact of the educational level, highly educated fathers might be more aware of the positive impact of fathers' (and mothers') time with their children. This effect could also be interpreted as the prevalence of modern gender roles among highly educated fathers (Blossfeld and Drobnič 2001). The negative effect of the youngest child's age and the positive effect of the educational level are in line with the results of Pacholok and Gauthier (2010).

Regarding participating fathers' time with their children, time availability seems to play a major role, as participants spend much more time with their children on weekend days than on weekdays. In addition, the employment status has an effect in several countries, also in comparison to their partner's. Given that the relative employment status reflects relative wages, the results support the Bargaining theory but not Becker's approach, as the relative work status has an effect on more or less childcare time, not on participation in childcare. The impact of the day of the week and the employment status is consistent with the

findings of other studies using Tobit models to assess (participating and non-participating) fathers' childcare time. However, the current analysis shows that the educational level does not have a major effect, in contrast to what these studies suggest.

To sum up, apart from the negative effect of the youngest child's age, predictors for fathers' childcare participation and minutes are mostly not the same. Thus, the hypothesis that some non-participants are generally not involved in childcare, and that they differ from participants with regard to socio-economic characteristics (here, the educational level in particular), is supported. While both fathers' participation and amount of time depend on the children's needs, I conclude that participating in childcare is primarily driven by the educational level, whereas the amount of time they spend with their children depends on time restrictions primarily set by their work hours. Consequently, these findings call for caution regarding the results of existing studies not distinguishing participation in childcare from participating fathers' childcare minutes.

Regarding practical applications, while an increase in fathers' participation rates can be interpreted as a sign indicating higher gender similarity in unpaid work, it remains unclear whether a decrease in their childcare time is a step backwards or is a result of the extension of public childcare facilities, school days and extracurricular activities among children. As children and parents (as well as the economy as a whole) would probably profit most if both parents take part in childcare but also participate in the labour market, that is, if they follow a dual-earner/dual-carer strategy, the assumption 'the more, the better' childcare no longer holds, because this might not reflect a balance between childcare and paid work. In this sense, participation is probably superior to the number of minutes. Another indicator would be fathers' childcare time relative to their partner's childcare time. Hall and MacDermid (2009) showed that, among dual-earner couples, fathers' childcare time in relation to their partners' vary considerably across the five types of dual-earner couples they identified.

Furthermore, the variable 'participation in childcare' as indicator of 'father's involvement' is worth discussing. The present analysis suggests that there are indeed fathers who are not involved in childcare, and who differ from involved fathers in terms of socio-demographic characteristics. However, a major shortcoming of this analysis is that the data at hand are limited to primary activities, and childcare is the only variable available related to time with or for children. Thus, fathers not participating in childcare (as defined for in the data) could still be involved with their children (Folbre and Yoon 2007; Monna and Gauthier

2010; Moro-Egido 2011). Firstly, childcare can be a secondary (or passive) activity. For instance, parents can go shopping and drop their children off at a friend's house on the way, or mow the lawn while looking after them playing in the yard. Secondly, parents do certain activities for children without the children being present. For example, they attend parent-teacher conferences and buy birthday presents. Thirdly, a parent can be responsible for a child even if the child is not directly present. For example, when the parent watches TV and the child is sleeping in another room. Consequently, more research on participation and participants' amount of time as *dependent variables* for different definitions of father-child time could allow deeper insights into the topic of fathers' involvement with their children. Moreover, as fathers' involvement in childcare or unpaid work in general is frequently related to fertility (Oláh 2003; Cooke 2004; Duvander and Andersson 2006; Brodmann et al. 2007; Lappegård 2010; de Laat and Sevilla-Sanz 2011) as well as marital stability and satisfaction (Sanchez and Gager 2000; Oláh 2001; Sigle-Rushton 2010, Oshio et al. 2012), the exploration of childcare participation versus minutes as *independent variables* could yield remarkable results.

In sum, researchers and policy makers have to bear in mind that parents' engagement with their children can be measured in many different ways. This knowledge is important for the identification of the most appropriate indicator for the particular background in which they would like to use it.

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## Appendix 4

**Table A.4.1: Summary statistics, with range of all countries, all fathers**

	mean		std. dev.		min.	max.
	min.	max.	min.	max.		
childcare participation	0.35 (IT)	0.60 (SW)	0.49 (SW)	0.5	0	1
childcare minutes	24.25 (FR)	57.27 (US)	48.07 (FR)	93.50 (US)	0	870 (US)
age of the youngest child 0-4	0.19 (IT)	0.55 (SW)	0.39 (IT)	0.50 (CA, NO, SW, US)	0	1
age of the youngest child 5-12	0.27 (SW)	0.55 (IT)	0.45 (SW)	0.50 (IT)	0	1
age of the youngest child 13-17	0.15 (CA, US)	0.26 (IT)	0.36 (CA, US)	0.44 (IT)	0	1
no. of children	1.63 (IT)	1.97 (US)	0.95 (US)	0.81 (GE)	1	10 (FR)
father's age	37.72 (CA)	41.56 (IT)	6.43 (NL)	7.54 (US)	20	55
father's age squared	1470 (CA)	1769 (IT)	400 (FR)	598 (UK)	400	3025
educational level: low	0.10 (NO, US)	0.58 (FI)	0.30 (NO, US)	0.49 (FI, IT)	0	1
educational level: medium	0.23 (CA, FI)	0.56 (NO)	0.42 (CA, FI)	0.50 (FR, IT, NO, SW)	0	1
educational level: high	0.09 (IT)	0.64 (US)	0.28 (IT)	0.50 (NL)	0	1
father's work: not working	0.04 (SW)	0.11 (CA)	0.20 (SW)	0.31 (CA)	0	1
father's work: part-time	0.02 (FI, FR, CA, GE)	0.04 (IT, NL, NO)	0.13 (CA, FI)	0.20 (IT, NL, NO)	0	1
father's work: full-time	0.74 (FR)	0.91 (GE)	0.28 (GE)	0.44 (FR)	0	1
father's work: unknown work hours	0.00 (NO, UK, US)	0.15 (FR, IT)	0.00 (NO, UK, US)	0.36 (FR, IT)	0	1
partner's work: not working	0.18 (SW)	0.42 (CA)	0.39 (SW)	0.49 (CA)	0	0
partner's work: part-time	0.00 (FI)	0.52 (NL)	0.00 (FI)	0.50 (NL)	0	1
partner's work: full-time	0.00 (FI)	0.57 (IT)	0.00 (FI)	0.50 (IT, US)	0	1
partner's work: unknown work hours	0.00 (NO, UK, US)	0.83 (FI)	0.00 (UK, US)	0.37 (FI)	0	1
both not employed or part-time employed	0.04 (FI)	0.12 (CA, UK)	0.20 (FI)	0.33 (CA, UK)	0	1
father full-time or unknown work hours, partner not	0.29 (FI, IT)	0.79 (NL)	0.41 (NL)	0.50 (CA, FR, SW, US)	0	1

partner full-time or unknown work hours, father not	0.01 (IT)	0.05 (NL, US)	0.11 (IT)	0.23 (NL)	0	1
both full-time or unknown work hours	0.09 (NL)	0.63 (FI)	0.28 (NL)	0.49 (FR, IT, SW)	0	1
weekend	0.28 (FR)	0.51 (US)	0.41 (SW, UK)	0.54 (NO)	0	1
housework participation	0.39 (IT)	0.79 (SW)	0.42 (NO)	0.50 (FR, US)	0	1
minutes of housework	23.94 (IT)	60.72 (UK)	47.94 (NL)	89.95 (US)	0	800 (US)
older survey	0.43 (NO)	0.62 (FI)	0.49 (NO)	0.5 (IT, SW)	0	1

