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## Change in the gender division of domestic work after mummy or daddy took leave: An examination of alternative explanations

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Change in the gender division of domestic work after mummy or daddy took leave:

An examination of alternative explanations

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## **Abstract**

This study investigates how the duration of child care leave taken by mothers and fathers relates to changes in couples' division of housework and child care after postnatal labour market return in Germany. It explores whether take-up of child care related leave may impact the gender division of domestic work beyond the period of leave and examines three theoretical explanations: 1) development of domestic work skills, 2) bargaining power based on economic resources, and 3) adaptations in gender role or parenting identities. Using data from the German Socio-Economic Panel (1992-2012) on 797 and 762 couples with a first or second birth, respectively, we applied OLS regression models with lagged dependent variables in combination with Heckman selection correction. The results suggested that dual-earner couples where mothers took longer leaves experienced a greater shift towards a gender-traditional division of domestic labour after childbirth even in the medium-term after labour market return. The linear relationship and stronger effects on the division of child care than for housework lent support to identity-based explanations. Paternal leave take-up was associated with a more equal division of housework and child care after first births but not after second birth transitions. The relationship with the leave duration was less clear. In terms of explaining the mechanisms for fathers, the findings provided greatest support for explanations relating to domestic skills development possibly in combination with changes in fathering identities.

Key words: child care; gender division of labour; housework; parenthood; parental leave

JEL codes: J13, J16; J18; J22; H31

## **Introduction**

This study investigates whether the durations of leave mothers and fathers took after childbirth were associated with medium-term changes in the gender division of domestic work after both partners had returned to the labour market. In recent years, the gender division of domestic work has received increasing attention from demographers and sociologists, as greater perceived or practised inequality in the division of housework or child care in couples has been found to relate to a reduced likelihood of a second birth (e.g., Schober 2012a, Cooke 2008, Cooke 2004, Olah 2003, Goldscheider et al. 2013) and greater risk of relationship breakdown (e.g., Schober 2012b, Kalmijn 1999, Schober 2012a) in several Western countries. Parenthood has been found to be a crucial turning point on average leading to increasing gender inequality in the division of housework, which often persists in the long-term over the course of relationships (Grunow et al. 2012, Kühhirt 2012). A growing cross-national comparative literature suggests that maternal and paternal domestic work contributions vary across contexts and one important variation relates to parental leave entitlements for mothers and fathers (Hook 2006, Sullivan et al. 2009, Rehel 2014, Schober 2014, Cooke and Baxter 2010). However, transmission mechanisms of these policies to the couple level, such as traditionalizing effects on the division of domestic work of longer maternal or paternal career breaks have rarely been investigated. This is of particular interest given that most OECD countries have increased parental leave entitlements with twelve countries providing job-protected leave for two years or more in 2013 (International Network of Leave Policies & Research 2014). Several countries also implemented or extended fathers' parental leave rights to encourage longer-term paternal child care involvement and to speed up maternal labour market return. Previous studies from the US, Australia, the UK, Canada, Germany, Norway and Sweden provide mixed results as to whether fathers who took some leave spent more time with their children after returning to the labour market (Nepomnyaschy and Waldfogel

2007, Tanaka and Waldfogel 2007, Haas and Hwang 2008, Hosking et al. 2010, Wrohlich et al. 2012, Rehel 2014, Ekberg et al. 2013, Kotsadam and Finseraas 2011). We contribute to the literature by exploring more in detail three potential explanations for how the durations of maternal and paternal leave take-up following childbirth relate to medium-term changes in housework and child care time in German couples. To this end, we compare changes in the gender division of housework and child care after first births with changes after second birth transitions. At the same time, we use longitudinal couple data to account for potential self-selection of mothers and fathers into longer leave take-up based on unobserved characteristics.

### **Previous Research on Parental Leave and Domestic Work after Childbirth**

Very few studies so far have investigated whether the duration of maternal leave take-up impacts the gender division of labour beyond the period of leave. Previous research has shown that women who are currently on leave or not employed on average perform more and their partners less unpaid work compared to women who work part-time or full-time (e.g., Gershuny et al. 2005, Brines 1994, Sayer and Gornick 2012, Craig and Mullan 2011). A few analyses of domestic work time differentiated between short-term and long-term unemployment (Brines 1994, Burda and Hamermesh 2009) or considered women's full-time work experience (Cunningham 2007) and generally lend some support to the importance of past labour market experiences. Some studies have explored whether longer entitlements to leave for mothers significantly impact the likelihood of employment and their wages in the long-term with mixed results (e.g., Ruhm 1998, Schoenberg and Ludsteck 2014). We are aware of only one recent cross-sectional study which examined the relationship between mothers' labour market interruptions and domestic work in one federal state in Germany. The authors found a more traditional division of housework in couples where mothers had taken longer leaves (Schulz and Rost 2012).

A number of studies have investigated the consequences of varying durations of fathers' leave, sometimes linked to paternity leave reforms, for paternal child care involvement. Studies from Sweden, Canada, and the US (Haas and Hwang 2008, Nepomnyaschy and Waldfogel 2007, Rehel 2014) found that fathers who took longer leave participated more in child care. Having taken any leave was also positively related to paternal child care involvement in the US and the UK (Tanaka and Waldfogel 2007, Pleck 1993), whereas associations with weekday and sole child care proved weak in Australia (Hosking et al. 2010) and not significant in Germany (Wrohlich et al. 2012, Schober 2014). These studies were mostly based on child care information collected at one point after the father had taken leave with retrospective questions on paternal leave taking. Our analysis extends these studies by observing German fathers' housework and child care involvement after the end of their leave, while controlling for their pre-birth involvement levels. This reduces the risk of bias as a result of more involved fathers being more likely to take some and longer leave.

A few Scandinavian and German studies have exploited paternity leave reforms, which increased the take-up of leave by fathers, and compared the child care or housework involvement or wages of fathers with children born shortly before the reform with men who became fathers shortly after the reform. Schober (2014) found that child care time on weekdays of West German fathers increased in the first couple of years after childbirth after the introduction of two daddy months and income-related leave compensation in 2007. By contrast, the Swedish Daddy Month Reform in 1995 seems to have had no effect on the amount of leave taken by fathers for the care of sick children (Ekberg et al. 2013). Kotsadam and Finseraas (2011) found that 15 years after a Norwegian paternity leave quota reform in 1993 couples who had a child after the reform



reported a more equal division of household tasks and less frequent conflicts over housework than respondents with children born before the reform. For both reforms, short-term evaluations found no effects of these reforms on fathers' wages (Cools et al. 2011, Johansson 2010). A recent study by Rege and Solli (2013) for the 1993 reform in Norway however suggested that fathers' earnings can be seen to decrease significantly when allowing for a two-year phase-in-period until paternity leave had become more accepted and used by the majority of fathers. They interpret this as fathers becoming more involved in child care after the reform. Despite some evidence of longer-term effects on the gender division of labour, the mixed results of these studies suggest that the mechanisms may be more complex than previously assumed. In this analysis of German couples, we attempt to disentangle the importance of different theoretical explanations underlying the observed medium-term changes in maternal and paternal contributions to housework and child care after leave periods of varying lengths.

### **Parental Leave and Other Early Years Policies in Germany**

Since the late 1980s, parental leave entitlements in Germany have been generous in terms of duration of leave, whereas benefit levels were rather low until a reform in 2007 (for a historical overview, see e.g., Ziefle and Gangl 2014, Rosenfeld et al. 2004). This created incentives for mothers to take long time-outs from the labour market, whereas only a small minority of fathers took some leave. The maximum entitlement to job-protected parental leave after a birth was extended from 18 to 36 months in 1992. The main aim of this leave extension as well as previous reforms was to enable parents - in practice mothers - to care for their children during the early years, while facilitating their labour market re-entry after the leave (Deutscher Bundestag 1994). Parents on leave were entitled to a child-rearing benefit of about €300 per month for the first six months. After that, benefits were reduced on a sliding scale based on household income and could be received for a maximum of 24 months. Two reforms in 1998 and 2001 introduced more

flexibility in the take-up period and rate of reimbursement and permitted leave take-up simultaneously with the other parent or with part-time work up to 30 instead of 20 hours per week, respectively. In 2007, the German government introduced an income-related reimbursement at 67 per cent of net earnings for 12 out of 36 months (capped at 1,800 Euros per month). The reform also included a two-month individual leave entitlement reserved for each parent, which has increased fathers' likelihood of taking leave (Wrohlich et al. 2012). The vast majority of leave-taking fathers, however, used only up to two months of leave (Trappe 2013, Kluge and Tamm 2009). Parents remained entitled to job-protected leave until the child's third birthday.

Since 1996, children have been entitled to a half-day place at a day-care centre from the age of three. Costs of day-care in Germany have been relatively low compared to other countries (Immervoll and Barber 2005). For children under the age of three, levels of publicly subsidised day-care provision have been lower in West Germany than in East Germany. Since 2005, day-care for the under threes has been expanded in both regions of Germany providing prioritised access to employed parents (Schober and Stahl 2014).