Definition of the variables: childcare participation: 0 minutes=no=0, >0 minutes=yes=1; childcare minutes: minutes of childcare (MTUS activity code av11) on the survey day; age of the youngest child: 0-4 years, 5-12 years, 13-17 years; number of children: number of children under the age of 18 in the family; father's age: age of the father in years; father's age squared: square of the age of the father; educational level: low (below ISCED 3), medium: (ISCED 3 or 4), high (ISCED 5 or higher); father's employment = fathers general work status: full-time employment, part-time employment, unknown work hours, not employed; partner's employment = female partner's general work status: full-time employment, part-time employment, unknown work hours, not employed; weekend: survey on a weekday (=0) or weekend day (=1); housework participation: participation in housework (MTUS activity codes av6 and av7) on the survey day, 0 minutes=no=0, >0 minutes=yes=1; minutes of housework: minutes of housework (MTUS activity codes av6 and av7) on the survey day; time of the survey: dummy for 1st (earlier) survey if 2 surveys are available.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

**Table A.4.2: Summary statistics, range of all countries, participating fathers**

	Mean		Std. dev.		Min.	Max.
	Min.	Max.	Min.	Max.		
childcare minutes	66.05 (GE)	104.46 (US)	59.39 (FR)	105.23 (US)	0	870 (US)
age of the youngest child 0-4	0.32 (IT)	0.74 (SW)	0.44 (SW)	0.50 (GE, US)	0	1
age of the youngest child 5-12	0.20 (SW)	0.59 (IT)	0.40 (SW)	0.49 (IT)	0	1
age of the youngest child 13-17	0.02 (CA)	0.10 (IT)	0.15 (CA)	0.30 (IT)	0	1
no. of children	1.72 (IT)	2.05 (NL, US)	0.68 (IT)	0.96 (UK)	1	10 (FR)
father's age	35.80 (CA)	39.57 (IT)	5.96 (NL)	7.14 (US)	20	55
father's age squared	1321 (CA)	1602 (IT)	461 (CA)	513 (SW)	400	3025
educational level: low	0.07 (US)	0.49 (FI)	0.25 (US)	0.50 (FI)	0	1
educational level: medium	0.21 (US)	0.62 (IT)	0.41 (US)	0.50 (FR, UK)	0	1
educational level: high	0.12 (IT)	0.72 (US)	0.32 (IT)	0.50 (NL)	0	1
father's work: not working	0.05 (IT, SW)	0.12 (CA)	0.21 (IT)	0.32 (CA)	0	1
father's work: part-time	0.02 (CA, FI, FR, SW)	0.05 (NL, NO)	0.14 (FI)	0.23 (NL)	0	1
father's work: full-time	0.75 (IT)	0.91 (GE)	0.29 (GE)	0.43 (FR)	0	1
father's work: unknown work hours	0.00 (NL NO, UK, US)	0.16 (IT)	0.00 (NO, UK, US)	0.37 (IT)	0	1
partner's work: not working	0.20 (SW)	0.44 (CA)	0.42 (NO)	0.50 (CA)	0	0
partner's work: part-time	0.00 (FI)	0.54 (NL)	0.00 (FI)	0.50 (NL, NO, SW)	0	1
partner's work: full-time	0.00 (FI)	0.53 (IT)	0.00 (FI)	0.50 (IT)	0	1
partner's work: unknown work hours	0.00 (NO, UK, US)	0.79 (FI)	0.00 (UK, US)	0.41 (FI)	0	1
both not employed or part-time employed	0.05 (FI, GE, US)	0.14 (UK)	0.21 (US)	0.35 (UK)	0	1
father full-time or unknown work hours, partner not	0.32 (FI)	0.77 (NL)	0.42 (NL)	0.50 (CA, FR, US)	0	1
partner full-time or unknown work hours, father not	0.02 (IT, SW, UK)	0.07 (NL)	0.13 (IT)	0.25 (NL)	0	1
both full-time or unknown work hours	0.09 (NL)	0.59 (FI)	0.29 (NL)	0.49 (FI, FR, IT)	0	1
weekend	0.28 (FR)	0.52 (UK)	0.45 (CA, FR)	0.50 (IT, SW, UK, US)	0	1
housework participation	0.53 (IT)	0.84 (UK)	0.37 (NO)	0.50 (IT)	0	1
minutes of housework	29.50 (IT)	74.34 (UK)	49.20 (NL)	85.23 (UK)	0	800
older survey	0.39 (IT)	0.60 (FI, GE)	0.49	0.49 (FI, GE, IT, NO, SW)	0	1

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

**Table A.4.3: Sensitivity analysis of fathers' participation in childcare in Germany**

Probit model, marginal effects, standard errors in parentheses  
dependent variable: childcare participation

		1991 (N=2245)	2001 (N=1670)	2-day average (N=3915)	weekdays (N=2769)	weekend days (N=1146)
age of the youngest child	0-4	ref. -0.238*** (0.028)	ref. -0.317*** (0.034)	ref. -0.265*** (0.022)	ref. -0.259*** (0.025)	ref. -0.308*** (0.040)
	5-12	-0.505*** (0.027)	-0.575*** (0.026)	-0.625*** (0.022)	-0.533*** (0.022)	-0.571*** (0.034)
	13-17	0.006 (0.015)	-0.031 (0.020)	-0.027** (0.011)	-0.017 (0.014)	0.012 (0.023)
no. of children		0.021 (0.017)	-0.000 (0.000)	0.019 (0.013)	0.015 (0.016)	-0.002 (0.028)
father's age		-0.000 (0.000)	0.000 (0.000)	-0.000† (0.000)	-0.000 (0.000)	-0.000 (0.000)
father's age squared						
educational level	low	ref. -0.055* (0.030)	ref. -0.056 (0.057)	ref. -0.006 (0.023)	ref. -0.038 (0.025)	ref. -0.061 (0.048)
	medium	0.057** (0.027)	0.016 (0.057)	0.071*** (0.021)	0.062** (0.028)	-0.004 (0.047)
	high					
father's employment	not employed	ref. -0.150 (0.104)	ref. 0.086 (0.095)	ref. 0.029 (0.063)	ref. -0.066 (0.084)	ref. 0.092 (0.024)
	part-time	-0.081 (0.052)	-0.012 (0.057)	0.004 (0.035)	-0.131*** (0.046)	0.114* (0.068)
	full-time		0.153 (0.118)	0.161† (0.071)	0.077 (0.155)	0.222 (0.143)
	unknown work hours	-				
partner's employment	not employed	ref. 0.011 (0.028)	ref. 0.011 (0.034)	ref. -0.004 (0.020)	ref. 0.008 (0.025)	ref. 0.023 (0.041)
	part-time	0.020 (0.031)	0.030 (0.043)	-0.021 (0.023)	0.022 (0.029)	-0.052 (0.059)
	full-time		0.051 (0.039)	0.016 (0.032)	0.107** (0.043)	0.018 (0.024)
	unknown work hours	-				
day of the week	weekday	ref. 0.036 (0.027)	ref. -0.025 (0.028)	ref. -0.004 (0.018)	- - -	- - -
	weekend					
housework participation		0.223*** (0.024)	0.195*** (0.028)	0.1717*** (0.018)	0.197*** (0.021)	0.246*** (0.038)
time of the survey	wave 1	- (0.020)	- (0.028)	-0.057*** (0.020)	0.028 (0.027)	0.017 (0.040)
	wave 2	-	-	ref.	ref.	ref.
Pseudo R <sup>2</sup>		0.2024	0.1825	0.2334	0.1850	0.2269

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

**Table A.4.4: Sensitivity analysis of participating fathers' minutes of childcare in Germany**

OLS model, beta-coefficients, standard errors in parentheses  
dependent variable: minutes of childcare