Germany provides an interesting case to study the relationship between leave take-up of mothers and fathers and involvement in housework and child care, as both parents have been entitled to take parental leave since 1986. As a result of the relatively low compensation levels until 2007, Germany represents an example of a context where mothers tended to take comparatively long leaves after childbirth. Similar long and, at least for part of the duration, low-paid leave entitlements are common in many Western countries (International Network of Leave Policies & Research 2014). Only a small percentage of fathers used to take any leave until the introduction

of the ‘two-month daddy quota’ in 2007. However, the average leave length of the few fathers who took leave before this reform was longer than for those who took of leave after the individual entitlement of two months was introduced (Trappe 2013).

By exploring the division of household labour in German couples after childbirth since the mid-1990s, we observe considerable variation of leave durations for fathers and mothers. We took great care to consider whether the theoretical relationships may be influenced by the varying institutional contexts.

### **Theoretical Framework: Child Care Leaves and Domestic Work**

To take parental leave, parents in Germany have to inform the employer shortly after childbirth of the duration of leave they intend to take until the child’s second birthday. After two years, the leave can be extended by another year. For other extensions or reductions of leave, a notice period of seven weeks and the employer’s approval are needed (BMFSFJ 2011). In line with the neo-classical economic theory (Becker 1981), resource-bargaining perspectives (e.g., Lundberg and Pollak 1996), and constructivist approaches of gender role identities (West and Zimmerman 1987), we would expect that partners’ relative economic resources, in particular earning potential, as well as gender or parenting identities at the time of birth influence the length of leave parents take and the division of domestic labour during and after the leave. However, these influences may also change as a result of leave take-up and therefore vary during the leave period. Three potential explanations can be identified how leave take-up or longer leave may impact the gender division of domestic work in the medium- or longer-term after the end of both parents’ leave entitlements: 1) improved domestic work skills and bonds with children, 2) reduced marketable skills and bargaining power, and 3) changing gender roles and parenting identities.

The neo-classical economic theory (Becker 1981) predicts that a more specialised division of paid and unpaid work during the parental leave period of one parent impacts partners' relative skills in the labour market and in the domestic sphere. The parent on leave is assumed to acquire better housework and child care skills, including improved child-specific knowledge and closer bonds with children. Longer employment interruptions are expected to lead to depreciation of labour market relevant knowledge of the respective partner. As a result of greater differences in skills and bonds with children, transferring the responsibility for child care tasks to the other parent may become more difficult even and the more specialised division of labour may persist to some extent even after labour market return. The transformative effect of new housework and child care skills would be expected to be stronger after the transition to parenthood than for further births (Knoester and Eggebeen 2006). A recent qualitative study of paternal leave taking reported that fathers acquired new domestic skills and greater respect for the care work previously done by mothers already after relatively short leave durations of about one month (Rehel 2014). We might therefore expect a non-linear relationship with stronger increases already after relatively short leave durations and weaker relationships for further leave taken. Qualitative studies also suggest that parents, who have not been the main carer previously, are more likely to acquire new skills and form bonds with a young child when they are mainly or solely responsible (Chesley 2011, Rehel 2014). If both partners in a couple take leave together, this may therefore inhibit the acquisition of new domestic skills for the partner who had lower perceived skills at the outset – in practice mostly the father. This argument is less likely to apply after a second birth than after a first birth, as with more than one child parents who take leave concurrently can divide up child care and housework tasks related to the different children.

The depreciation of labour market-related human capital as a result of longer leave take-up may be assumed to lower the future earnings potential of the leave-taking partner, for instance by slowing down career progression or due to discrimination. From a resource-bargaining perspective (Lundberg and Pollak 1996), longer leave take-up should therefore reduce the bargaining power of the respective partner to negotiate for a lower contribution to housework for him or herself. Bargaining power is likely to be more relevant for the division of housework than for child care (Raley et al. 2012, Bianchi et al. 2012, Cooke 2007), as the former is often perceived as more onerous and less satisfying than the latter (Hallberg and Klevmarken 2003). Child care time is also more often combined with leisure activities (Bianchi et al. 2000, Craig and Mullan 2011).

Following identity and role occupancy perspectives (Stryker and Burke 2000, Knoester and Eggebeen 2006), the salience of specific parts of the self-concept depends on the context or issue and may show some temporary variations, especially during life course transitions (Stewart and McDermott 2004). Empirical studies provide evidence of some modest changes in the salience of stereotypically masculine or feminine personality attributes and in work-care attitudes across the transition to parenthood (Burke and Cast 1997, Deutsch et al. 1988, Evertsson 2013, Schober and Scott 2012). New parents may consciously construct their identities (Deutsch et al. 1988). Attitudinal changes have been found to vary by the work and care arrangements which parents practise (Schober and Scott 2012, Himmelweit and Sigala 2004) and by the child's age (Evertsson 2013). Through altered preferences for work and care, the take-up and length of both parents' leave may impact the division of housework and child care even beyond labour market return. As parents tend to perceive spending time with children as more fulfilling and compatible

with some leisurely pursuits than housework (Hallberg and Klevmarken 2003), such medium-term changes in identities and preferences are more likely for child care than for housework.

As a result of the combination of changes in terms of identities, skills, or bargaining, we expect in general that mothers and fathers who have taken longer child care leaves will continue to spend more time on housework and child care after both partners have returned to the labour market (*Hypothesis 1*).

In an attempt to disentangle the importance of the above mentioned explanations for such changes, we formulate the following three hypotheses:

*Hypothesis 2 (Domestic skills)*: If the improvement in domestic work skills is an important driver, we would expect stronger positive associations of a partner's leave duration with own subsequent contributions to housework and child care after a first birth compared to a second birth. Furthermore, the relationship is likely to be non-linear with stronger increases as a result of some leave take-up. The amount of change should be smaller if one parent takes the whole leave while the other partner is also on leave.

*Hypothesis 3 (Economic bargaining)*: If longer leaves are reflected in lower bargaining power, we would expect a stronger positive association of the leave duration with changes in the division of housework than with child care. Furthermore, the association should be partly accounted for by changes in partners' relative wages after labour market return.

*Hypothesis 4 (identity adaptation)*: If longer leave take-up results in stronger identification with egalitarian gender roles and family care responsibilities, we would expect past leave duration to

be more strongly associated with a parent's own contributions to child care than to housework after labour market return. Continuing greater child care involvement even after controlling for changes in work hours and relative wages after return may provide even stronger evidence of medium-term changes in identities. Similar to skill development, changes in gender role and parenting identities are less likely if the whole leave was taken while the other partner was also on leave, especially after a first birth.

### **Data and Method**

The data to test the hypotheses are drawn from couple responses in the German Socio-Economic Panel (SOEP) for the years 1992 to 2012. The SOEP is a representative household panel study with about 20.000 respondents from 11.000 households (for a detailed description, see Wagner et al. 2007). The SOEP includes annual questions on housework and child care time to all members of the household. Furthermore, each year respondents were asked to provide monthly histories on employment and leave take-up for the past year, which can be matched with fertility histories.

To investigate how the durations of leaves mothers and father took after childbirth are associated with both parents' involvement in housework and child care after labour market return, we focused on dual earner couples after the end of the three-year job protection period. We estimated ordinary least squares (OLS) regression models of maternal and paternal housework and child care hours and relative shares of housework and child care, respectively, in the fourth year after childbirth. By estimating separate models for housework and child care and for first and second births, respectively, we attempted to disentangle some of the theoretical mechanisms relating to skills formation, economic resources, and changes in identities. We excluded third and higher parity births because couples with three or more children are a highly selective group in Germany and our sample was too small to analyse them separately. All models included lagged variables

(Dalecki and Willits 1991, Cronbach and Furby 1970) on time use on housework and child care before birth to control for unobserved characteristics, such as their identities with respect to parenting and work, which may influence parents' leave take-up as well as the post-natal division of labour in couples.

In Germany, a substantial minority of mothers stay out of the labour market even beyond the three-year job protection period. In our sample, 55 and 48 percent of mothers with one or two children, respectively, were not active in the labour market in the fourth year after childbirth, for instance, because they had another child and took the next parental leave. Only 2 percent of fathers were unemployed. Whereas in the German context fathers' unemployment can be assumed to be largely involuntary, non-employed mothers may differ systematically from those who already returned to work in observed and unobserved characteristics, such as career orientations and work-care preferences. To take account of any potential selection bias due to unobserved heterogeneity, we used a Heckman two-step correction model (Heckman 1976). Hence we estimated OLS regression models of maternal and paternal housework and child care hours in the fourth year after childbirth, while controlling for any selection bias due to focusing solely on dual earner couples in employment. For the Heckman-selection correction to produce unbiased estimates, an exclusion restriction is required. This means that we need at least one exogenous predictor of the selection outcome, maternal labour market return, which is not related to our outcomes of interest, the division of housework and childcare. We used the male partner's monthly income after birth, the regional unemployment rate at county level and an interaction effect of both variables, as they can be assumed to affect mothers' employment after childbirth but have no direct effect on the division of housework and child care after controlling for mothers' and fathers' prenatal labour market participation, wages, education levels, and other



covariates. These three indicators were included only in the selection model and not in the regression models of housework and child care time or division, respectively.