		1991 (N=1214)	2001 (N=808)	2-day average (N=2022)	weekdays (N=1415)	weekend days (N=607)
age of the youngest child						
	0-4	ref. -24.97***	ref. -23.73***	ref. -31.65***	ref. -17.31***	ref. -53.64***
	5-12	(4.32) -37.27***	(5.44) -32.91***	(2.48) -44.37***	(3.48) -31.22***	(7.63) -53.97***
	13-17	(6.53) 0.98	(8.10) -6.60*	(3.68) -2.86†	(5.12) -5.83***	(12.53) 10.56**
no. of children		(3.17) 0.41	(3.02) 1.05	(1.56) 2.54	(1.70) 2.72	(5.93) -1.51
father's age		(3.42)	(4.60)	(1.83)	(2.05)	(5.66)
father's age squared		(0.05)	(0.05)	(0.02)	(0.03)	(0.07)
educational level						
	low	ref. -1.62	ref. -4.70	ref. -2.31	ref. -3.71	ref. -14.88†
	medium	(4.85) 0.086	(10.20) 2.51	(3.12) 6.49*	(4.12) 3.95	(8.91) 0.37
	high	(4.28)	(10.04)	(3.02)	(3.64)	(8.82)
father's employment						
	not employed	ref. -3.17	ref. -15.48	ref. -1.47	ref. -26.21**	ref. 33.78
	part-time	(19.13) -9.68	(16.72) -24.00**	(9.61) -17.42***	(11.48) -20.98***	(32.69) -0.41
	full-time	(8.54)	(11.85)	(6.07)	(7.75)	(15.05)
	unknown work hours	-	-35.41 (23.71)	-21.02 (13.82)	-25.20 (28.24)	-33.45† (19.61)
partner's employment						
	not employed	ref. -0.76	ref. -5.14	ref. -3.12	ref. -6.41	ref. 4.43
	part-time	(4.67) -1.56	(5.26) -1.08	(5.57) -4.85	(3.39) -1.17	(8.02) -8.57
	full-time	(5.16)	(7.28)	(3.30)	(4.48)	(8.46)
	unknown work hours	-	-2.88 (5.92)	-4.65 (3.92)	-9.25 (5.74)	11.17 (11.37)
day of the week						
	weekday	ref. 27.92***	ref. 18.27***	ref. 8.28***	-	-
	weekend	(5.17) 0.19***	(5.14) 0.13***	(2.63) 0.14***	- 0.186***	- 0.11**
minutes of housework time of the survey		(0.065)	(0.06)	(0.03) -9.65***	(0.04) -11.17**	(0.05) -16.47**
	wave 1	-	-	(2.85)	(3.87)	(7.90)
	wave 2	-	-	-	ref.	ref.
constant		61.54 (58.74)	96.17 (97.10)	51.79 (36.32)	50.78 (40.44)	127.63 (107.14)
R <sup>2</sup>		0.1402	0.1504	0.1782	0.1051	0.1399

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Sources: MTUS 2010 (Gershuny and Fisher 2010); own calculations.

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## **Public Sector Employment and Fertility in Germany**

*Publications*

Reich, N.: Public sector employment and fertility in Germany. *Forthcoming as HWWI Research Paper.*

*Presentations*

International Conference: Fertility over the Life Course, University of Bremen, Bremen (Germany), 12-13 September 2012. (Poster Session) (forthcoming)

Seminar: Demografie und Wirtschaft – fünftes gemeinsames Forschungsseminar des Rostocker Zentrums zur Erforschung des Demografischen Wandels und des Hamburgischen WeltWirtschaftsInstituts gGmbH (HWWI), in Hamburg (Germany), 15 June 2012.

Doctoral Seminar: Prof. Dr. Straubhaar at HWWI, in Hamburg (Germany), 15 May 2012.

Doctoral Seminar: Prof. Sonja Drobnič, PhD., Fakultät Wirtschafts- und Sozialwissenschaften, Institut für Soziologie, Lehrstuhl für Methoden der empirischen Sozialforschung, in Hamburg (Germany), 8 May 2012.

## **Abstract 5**

This study deals with the role of women's public sector employment for fertility in Germany. It is hypothesised that, among working women, the number of children is significantly higher for those working in the public sector than those working in the private sector, as working conditions are more family-friendly in the public sector. Data from the 2005 Generation and Gender Survey are used to estimate the relation between the work sector and the number of children of working women, excluding those who are self-employed. The results of a Poisson model for the number of children show that public sector employment does not correlate significantly with the number of children in this sample, nor in the following subgroups of working women: women with high/medium/low educational level, mothers. However, working in the public sector is positively correlated with the number of children among working women in partnerships. Moreover, estimating predictors of the number of children for each work sector separately reveals that the negative gradient of the educational level on fertility is not evident in the public sector among women in partnerships.

*JEL Classification:* J13, J45, J81

*Keywords:* Fertility, work family conflict, job security, public sector

## 5.1 Introduction

Jobs in the public sector have been shown to attract women more than men. In several industrialised countries, e.g. Germany, the Scandinavian countries, Ireland and Portugal, women make up more than half of the public sector workforce, and the percentage of women is higher in the public sector than in the private sector (Anghel et al. 2011; OECD Public Management Service 2012; Ponthieux and Meurs 2009). It is argued that many women prefer working in the public sector because of a higher level of job security (Cavalli 2010), fewer work hours (Anghel et al. 2011) and more possibilities to work part-time (Buchmann et al. 2001). These features are especially important for women who would like to become mothers and balance work and family life. Indeed, a cross-national analysis of 28 European countries suggests that work-family responsibility conflict is significantly lower in the public than in the private sector (Chung 2011).<sup>39</sup> Moreover, there is evidence of a lower gender wage gap (Anghel et al. 2011; Datta Gupta et al. 1998; Ponthieux and Meurs 2009) and a positive wage effect for women (Ponthieux and Meurs 2009; Tepe and Kroos 2010) in the public sector.

From a theoretical point of view, favourable working conditions are expected to have a positive effect on fertility. According to dynamic bargaining models, (e.g., Ott 1992), women in couples try to ‘keep a foot in the door’ regarding labour market participation. This is crucial for their bargaining power in the future with regard to negotiations on the division of paid and unpaid work with their partners as well as for their options outside marriage. Following this line of argumentation, women would probably profit from a secure job that could be reconciled with family duties. Higher wages, on the one hand, can lead to a higher demand for children if children are seen as normal goods (see, e.g. Apps and Rees 2004; Becker 1981). On the other hand, higher wages imply higher opportunity costs of taking leave from work or reducing work hours due to childcare obligations. Hence economic theories are divided with regard to the impact of the sector choice on fertility.

Good working conditions in the public sector can result in a positive relationship between public sector employment and the number of children in three different ways. Firstly, a

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<sup>39</sup> Experiencing work-family responsibility conflict is constructed from the response to the statement ‘It has been difficult for me to fulfil my family responsibilities because of the amount of time I spend on the job.’ The response ‘several times a week’ is defined as experiencing work-family responsibility conflict. The other answer categories, defined as not experiencing work-family responsibility conflict, are: several times a month, several times a year, less often or rarely, never.

woman may aim at working in the public sector for different reasons (expected job security, wage, etc.), choosing a state-recognised apprenticeship or a university education that clearly leads to employment in the public sector, such as, for instance, the study of administrative sciences. Secondly, a woman might be family-oriented and therefore would like to work with children. Typical professions with children are teaching, childcare work, and paediatrics. These jobs are likely to be public sector jobs in Germany, especially teachers' jobs. Thirdly, a woman may have chosen education according to her interests (other than family-orientation) and later end up working in the public sector. Then she could discover that her job can easily be reconciled with having many children, affecting fertility positively.

Existing empirical studies usually find a positive and significant effect of the work sector on various fertility indicators. Working in the public sector has a positive impact on the timing of second and third births in European countries (Adserà 2003) and the number of children as well as the intended number of children of working mothers in Italy (Cavalli 2010). Besides, Adserà (2006) shows that realised fertility tends to be closer to (or higher than) intended fertility for women working in the public sector than in the private sector in Spain. Hoem et al. (2006) point out that Swedish women who have undertaken studies typically leading to subsequent employment in the public sector have higher ultimate fertility than women with similar education leading to subsequent employment in the private sector.<sup>40</sup> However, Cooke (2003) does not find a significant effect of the mother's employment in the public sector for second birth hazards in Italy and Spain. On the aggregate level, there is evidence that the national share of public employment in overall employment has a positive impact on the timing of births when comparing different European countries (Adserà 2003), but that this share on a regional level does not have a significant impact in Germany (Hank 2002).