Using the Heckman two-step correction approach, we estimated a standard probit model in the first stage, shown in stylized Eq. 1. We observed the dichotomous variable  $z_{it}$  with a value of 1 if both parents have returned to the labour market in the fourth year after child birth and 0 otherwise. The three exclusion restrictions and other control variables are denoted by the vector  $\omega_{1t}$ .

$$z_{it} = \omega_{1t}\gamma + u_t \quad (\text{Eq. 1})$$

Using the estimated self-selection correction, lambda or the so-called inverse Mills ratio ( $\lambda$ ), we, secondly, estimated the effects of the leave taken by mothers  $lm_{it}$  and of fathers  $lf_{it}$  on absolute or relative time use on domestic work  $d_{it}$  of mothers or fathers, respectively, as shown in Eq. 2.  $d_{it}$  may stand for housework or child care, which are estimated in separate models.  $a_{it-4}$  includes a set of variables capturing selection factors into leave take-up, such as prenatal employment status and partners' relative wages.  $b_{it-t-4}$  accounts for changes in these same factors since the year before childbirth, capturing simultaneous trends or possible mediators of any effects of leave duration.  $x_i$  is a vector of (mostly) time-invariant demographic characteristics and  $\varepsilon_{it}$  denotes the random variation. The models of housework after both childbearing transitions and the models of child care after a second birth include a lagged dependent variable measured in the year prior to childbirth. Hence we are essentially modelling change in housework and child care time and division, respectively, from the year before to the fourth year after birth.

$$d_{it} = \beta_{1t} + \beta_2 d_{it-4} + \beta_3 lm_{it} + \beta_4 lf_{it} + \beta_5 a_{it-4} + \beta_6 b_{it-t-4} + \beta_7 x_i + \beta_8 \lambda + \varepsilon_{it} \quad (\text{Eq. 2})$$

### *Sample Selection and Nonresponse*

Our analysis sample included all women in couples who could be observed after the birth of their first or second child until the fourth year after childbirth. The fourth year was chosen, as the maximum duration of job-protected leave is three years and so the majority of parents have re-entered the labour market. The sample was further restricted to couples, irrespective of marital status, where women were between 20 and 45 years old when they had their first or second child. For most years, annual attrition rates in the SOEP are below 10 % and therefore moderate (Gramlich 2008). Other longitudinal studies found couples with young children to generally have a low risk of wave non-response (Uhrig 2008). However, we decided not to follow couples beyond four years after childbirth, as we found attrition rates to increase significantly after that. 10 percent and 16 percent of couples with a first or second child, respectively, had some missing values for one or more of the independent variables. The independent variables with the largest amount of missing information concerned wages and domestic work hours before childbirth. To test for potential selectivity in the item non-response, we used multiple imputations to impute the missing values of independent variables, by using 30 imputation cycles (Schafer 1997). The results based on the multiply imputed data did not differ substantially from models based on the dual-earner sample with complete information. However, given that combining multiple imputation techniques with estimated wage rates and with Heckman selection correction models involves a number of assumptions which are difficult to test, the following analysis presents models based on couples with complete information. In addition we include a dummy variable of missing prenatal wage values to prevent a reduction in the small sample of fathers who took leave after childbirth. The final sample included 798 couples having a first child and 762 couples

experiencing a second birth. Of these, 362 and 396 were dual earner couples in the fourth year after their first or second birth, respectively.

### *Operationalization of Dependent and Independent Variables*

The dependent variables refer to hours per weekday which mothers or fathers, respectively, spent on housework or child care in the fourth year after childbirth. In addition, we measured mothers' relative share as mothers' weekday hours relative to the sum of both partners' hours spent on housework and child care, respectively. Unfortunately, questions regarding time use on weekends were only asked every other year in the SOEP.

The key independent variables were the duration of maternal and paternal leave take-up. This information is based on the monthly leave histories reported by parents each year. We used a continuous measure of the length of mothers' maternal leave in months. We also tested a categorical variable which differentiated between maternal leave durations up to 12 months, 12 to 24 months and more than 24 months. For fathers, a categorical variable distinguished between no leave at all, a period of leave up to 6 months, and more than 6 months. As shown in Table 1, the average length of maternal leave was about 24 months for employed mothers. Whereas almost all mothers took leave, only 10 percent of first-time fathers and 6 per cent of second-time fathers took some leave with about half of these taking more than six months. The sample of leave-taking fathers since the introduction of the 'daddy quota' of two months in 2007 was too small to further differentiate leave durations of less than two months. However we performed additional tests on this threshold by combining both birth parities. We also considered a dummy variable indicating whether the father took the whole leave while the mother was also on leave.