To date, the relationship between public sector employment and fertility in Germany has not been analysed in detail. Hence the main research question of this paper is whether, among dependent employed women, those working in the public sector have significantly more children than those on the payroll in the private sector. I use data from the 2005 Generations and Gender Survey, as this survey contains many important variables for analysing fertility-related topics. Poisson models are estimated with the number of children as dependent variable. The main independent variable is the work sector (public/private) at

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<sup>40</sup> Exception: librarians.

the time of the interview. Therefore, this paper does not address the decision of having a(nother) child, but focuses on the question whether having children can better be reconciled with a job in the public or the private sector. In other words, the working conditions under which having children is possible are explored, regardless of which of the three mechanisms outlined above have induced them. Estimations are conducted for all working women as well as several subgroups of working women: women in partnerships, mothers, and women with different educational levels. It is hypothesised that working in the public sector is positively correlated with the number of children, but that the magnitude of the coefficients differs between these subgroups. Firstly, as the rewards from working in the public sector decline with an increase of the educational level in Germany (Tepe and Kroos 2010), I assume that the positive association is stronger among women with low educational level than their highly educated counterparts. Secondly, since the work sector might facilitate having more children among mothers, but do not affect the decision of whether to have children or not, the relationship between work sector and number of children is assumed to be more positive among mothers than among all working women. Thirdly, having a partner is likely to play a role, as partners can provide additional financial security as well as time resources to unburden the mother from household chores. Consequently, mothers would be able to combine even a private sector job with having children, weakening the positive correlation between women's work sector and the number of children if they have a partner. In order to further explore the relationship between educational level, work sector, and fertility, separate estimations for women in each work sector are analysed showing whether the correlation between the educational level and the number of children differs between the sectors. Accordingly, this paper contributes to the empirical literature on the relationship between public sector employment and fertility.

The paper is organised as follows. Section 5.2 briefly summarises the differences and similarities of the public and the private sectors in Germany according to related literature and data from the 2005 German Microcensus (Federal Statistical Office 2005). In Section 5.3, the data, the sample and the variables are described. In Section 5.4, the empirical strategy is presented. Results of the main models and further robustness checks are presented in Section 5.5. Section 5.6 concludes.

## 5.2 Public and private sector in Germany: Differences and similarities

Over 40 million individuals are working in Germany, among them 4.5 million who are employed in the public sector (Bundesministerium des Innern 2012). In order to highlight differences between public and private sector employment characteristics that could affect fertility outcomes in Germany, an analysis has been conducted exploring indicators of general differences, workplace security, earnings, and working conditions using the German Microcensus. This is a 1% representative sample of the German population. I took data from the year 2005, as the fertility estimations are based on data from this year as well. Key characteristics of full-time (at least 35 hours per week) workers, aged 20 to 65, in the public and private sector in Germany are presented (see Table 5.1), as people base their perception of the job characteristics in these sectors on these standard employment conditions. For the private sector, I included only dependent employees. Self-employed persons are excluded, as they often enjoy a larger scope of action regarding the determination of working time and other conditions, in that they need not accommodate conditions set by the employer. Hence, the comparison is restricted to individuals in the public and private sector who are subject to external rules regarding their employment conditions.

As depicted in Table 5.1, workers are on average almost three years older in the public sector than in the private sector. The share of women is clearly higher in the public sector, confirming the results of other studies (Ellguth and Kohaut 2011; OECD Public Management Service 2012). While more than 40% of workers are female, the share is only about 31% in the private sector. Like in other countries, the public sector seems to be very attractive for women. Moreover, there is a large difference between the sectors with regard to the educational level. While about one of five employees in the public sector has a university degree, less than one in ten do so in the private sector.

The average income as well as its median is higher in the public than the private sector. Both lie between € 1,700 and € 2,000 in the public, while the average income lies between € 1,500 and € 1,700 and the median income between € 1,300 and € 1,500 in the private sector. To a large extent, this difference can likely be explained by the higher share of university graduates in the public sector. A more detailed comparison between wages in the public and the private sector in Germany has revealed that, when comparing similar firms using a matching technique, workers in the public sector actually earn less than their

counterparts in the private sector (Ellguth and Kohaut 2011). This is in line with the result of Dustman and van Soest (1998) who find that, among male workers in Germany, potential wages are on average higher in the private sector than in the public sector for all educational groups, but this advantage falls with increasing age and educational level. Women might nevertheless profit financially from working in the public sector. According to Tepe and Kroos (2010), women in lower earning categories profit most from working in the public sector, while men in the highest earnings categories face the highest deductions. The gender wage gap (women's net income as a percentage of men's) is also lower in the public sector (Ponthieux and Meurs 2009). According to Kleinert (2011), the share of women in managerial professions is higher in the public sector, and this sector is also leading in terms of the growth rate of this share. While the share of women in managerial positions increased from 29% in 2000 to 33% in 2007 in the public sector, it went up from 21% to 24% in the private sector during the same time span. The higher level and growth rate in the public sector is not surprising, given that the promotion of equal opportunities for women is mandatory in the public sector in accordance with national and European legislation. In contrast, there is no statutory, controllable strategy for gender equality in private sector firms (Stiegler 2004; Info-Service öffentlicher Dienst and Beamte 2012).

The share of employees with a permanent contract as well as the average number of years worked in a job (i.e., worked for the same employer) serve as indicators for job security. On average, workers in the private sector remain at the same job for less than 11 years, while public sector workers remain almost 15 years, as shown in Table 5.1. According to these indicators, job security is higher in the public sector. However, the ratio of employees with a permanent contract is slightly higher in the private sector, where almost nine in ten employees hold this type of contract. In addition, Ellguth and Kohaut (2011) point out that the likelihood of being able to convert a temporary job into a permanent job is considerably higher in the private than in the public sector. The authors conclude that, in the public sector, job security is high for the 'insiders' who managed to snatch one of the comparatively few permanent jobs, while 'outsiders' are left empty handed.

**Table 5.1: Differences between public and private sector workers who work at least 35 hours per week**

	public sector	private sector (without self-employed workers)
average age (years)	42.71	39.85
share of females (%)	43.47	30.81
share with permanent contract (%)	87.40	89.40
average net income in the last month (€)	1,700-2,000	1,500-1,700
median income in the last month (€)	1,700-2,000	1,300-1,500
share with university degree (%)	21.80	7.28
average usual work hours per week (hours)	40.36	40.32
average work hours last week (hours)	37.06	38.10
share with night work, at least on a regular basis, in the last 3 months (%)	11.32	10.26
share with Saturday work, at least on a regular basis, in the last 3 months (%)	22.81	22.13
share with Sunday/holiday work, at least on a regular basis, in the last 3 months (%)	20.08	10.59
home office, at least half of the regular weekly work hours (%)	2.95	1.10
average number of years worked in this job (years)	14.62	10.48

Note: Average and median net income in the last month: class intervall of the average and median class of 24 income groups.

Sources: German Microcensus 2005 (Federal Statistical Office 2005); own calculations.

Indicators for other working conditions show that circumstances are not necessarily more family-friendly in the public sector than in the private sector, according to the data from the German Microcensus. The average work hours (both usual and last week) among full-time employees are lower in the public than in the private sector according to Table 5.1. Additional analysis of part-time work (not displayed in the table) reveals that the share of persons working part-time is slightly higher in the public (25.85%) than in the private sector (23.46%), yet the quality of part-time jobs differs between the sectors. While most part-time jobs are ‘regular’ jobs in the public sector, many are ‘marginal’ jobs in the private sector, implying worse working conditions for the workers (Ellguth and Kohaut 2011). The share of workers reporting regular night and Saturday work is almost the same in the two sectors, as shown in Table 5.1. But the share having to work on Sundays or on holidays regularly is twice as high in the public sector as in the private sector.

In sum, women are likely to profit from higher tenure, higher wages, fewer regular work hours and a greater possibility of working from home when working in the public sector, but other working conditions are not more suitable for the reconciliation of work and family life than in the private sector, according to the results for the type of contract and odd working times. These findings stand in contrast with the image of the public sector promoted on the public sector's job market websites. It is portrayed as a model example of a family-friendly work environment, with several part-time schemes, job-sharing opportunities, home office options, sabbaticals and other possibilities for the reconciliation of work and family life (Interamt.de 2012) being touted in advertising.

In this context it must be mentioned that there are also differences between two distinct groups of workers in the German public sector, namely civil servants (*Beamte*) and employees paid in line with collective agreements (*Tarifbeschäftigte*, workers and employees). Only 1.6 million of the 4.5 million working in the public sector are civil servants. They enjoy several advantages compared to the others. Firstly, most civil servants hold a permanent work contract. Secondly, if paid the same gross wage, the net wage can be higher for the civil servant than for other employees, because of different regulations as to the contributions to health, pension, unemployment insurance and other taxes. The share of civil servants is typically high among police officers, fire fighters, tax administrators, judicial officers, school teachers, university professors and persons in managerial positions of the governments on the federal and the state level. On the contrary, the percentage of non-civil service employees in the public sector is high in healthcare, social and technical professions, as well as among scientific university personnel other than professors (Bundesministerium des Innern 2012). Thus, not all individuals working in the public sector enjoy all benefits commonly attributed to public sector employment, leading to the interesting question whether the work sector can really make a difference for women's fertility.

### **5.3 Data, sample and variables**

The latest available data from the Gender and Generations Survey (GGS) are used, which were collected in 2005 (Gender and Generations Programme 2012). The GGS is embedded in the Gender and Generations Programme (GGP), an international programme focusing on the analysis of population dynamics and its causes. The programme covers representative samples from the population aged 18 to 79 in several countries in Europe as well as from

Russia and Japan. The survey design follows a life-course approach, accounting for retrospective data (on past events) and prospective views (intentions, expected consequences, important circumstances etc.). It targets childbearing, partnership dynamics, home-leaving and retiring. Among the main explanatory domains are economic aspects, values and attitudes, parent-child relationships, gender relationships, household composition/stepfamilies, housing, contraception and infertility treatment, health, subjective well-being, personal networks/private transfers, welfare state/public transfers (Vikat et al. 2007). In view of these facts, the GGS is perfectly suited for analysing predictors of fertility.

The German sample covers 9,967 individuals, 3,067 of whom are women aged 20 to 50. Almost 60% of these women are working, but the analysis does not include those who did not state being employed continuously throughout much of the year. Among these are all self-employed women, as they have a missing value in this variable. In other words, for self-employed women we do not know whether they work regularly throughout the year. Conceptually, it is necessary to exclude them, as, in contrast to self-employed individuals, workers in the public sector and dependent employees in the private sector are subject to working conditions which are set by their employers. The question is whether under these external restrictions having children can be better reconciled with public than with the private sector work.

The final sample used for the analysis covers 1,443 women who are between 20 and 50 years old, are working and do not have missing values in any of the covariates used in the models. Almost one third (31.2%) is employed in the public sector, more than two thirds (68.8%) in the private sector. As the data do not provide information on the full work history, the current employment sector is used as the main dependent variable. Thus, only correlations but no causal relationship can be detected. Only for mothers, it is possible to see whether the woman has been in the same work sector since before the birth of the last child. This possibility is explored in the sensitivity analyses.

The number of biological children ranges between zero and five in this sample. In all but one subgroup of working women analysed – all, low/medium/high educational level, mothers, women with partners – the average number of children is higher among women working in the public sector, but the difference is quite small (see Table 5.2). Only among women with a low educational level is the average number of children is lower in the public sector (1.35) than in the private sector (1.40).

**Table 5.2: Average number of children among different groups of women in the public and the private sector**

	public sector	private sector
all	1.21	1.20
educational level: low	1.35	1.40
educational level: medium	1.24	1.19
educational level: high	1.16	1.10
mothers	1.71	1.68
women with partners	1.44	1.37

Sources: GGS from GGP (2005); own calculations.

The selection of the remaining independent variables is made on the basis of existing studies on the predictors of fertility. In particular, the following factors are accounted for. The measurement of *age* is straightforward; it simply measures the number of years a woman has lived so far. *Age squared* is also included in order to account for the possible non-linearity. In addition, the health status is accounted for, as it could influence fertility. *Health* is a categorical variable distinguishing between (1) very good, (2) good, (3) fair, bad or very bad health status according to the person's own assessment. The *educational level* is measured in three categories: low (ISCED<sup>41</sup> 2 or lower), medium (ISCED 3 to 4), and high (ISCED 5 or 6). Fertility and education are hypothesised to be correlated negatively, as women with a higher educational level have a higher average age at the first birth and are more likely to remain childless, at least in the western part of Germany (Hank 2002; Hank et al. 2004; Kreyenfeld 2004; Ruckdeschel 2009).<sup>42</sup> Since empirical evidence suggests a relationship between the *marital status* and fertility (Hank 2002; Ruckdeschel 2009), this is accounted for in three categories: no partner, cohabiting, married. In addition, the *number of partners had* (including the current) is inserted as regressant, because it is likely to be related positively to the number of children according to the empirical literature (Breton and Prioux 2005; Köppen 2003; Ekert-Jaffé et al. 2002). Religiousness is another parameter affecting fertility positively in Germany (Groot and Pott-Buter 1992; Hank et al. 2004) and other industrialised countries (Kravdal 1992; Kravdal 1996; Hoem et al. 2001; Rønsen 2004; Vatterrott 2011). Therefore, the models feature a dummy for *attending religious services at least once a month*, serving as the indicator for religiousness. The variable *born in a foreign country* is coded 1 if the woman was not born in Germany,

<sup>41</sup> International Standard Classification of Education.

<sup>42</sup> Eighty percent of women in the sample live in western Germany.

0 otherwise. German studies have found a positive or non-significant effect of variables related to the ethnic background on various fertility outcomes (Hank 2002; Hank and Kreyenfeld 2003; Hank et al. 2004), studies for other industrialised countries have found a positive effect (Aassve et al. 2006; Breton and Prioux 2005; Milligan 2002). Assuming that grandparents who live nearby can provide childcare, thus having a positive effect on fertility (Ette and Ruckdeschel 2007; Garcia-Moran and Kuehn 2012; Hank and Kreyenfeld 2003; Hank et al. 2004), a variable indicating whether the *woman's mother lives less than 30 minutes driving distance away* as well as a dummy indicating whether the woman *lives with her parents in the same household* are included. Two variables for work/family orientation are also included, as they have shown to be significant in existing empirical studies (e.g., Ruckdeschel 2009). To be precise, dummy variables indicating if a woman *agrees* or *strongly agrees* with the statements '*a woman has to have children in order to be fulfilled*' and '*looking after the home or family is just as fulfilling as working for pay*' are inserted into the model. Several existing studies further propose a negative relation between living in an urban area instead of in a rural area and the number of children (Köppen 2003; Andersson et al. 2004; Hank et al. 2004), hence the dummy *urban* is included in the regressions. Regarding the *region*, a dummy indicates if the woman lives in the *eastern part* of Germany (including Berlin). This variable is included because of the different fertility histories and current patterns of these two parts of Germany (Federal Statistical Office 2008; Kreyenfeld 2004). Another factor which has a positive impact on the number of children is the woman's number of siblings (Buber 2002; Hoem et al. 2001; Kotte and Ludwig 2011; Rønsen 2004), but the inclusion of this variable was dismissed due to the large percentage of missing values (17.8%). Unfortunately, also the variables on the woman's and, in case of a partnership, her partner's income have too many missing values to be eligible for consideration.

In case the parameter estimate for public sector is significant, other work-related variables are inserted into the model, in order to find out whether the work sector itself has an effect, or whether it just displays underlying workplace characteristics. The characteristics accounted for are the *work contract* (permanent versus temporary or self-employed), the *usual number of weekly work hours*, the *possibility to do part of the work at home*, and any *irregular work schedules* where regular is defined as during the day on weekdays.

For women with partners, some variables related to the partner are accounted for which possibly have an effect on the number of children as well as on the relation between the

work sector and the number of children. In particular, the model features the *partner's educational level, whether he works in the public sector, and whether the woman is content with the division of housework.*

Summary statistics for the variables included in the full model for all working women are presented in the appendix.