We included a rich set of control variables measured before childbirth which may affect the length of leave taken by mothers and fathers as well as time allocations to housework and child care. As further indicators for labour market attachment, right to return to the same job, and work-family orientations we considered mothers' employment status and fathers' work hours before childbirth. Fathers' earnings before birth were included as a proxy for ability to outsource household labour. As previous studies found that bargaining power and relative earnings potentials may matter for how leave is divided up between parents (Trappe 2013, Reich 2011, Lappegard 2008) and for how couples adapt their division of labour after childbirth (Sanchez and Thomson 1997), we considered mothers' wages relative to couples' combined wages before birth. For mothers who were not employed before childbirth, we estimated their earning potential using a wage equation with Heckman selection correction. In the wage equation, we considered mothers' age and age squared, education level, years of full-time work experience, marital status, number of children, region, parental leave policy reforms, and the county level unemployment rate. Based on these estimated wages, we distinguished three categories of mothers earning per hour less than 40 percent, between 40 and 60 percent and over 60 percent of both partners' combined wages.

Previous studies reported occupational status and employment sector to predict leave take-up for fathers (Bygren and Duvander 2006, Naz 2010). Further tests including both partners' occupational status and employment sectors before birth however showed no significant associations with domestic work division. Previous studies have suggested that couples where fathers take leave hold more gender-egalitarian ideals (Vaskovics and Rost 1999) and the latter may also contribute to a less traditional division of domestic labour after childbirth (Sanchez and Thomson 1997, Baxter et al. 2008, Schober 2013). As gender role identities have not been

measured regularly in the SOEP, we considered time use on housework or child care before the respective birth to control for some stable but unobserved differences in identities and preferences towards housework and child care. We also tested four irregularly-collected measures of the importance respondents attached to different life domains, such as having children or a successful career, but we found only very weak associations with the division of housework and child care.

In subsequent modelling steps, we examined potential intervening effects of changes in relative wages after labour market return and in both parents' work hours from the year before to four years after the birth. In all models we accounted for relatively time-invariant couple characteristics. For educational attainment, we differentiated between i) college degree, ii) high school degree or vocational qualification, and iii) secondary school certificate or less. We created a dummy variable for whether the mother was less educated than the father. Further control variables included birth year, migration background of the mother or father, respectively, marital status, and the age of the youngest child in months. We also used several dummy variables to control for parental leave policy reforms in 1998, 2001, and 2007.

Despite some convergence over the past decade, parents in East Germany are still more accepting of maternal employment than in West Germany (Schmitt and Trappe 2010). Therefore, we include a dummy variable for the region in which the couple lived.

In addition to the same prenatal or time-invariant control variables, we considered the county level unemployment rate, fathers' monthly income, and an interaction of the two variables only in the selection model of maternal labour market return.

## **Results**

### *Estimation Strategy*

In the first modelling step to test Hypothesis 1, we included the leave length of mothers and fathers in addition to prenatal domestic work involvement and prenatal or relatively time-invariant control variables. Here we also tested categorical specifications of maternal leave duration to allow for a non-linear relationship in line with Hypothesis 2 regarding skills development. In a second step, we explored whether the effect of leave take-up was persistent after controlling for the change in mothers' relative wage rate after labour market return. Including the latter should partly or fully account for any significant effect of leave taking, if longer leave take-up was reflected in lower marketable skills and bargaining power as assumed in Hypothesis 3. In a third and fourth modelling step, we added changes in work hours of mothers and fathers, respectively, since before childbirth to examine whether they mediated the relationship between length of leave taken and changes in domestic work involvement. We tested for multicollinearity using variance inflation factors but found no evidence of problems in any of the models.

Tables 2 to 5 show the estimated effects of the accumulated duration of leave taken by mothers and fathers on time use on housework and child care after first and second childbirth. To save space, we only present a baseline model and a second model including the mediation variables and report on intermediate steps in the text.

### *Leave Length and Changes in the Division of Domestic Work*

Hypothesis 1 assumed a positive association between leave length of both parents and their own absolute or relative domestic work involvement to persist after labour market return. On the whole, the results in Tables 2 to 5 provided some support for a persistent effect of maternal leave length beyond labour market return. As can be seen in Tables 2 and 3, first-time mothers who have taken longer leave increased their housework time more and performed more child care on a

weekday in absolute terms and relative to their partners (see Figure 1). One additional year of leave was associated with a 4-percentage point larger increase in mothers' housework share and with a 6-percentage point increase in mothers' child care share.

For second-time parents, longer maternal leave was significantly associated with longer child care hours after labour market return, as shown in Models 1 and 3 in Table 5. One additional year of leave was estimated to increase mothers' weekday child care time by about one hour and their relative share by 3 per cent. For housework, the length of leave second-time mothers took was negatively associated with the change in fathers' relative and absolute contributions to housework, albeit the former association was only marginally significant (see Table 3 and Figure 1).

<Figure 1 about here>

For the effect of fathers' leave taking, the results provide only partial support for Hypothesis 1. For the most part, some leave take-up was positively associated with a more equal division of domestic work in couples. However, the relationship with the leave duration was often not linear and seemed to vary by birth parity and between housework and child care.