## 5.4 Empirical strategy

The aim of this paper is the analysis of the relationship between the sector choice and the number of children as the dependent variable. This is a count variable which can only take non-negative values. Commonly-used models for the number of children are hence the Ordered Probit/Logit model and the Poisson model.<sup>43</sup> The Ordered Probit/Logit model demands the fulfilment of the proportional odds assumption. This is quite a strong assumption, implying that the  $\beta$  -coefficients are equal for each step between two outcomes of the dependent variable. In other words, a change in the dependent variable's value must only result in the probability curves being shifted to the right or left (Long and Freese 2001). For the data at hand, tests for the proportional odds assumption have been conducted showing that the assumption is violated by a few of the independent variables used in the models. Hence the Ordered Probit model (with and without the critical variables) is only used as a robustness check for the confirmation of the main models' results. A Poisson model is chosen as the main model. Formally, a Poisson distribution for an outcome  $y$  can be defined as

$$PR(y | \mu) = \frac{e^{-\mu} \mu^y}{y!} \text{ for } y = 0, 1, 2, \dots \quad (5.1)$$

with  $\mu > 0$  as the single parameter defining the distribution. In the Poisson regression model, the Poisson distribution is extended to allow each observation to have a different value of  $\mu$ . In other words, it is assumed that the observed count for observation  $i$  is drawn from a Poisson distribution with mean  $\mu_i$ , which is estimated from observed characteristics. The Poisson regression model can hence be expressed as

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<sup>43</sup> See Nguyen-Dinh (1997) for a discussion of the number of children as dependent variable.

$$\mu_i = E(y_i | X_i) = \exp(X_i\beta) \quad (5.2)$$

Again,  $\mu > 0$ , because of the exponent of  $X\beta$  (Long and Freese 2001). A special property of the Poisson model is that the mean of the distribution  $\mu$  equals the variance (equidispersion). With an unconditional mean of 1.20 and an unconditional variance of 0.98 the dependent variable – the number of children – it is likely that this requirement is fulfilled, and the comparison of the Poisson model with a negative binomial model which would account for the over-dispersion of the conditional mean revealed that over-dispersion is indeed not evident. At first, a model is estimated featuring the work sector, which is the main independent variable of interest, and all independent variables described above except for the other workplace related variables. Then, a reduced model is estimated, using only the variables that have proved to be significant in the full model, and the work sector regardless of the significance. By doing so, possible problematic relationships between the dependent variable, the work sector, and another non-significant variable can be detected.<sup>44</sup>

If the coefficient for the work sector is significant, the model is extended by the inclusion of further workplace-related variables, in order to test whether the work sector itself has an effect, or whether it just displays underlying workplace characteristics. For women in partnerships, the partnership-related variables which can be correlated with the number of children are included additionally.

Finally, in order to further explore the relationship between the number of children, the work sector, and the educational level, estimations are conducted separately for each work sector, for all working women, mothers, as well as for women in partnerships.

## 5.5 Results

### 5.5.1 Main results

The results of the Poisson models for the main sample – working women except for self-employed – are presented in Table 5.3. The results of the full model can be found on the left hand side, the reduced model with only significant variables and the work sector is on

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<sup>44</sup> To be precise, firstly, if a variable is highly correlated with public sector employment, then incorrectly including it in the regression will inflate the variance of the estimator. Secondly, in a more general model which contains every variable that might be relevant, some variables could appear to be significant, even if “by accident” (Greene 2003:151-152).

the right hand side. In contrast to the hypothesis that the number of children is significantly higher among women working in the public sector than in the private sector this variable does not have a significant effect in either of the models. Regarding the other variables in the full model, each additional year of life is related to an increase in the predicted number of children, but the magnitude decreases as the number of years rise, as the result for the squared term suggests. Being religious, defined as attending religious services at least once a month, increases the predicted number of children by 18.9%, being married instead of having no partner increases it by 38.0%, and each additional partner ever had increases it by 13.4%. Agreeing or strongly agreeing to the statement ‘a woman has to have children in order to be fulfilled’ results in an increase of the predicted number of children by 11.2%. The educational level has a negative impact on the number of children. Having a medium educational level decreases the predicted number of children by 21.1%, holding a high educational degree decreases it by 31.6%. The predicted number of children is 32.4% lower for women living with the parents in the same household, and 13.8% lower for women in urban areas. No significant result is found for the following variables: the mother living less than 30 minutes driving distance away, the health status, being born in a foreign country<sup>45</sup>, living in the eastern part of Germany, agreeing or strongly agreeing to the statement ‘looking after the home or family is just as fulfilling as working for pay’. The reduced model without these insignificant variables qualitatively confirms the results of the full model.

Next, it is tested whether the results hold for different subgroups of women.<sup>46</sup> Existing empirical data suggest that rewards of public sector employment differ by educational level. However, contrary to expectations, the work sector has no effect on the number of children of women relative to their level of education, whether high, medium or low.

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<sup>45</sup> The model has also been tested using the mother's citizenship instead of the women's country of origin, as Fernández and Fogli (2009) find a positive effect of this variable on fertility in the United States, and using the woman's citizenship instead of her country of origin. However, also in the estimations with the data at hand, these variables were not significant.

<sup>46</sup> Both the full models and the reduced models have been estimated for these subgroups, with negligible differences regarding the results of the work sector. I decided to present the results of the reduced model here.

**Table 5.3: Predictors of the number of children - working women**

Poisson model, dependent variable: number of children

	full model			reduced model		
	coefficient	robust st. err.	per-centage change	coefficient	robust std. err.	per-centage change
public sector (ref. private sector)	0.054	(0.054)	5.6	0.059	(0.054)	6.1
age	0.471***	(0.044)	60.2	0.472***	(0.044)	60.3
age squared	-0.006***	(0.001)	-0.6	-0.006***	(0.001)	-0.6
educational level: low	ref.	ref.	ref.	ref.	ref.	ref.
educational level: medium	-0.236***	(0.085)	-21.1	-0.244***	(0.082)	-21.7
educational level: high	-0.379***	(0.096)	-31.6	-0.380***	(0.093)	-31.6
attending religious services at least once a month	0.173***	(0.060)	18.9	0.162***	(0.059)	17.5
marital status: no partner	ref.	ref.	ref.	ref.	ref.	ref.
marital status: cohabiting	-0.042	(0.110)	-4.1	-0.036	(0.109)	-3.5
marital status: married	0.322***	(0.062)	38	0.336***	(0.062)	40
number of partners ever had (including the current)	0.126***	(0.042)	13.4	0.125***	(0.034)	13.3
parents in the same household (ref. no)	-0.392**	(0.186)	-32.4	-0.397	(0.183)	-32.7
agree or strongly agree: a woman has to have children in order to be fulfilled (ref. (strongly disagree, undecided)	0.106**	(0.057)	11.2	0.132**	(0.054)	14.1
urban area (ref. rural)	-0.148***	(0.050)	-13.8	-0.147***	(0.050)	-13.7
mother lives less than 30 minutes away (ref. no mother in <30 minutes distance)	0.028	(0.054)	2.8			
health: very good	ref.	ref.	ref.			
health: good	0.012	(0.058)	1.2			
health: fair, bad or very bad	0.011	(0.081)	1.1			
born in a foreign country (ref. Germany)	0.056	(0.368)	5.7			
east Germany (ref. west G.)	0.056	(0.063)	5.8			
agree or strongly agree: looking after the home is just as fulfilling as working for pay (ref. (strongly) disagree, undecided)	0.025	(0.050)	2.5			
constant	-9.440***	(0.846)		-9.483***	(0.711)	

p< 0.10: \*, p<0.05: \*\*, p< 0.01: \*\*\*.

N=1443. Pseudo R<sup>2</sup>: full model 0.1155, reduced model 0.1171.

Sources: GGS from GGP (2012); own calculations.

Two other subgroups analysed are mothers and women in partnerships. The sector choice may not affect the decision on whether to have children or not, but may have an effect on the number of children of women that are already mothers, as proposed earlier by Cavalli (2010). Likewise, having a partner may influence the impact of the women's work sector on fertility. As most men of working age are indeed working, implying income resources and security for all family members, the partnership status may affect the relationship between women's work sector and fertility. Results for mothers and women in partnerships are presented in Table 5.5. While working in the public sector is not significant among mothers, this variable is positive and significant for women with partners.<sup>47</sup> Working in the public sector is related to an increase the expected number of children by 11.5%, holding all other variables constant. At first sight, this result is surprising, as having a male partner is commonly interpreted as being more financially secure. Therefore, the characteristics of the women's job are expected to be of lower importance for childbearing if she has a partner. But considering that working women are a selected group, and that maybe women with a partner whose job provides outstanding security and financial resources do not work at all, this result becomes plausible.

**Table 5.4: Public sector and number of children, subgroups of working women according to educational level**

Poisson model, dependent variable: number of children  
beta coefficients, standard errors in parenthesis

	high educational level (N=375)	medium educational level (N=973)	low educational level (N=125)
public sector (ref. private sector)	0.096 (0.079)	0.040 (0.051)	0.090 (0.183)

p< 0.10: \*, p<0.05: \*\*, p< 0.01: \*\*\*.

Control variables: age, age squared, attending religious services at least once a month, parents in the same household, partnership status, number of partners ever had, urban area, agree or strongly agree: a woman has to have children in order to be fulfilled  
Sources: GGS from GGP (2012); own calculations.

<sup>47</sup> In addition, a Probit model has been estimated for the dependent variable 'having children yes/no', in order to find out whether the work sector affects the decision whether to have children. The results showed that this is not the case.

**Table 5.5: Public sector and number of children, subgroups: mothers, women in partnerships**

Poisson model, dependent variable: number of children

	mothers (N=1043)		women in partnerships (N=1007)	
	beta-coefficient, robust std. err. in parentheses	percentage change (%)	beta-coefficient, robust std. err. in parentheses	percentage change (%)
public sector (ref. private sector)	0.024 (0.030)	2.4	0.040** (0.051)	11.5

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Control variables: age, age squared, attending religious services at least once a month, parents in the same household, partnership status (mothers: no partner, cohabiting, married; women in partnerships: cohabiting, married), number of partners ever had,  
Sources: GGS from GGP (2012); own calculations.

This result holds even if more variables regarding the partnership and the woman's workplace are included in the model.<sup>48</sup> As shown in Table 5.6 on the left hand side, the significant positive result for the public sector remains at 11.7%, while the partner's educational level and work sector is not significantly correlated with the number of children. The finding that the partner's educational level is not related to fertility is in line with results of Köppen (2003) for West Germany, but contradicts the results of Cooke (2004) who finds a positive effect for the male partner's educational level on fertility in Germany. Satisfaction with the division of household tasks is negatively correlated with the number of children, but with the data at hand the direction of the effect remains unclear.

<sup>48</sup> This was only possible at the expense of some cases which had missing values in the variables related to the partner or the workplace.

**Table 5.6: Predictors of the number of children, subgroup of women in partnerships**

Poisson model, dependent variable: number of children

	model with additional partner characteristics (N=998)			model with partner and workplace characteristics (N=881)		
	coefficient	robust st. err.	per-centage change (%)	coefficient	robust st. err.	per-centage change (%)
public sector (ref. private sector)	0.110**	(0.046)	11.7	0.130**	(0.049)	13.9
age	0.392***	(0.040)	48	0.379***	(0.046)	46.1
age squared	-0.005***	(0.001)	-0.5	-0.005***	(0.001)	-0.5
educational level: low	ref.	ref.	ref.	ref.	ref.	ref.
educational level: medium	-0.173	(0.086)	-15.9	-0.108	(0.096)	-10.2
educational level: high	-0.313***	(0.095)	-26.8	-0.253***	(0.106)	-22.4
attending religious services at least once a month	0.186***	(0.045)	20.4	0.130**	(0.052)	13.9
marital status: cohabiting	ref.	ref.	ref.	ref.	ref.	ref.
marital status: married	0.405***	(0.099)	49.9	0.350***	(0.058)	43.3
number of partners ever had (including the current)	0.067	(0.049)	6.9	0.038	(0.190)	3.9
parents in the same household (ref. no)	-0.196	(0.0185)	-17.8	-0.352*	(0.047)	-29.7
agree or strongly agree: a woman has to have children in order to be fulfilled (ref. (strongly) disagree, undecided)	0.099**	(0.043)	10.4	0.091*	(0.047)	9.5
urban area (ref. rural)	-0.120***	(0.042)	-11.3	-0.130***	(0.045)	-12.2
partner works in the public sector (ref. private sector)	-0.011	(0.060)	-1.1	-0.074	(0.069)	-7.2
partner's educational level: low	ref.	ref.	ref.	ref.	ref.	ref.
partner's educational level: medium	-0.138	(0.088)	-12.9	-0.180*	(0.095)	-16.5
partner's educational level: high	-0.025	(0.090)	-2.5	-0.081	(0.097)	-7.8
satisfaction with the division of household tasks	-0.019**	(0.009)	-1.9	-0.012	(0.010)	-1.2
permanent contract (ref. temporary)				-0.110	(0.072)	-10.4
no. of hours usually worked per week				-0.014***	(0.003)	-1.3
can do part or all of the work at home (ref. work outside home)				0.236***	(0.070)	-26.6
any irregular work hours (ref. during day time on weekdays)				-0.021	(0.010)	-2.1
constant	-7.582***			-6.796***	(0.891)	

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Pseudo R<sup>2</sup>: first model 0.0637, second model 0.0733.

Sources: GGS from GGP (2012); own calculations.

Next, it is investigated whether the positive effect of the public sector is driven by underlying workplace characteristics that can be isolated, resulting in a loss of significance for the original work sector variable. As shown on the right hand side of Table 5.6, the positive and significant result for the public sector remains significant, even after controlling for the type of work contract, the usual number of weekly work hours, the possibility to do part of the work at home, and having irregular work schedules. In other words, the positive result of the public sector cannot be ascribed to any of these workplace characteristics. The work contract and irregular schedules are not significantly correlated with the number of children, while the number of weekly work hours shows a negative, the possibility to do part of the work at home a positive result.

Finally, the hypothesis is tested whether the work sector has an effect on the educational gradient of fertility. In particular, models are estimated for women in each sector separately, for (1) all women, (2) mothers, and (3) women in partnerships. As the number of private sector cases is much larger than the number of public sector cases for all three groups of women, and as the p-values of significance can be influenced by the sample size, representative samples of women working in the private sector have been randomly drawn from the original sample featuring the same sample size as the public sector samples. The results are shown in Table 5.7. The hypothesis is only supported for highly qualified women in partnerships. Among these, working in the public sector alleviates the negative association between the educational level for the number of children. In particular, among women with partners and working in the public sector, there is no significant difference between women with differing educational levels. On the contrary, in the private sector, a high educational level decreases the predicted number of children by 30.1%.

**Table 5.7: Predictors of the number of children: separate estimations for public and private sector workers**

Poisson mode., dependent variable: number of children  
beta-coefficients, robust standard errors in parenthesis, percentage change in italics

	all		all		all	
	public sector (N=459)	private sector (N=459)	public sector (N=324)	private sector (N=324)	public sector (N=317)	private sector (N=317)
education: low	ref.	ref.	ref.	ref.	ref.	ref.
education: medium	-0.262 <i>-0.23.1</i> (0.182)	-0.217* <i>-19.5</i> (0.113)	-0.173 <i>-15.9</i> (0.129)	-0.061 <i>-5.9</i> (0.076)	-0.155 <i>-14.4</i> (0.129)	-0.049 <i>-4.8</i> (0.125)
education: high	-0.362** <i>-30.4</i> (0.182)	-0.281** <i>-24.5</i> (0.127)	-0.209 <i>-18.9</i> (0.131)	-0.103 <i>-9.8</i> (0.090)	-0.220 <i>-19.7</i> (0.220)	-0.357** <i>-30.1</i> (0.161)

p < 0.10: \*, p < 0.05: \*\*, p < 0.01: \*\*\*.

Control variables: age, age squared, attending religious services at least once a month, parents in the household, partnership status, number of partners ever had, urban area, agree or strongly agree: a woman has to have children in order to be fulfilled.

Sources: GGS 2005 from GGP (2012); own calculations.