First-time fathers who took more than six months of leave increased their weekday housework time by just under one hour more than those who took no leave, whereas the difference with shorter leave durations was not significant. Also the division of child care was more equal among first time parents when fathers had taken less than six months of leave (Table 4). Longer leave durations for fathers were also associated with greater paternal child care involvement in absolute terms. However, fathers' leave take-up was not significantly associated with changes in paternal housework and child care contributions after a second birth. For second-time parents, fathers'

leave take-up for over 6 months was negatively associated only with the increase in maternal child care time since before birth.

<Tables 2-5 about here>

### *Development of Domestic Work Skills*

Hypothesis 2 assumed that if leave take-up resulted in greater (relative) housework and child care skills, the effects should be strongest at leave durations exceeding a few weeks but not necessarily more than three or six months. Furthermore, we expected such effects to be stronger after the transition to parenthood compared to later births. They should also be weaker for first-time fathers who took their whole leave simultaneously with the mother.

For mothers' leave take-up, models with a categorical variable of leave duration provided no support for short leaves up to one year having a disproportionately greater impact on the division of housework and child care than longer leaves (results available on request). For the division of housework, we also found no evidence of fathers' leave durations up to six months having a significant effect of similar or larger size as longer leave either for first or second births. Only the similar or stronger negative association of paternal leave up to six months compared to longer leave with mothers' child care hours and share provided some evidence in line with the skills development hypothesis. The fact that it seems to matter more for mothers' contributions than fathers' may be interpreted as mothers perceiving a change in paternal child care skills after a first birth. Joint models of both birth parities with a categorical variable differentiating fathers who took up to three months of leave from those with longer leaves showed substantively the same results.



In line with Hypothesis 2, fathers who took their total leave while the mother was also on leave were found to reduce their child care time more strongly after a first birth compared to those who took some solo leave. After a second birth, fathers who took simultaneous leave of with their partners were found to increase their child care time more, possibly because they became more involved with the older sibling of the newborn. These results provide partial support for the importance of altered domestic work skills, in particular regarding child care, as a result of first-time fathers' leave taking as assumed in Hypothesis 2. Skills development, however, does not seem to be an important explanation for the medium-term effect of maternal leave duration on the gender division of domestic work.

#### *Marketable Skills and Bargaining*

First-time mothers with higher relative wages before childbirth practised a more equal division of housework and child care after birth providing some support for importance of earnings potential and bargaining power. For second birth transitions, mothers' prenatal wages however were at most marginally significant. In a second modelling step, we considered the changes in women's gross hourly wage rate relative to both partners' combined wages. If longer leave take-up of mothers and fathers, respectively, were to reduce their own bargaining power, as assumed in Hypothesis 3, we would expect changes in the relative wage rate to mediate the relationship with domestic work, especially for housework, and to be statistically significant. Across all models we found only weak evidence of this pattern. An increase in mothers' relative wage rate reduced the increase in mothers' own housework hours after a second birth but did not mediate the effect of either parent's leave take-up on the division of housework. Hypothesis 3 therefore had to be rejected.

### *Changing Gender and Parenting Identities*

Across all models the lagged dependent variables were strongly significant and reduced the associations of leave length taken by mothers and fathers with the division of domestic work after labour market return. This provides support for the argument that mothers and fathers who are less career- and more family-orientated choose to take longer leaves and share domestic work more equally. The associations of prenatal housework hours or division with the division or hours of child care after a first birth were at most marginally significant; these models therefore should be interpreted with greater caution. Considering the change in working hours after labour market return can be assumed to capture additional unobserved differences in work-care identities, which may already be partly the results of adaptations during the leave period. Yet, even after controlling for changes in maternal work hours, one additional year of leave for first-time mothers was still associated with performing almost an hour more child care on a weekday and with a 4-percent-higher child care share. Among second-time mothers, the associations with the change in child care time or division were slightly smaller. By contrast, the length of leave mothers had taken was not significantly associated anymore with the division of housework after a first or second birth. Most of the significant associations of fathers' leave duration with domestic work contributions were unaffected by controlling for maternal and paternal work hours. If we assume that the various control variables capture most of the unobserved variation in work-care preferences at the time of childbirth, one possible explanation for the remaining significant relationships with child care may be that longer leaves contribute to shaping work-care identities in line with Hypothesis 4.