To sum up, working in the public sector is not related to the number of children neither among the main sample of working women nor among several subgroups of women, namely those with high/medium/low education, and mothers. But, firstly, it shows a positive correlation among women with partners. Secondly, for women in partnerships, there is not a negative association between a high level of education and the number of children in the public sector, but in the private sector.

## 5.5.2 Robustness checks

Several estimations and tests have been conducted in order to confirm the results of the main model. Firstly, ordered Probit models have been carried out, with and without the variables violating the proportional odds assumption. The results are qualitatively (i.e., regarding the sign and the level of significance) the same as those presented above.

Secondly, working in the public sector is treated as an exogenous variable in the Poisson model. However, the sector choice may be endogenous with regard to the number of children. To be precise, women who anticipate becoming mothers or having a large number of children and who would like to stay in the labour market after childbearing may self-select into the public sector due to – presumably – better working conditions for

mothers, such as higher job security, less work hours, lower gender pay gap, and a higher likelihood of reaching a managerial position.<sup>49</sup>

Alternatively, it is possible that discrimination against women with children in the job application procedure is higher in the private than the public sector, so that these women are more successful applying for vacancies in the public sector. Hence a test of the endogeneity of the work sector regarding the number of children has been carried out. In accordance with the results, the hypothesis of endogeneity is rejected.

Thirdly, for women with children I selected those who are still in the same job as before the birth of their youngest child. But also in the estimation with the work sector they have been working in since before the last birth as an independent variable, the result is not significant.

Finally, there are two types of public sector workers in Germany – civil servants (*Beamte*) and other employees (*Tarifbeschäftigte*). Therefore, it might be the case that being a civil servant, and hence enjoying a higher level of job security, is the decisive factor instead of the broader category of working in the public sector. In the GGS data, the current occupation is divided into eight categories: (1) farmer, (2) highly skilled professional, (3) self-employed, (4) civil servant (*Beamte*), judge, soldier, (5) labourer; (6) in training (state-organised apprentice), (7) paid family worker, (8) other contracted employees. From these, a dummy variable has been constructed, taking the value 1 if the occupation is ‘civil servant, judge, officer’, 0 otherwise. Then, the models presented in Section 5.1 have been re-estimated for all groups of women using this variable instead of the ‘public sector’ variable used before. Results show that this variable does not affect the number of children significantly. Similarly, in order to capture women with a secure public sector job, a dummy variable indicating public sector employment with a permanent contract (0 otherwise) has also been tested, but, again, without significant results.

## 5.6 Conclusion

This article presents empirical evidence on the relationship between working in the public sector and the number of children among working women in Germany. The assumption of a positive relation is derived from the hypothesis that women profit from family-friendly

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<sup>49</sup> See (Cavalli 2010) for a discussion of the endogeneity of the sector choice in modelling fertility intentions.

working conditions and higher wages in the public sector. In line with this assumption, empirical evidence for other industrialised countries suggests a positive impact of working in the public sector on the number of children. Three mechanisms could account for this finding: (1) the woman explicitly chose education that would lead to employment in the public sector, (2) due to her family-orientation, the woman chose education (teacher, child care worker, paediatrician) which leads to a career often found in the public sector in Germany, (3) a woman working in the public sector discovers the possibilities to reconcile work and family.

The results of the Poisson models suggest that the hypothesis that the number of children is significantly higher among women in the public than in the private sector is rejected for working women and all subgroups analysed except for women in partnerships. Specifically, working in the public sector does not significantly correlate with the number of children among all working women, women with high/medium/low education, and mothers. But, firstly, it shows a positive result among women with partners, the group that was assumed to have the lowest impact of the work sector. It is concluded that a woman's job in the public sector is not enough for a smooth reconciliation of work and family life, but that a partner is needed. He could provide additional financial security and could take over some of the childcare and household tasks.

Secondly, among women in partnerships, the negative relation between a high educational level and the number of children is only significant in the private sector. In other words, the public sector has an egalitarian effect on the negative educational gradient with regard to the number of children for this subgroup of women. This result is interesting, given the fact that the negative educational gradient of fertility is much more pronounced in Germany than in Scandinavian and other industrialised countries, even having given rise to public concern during the last years.

Why is the work sector not positively correlated with the number of children of all working women in this study? Firstly, only one part of those working in the public sector, namely civil servants, enjoy special benefits and conditions that are distinct from private sector jobs. But sensitivity analysis revealed that even being a civil servant is not significantly correlated with the number of children. Secondly, as Hoem et al. (2006) have pointed out for Sweden, also the type of education matters. For example, in their analysis, teachers and midwives have considerably higher fertility than librarians despite the same work sector. Similar results have been found in numerous other studies (e.g., Lappegård 2002;

Lappegård and Ronsen 2005). Maybe women with high fertility intentions choose professions in which they work with children (teachers) or mothers (midwives), while the sector plays a minor role for the education and professional decision. Moreover, teachers profit from vacation times that coincide with their children's vacation days from school, making this profession even more family-friendly. Thus, only some women in the public sector would have a higher fertility, but their share is too small to account for a difference in fertility between women in the different sectors.

Thirdly, the opportunity costs of employment breaks increase with the rank in the organisational hierarchy (Buchmann et al. 2001). As the gender wage gap is lower and the share of women in managerial positions is higher in the public sector, having to take leave from the job for childbearing and rearing might be more 'expensive' for some women in the public sector than in the private sector despite the stronger guarantee to return to the same job after parental leave. This could countervail a possible positive effect on fertility. Finally, as Buchmann et al. (2001) revealed, the exit rate (leaving the labour market) is considerably higher and the re-entry rate is clearly lower for women in the public sector than for those in the private sector. In other words, the strategy of family-oriented women might be to enter the labour market and work in a convenient job in the public sector, but leave the labour market for good upon family formation. These women obviously are omitted in the analysis conducted in this article which focuses on working women only. Hence the research could be extended by conducting an analysis with data that offers complete work and fertility histories, so that survival models for birth events could be estimated. This would also imply the possibility to detect causal relationships.

Concerning working conditions in the public and the private sector, the results of the study at hand suggest that the public sector does not have the lead over the private sector with regard to family-friendliness. Firstly, this could be due to the fact that working conditions for mothers are indeed not better in the public than the private sector. This is in line with the results of the comparison with data from the Microcensus. Secondly, it is possible that there are theoretically more measures in place to reconcile work and family in the public sector than in the private sector, but that they are not adequately offered (to the workers by their superiors). Both strands of thought would lead to women questioning a good reconciliation of work and family life. This, in turn, could induce women to either have fewer (or no children) or to leave the public sector or the labour market upon the arrival of a child.

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## Appendix 5

**Table A.5.1: Summary statistics for the overall sample**

variable	sample size	mean	std. dev.	min.	max.
number of children	1443	1.201	0.991	0	5
public sector employment	1443	0.312	0.463	0	1
total intended number of children	1443	1.66	0.919	0	5
age	1443	37.757	7.773	20	49
age squared	1443	1486	561	400	2401
low educational level	1443	0.085	0.279	0	1
medium educational level	1443	0.662	0.473	0	1
high educational level	1443	0.253	0.435	0	1
partnership status: no partner	1443	0.315	0.464	0	1
partnership status: cohabiting	1443	0.107	0.31	0	1
partnership status: married	1443	0.578	0.494	0	1
number of partners ever had	1443	1.06	0.62	0	5
health: very good	1443	0.316	0.465	0	1
health: good	1443	0.557	0.497	0	1
health: fair, bad or very bad	1443	0.127	0.332	0	1
attending religious services at least once a month	1443	0.17	0.376	0	1
East Germany	1443	0.2	0.4	0	1
urban area	1443	0.466	0.499	0	1
born in a foreign country	1443	0.132	0.339	0	1
grandparents in the household	1443	0.039	0.193	0	1
agree or strongly agree: a woman has to have children in order to be fulfilled	1443	0.261	0.439	0	1
agree or strongly agree: looking after the home or family is just as fulfilling as working for pay	1443	0.532	0.499	0	1
irregular schedule	1443	0.161	0.367	0	1
can do at least part of the work at home	1443	0.06	0.237	0	1
number of work hours per week	1443	32.944	9.384	20	80

Sources: GGS from GGP (2005); own calculations.