### *Selection Correction Model*

The model of selection into formal employment three years after a first birth points to some significant differences with respect to observed and unobserved influences (see Table 6). Maternal labour market return was more likely among older mothers and during more recent reform periods, among mothers who had the same or a higher education level as their partners, among those who were in employment before childbirth, and who lived in East Germany. Maternal employment was less likely the higher fathers' earnings and the higher the local unemployment rate. However, fathers' earnings were less negatively associated with maternal employment in regions with higher unemployment rates, which may be due to men's earnings being perceived as less secure. In the models of women's domestic work shares and fathers' hours after a first birth, the lambda terms were statistically significant. The signs point to unobserved factors which increased the likelihood of maternal employment but at the same time reduced the change in fathers' relative and absolute contributions to domestic work. The selection model of maternal employment after the second birth showed mostly similar associations. In addition, maternal employment was more likely among non-immigrant mothers and the older the child. However, the county unemployment rate and the interaction with fathers' income was only close to statistically significant.

<Table 6 about here>

### *Sensitivity Analysis*

To examine whether differences in the family policy context altered the relationship between leave length of mothers and domestic work division in couples qualitatively, we reran the models after excluding the East German subsample and birth events which occurred since the 2007 reform. Both provided similar results as in the tables.

To examine whether the effects of the durations of leave taken by mothers are driven by adaptation processes after the labour market return, we tested interaction terms between maternal leave length and age of the youngest child in all models. The interaction term was negative and statistically significant only for the increase in maternal child care hours after a first birth. The longer mothers have been back to the labour market, the more they decrease their child care. This possibly indicates lagged adaptation to changes in labour market status, as suggested by Gershuny et al. (2005).

## **Discussion**

This study has explored whether the duration of leave mothers and fathers have taken continues to account for the shifts in the division of housework and child care they experienced since childbirth even after parents' labour market return. We investigated three theoretical explanations as to how leave-taking may impact the gender division of domestic work beyond the period of interruption: 1) skills development, 2) bargaining power based on potential earnings, and 3) adaptations in gender role or parenting identities. The results suggested that dual-earner couples where mothers took longer leaves experienced a greater shift towards a gender-traditional division of domestic labour after childbirth even in the medium-term after labour market return. This is in line with a recent study on one German state (Schulz and Rost 2012). The medium-term effects of maternal leave durations appeared to be relatively linear and stronger for child care than for housework and not significantly related to changes in relative wages. On the whole the observed pattern was more in line with altered preferences and identities during the leave than with changes in domestic work skills or economic bargaining power.

Paternal leave take-up was associated with a significantly more equal division of housework and child care after a first birth but not after a second birth. The relationship with the leave duration

was less clear. Leave durations of up to six months appeared to reduce maternal housework and child care responsibilities after a first birth, whereas longer leave were related to greater housework and child care involvement of fathers themselves. These findings are in line with a Norwegian study that leave take-up of fathers can result in a more equal division of housework (Kotsadam and Finseraas 2011). By documenting differences between first and second birth transitions, we add an important dimension to the growing number of studies from different countries (Nepomnyaschy and Waldfogel 2007, Tanaka and Waldfogel 2007, Haas and Hwang 2008, Hosking et al. 2010, Wrohlich et al. 2012, Rehel 2014, Ekberg et al. 2013) which provide mixed evidence as to whether fathers' leave taking results in a more equal division of child care in the longer-term.

In terms of theoretical mechanisms underlying the medium-term gender division of labour changes following paternal leave take-up, we found some evidence for the argument that fathers improve their relative domestic work skills - at least as perceived by mothers. Firstly, the associations of short durations of paternal leave up to six months and longer durations with changes in the division of domestic work were of similar strengths. Secondly, they were similar for housework and child care. Thirdly, associations were significant only for first-time fathers, for whom more new household labour tasks emerge. Finally, improvements in paternal involvement were only significant when first-time fathers took some solo leave.

The economic argument of longer paternal leave take-up leading to a depreciation of labour market skills and lower relative wages resulting in reduced bargaining power was not supported. Given that we found the significant increases in fathers' own housework and child care contributions only for longer durations exceeding six months, our results also fitted to some

extent with explanations relating to changes in gender role identities. However, the lack of such evidence for second-time fathers indicates that this probably was not the only mechanism. It should be noted that the three types of explanations may not be completely separable and independent. Possibly for first-time fathers who took more than six months of leave acquiring new housework and child care skills and closer bonds with their children went hand in hand with altered father identities.

This study has several important limitations. Unfortunately we were not able to measure changes in identities or preferences directly. Another limitation concerns the small subsample of couples where fathers had taken some leave after childbirth and whom we were able to observe since before childbirth. The results regarding fathers' leave taking therefore have to be treated with greater caution than those for mothers' leave durations. Although we took great care to account for self-selection into longer leave take-up for mothers and fathers by controlling for changes in many observable and in time-invariant unobservable characteristics, we cannot exclude that time-variant changes in unobservable characteristics may bias our results. Nevertheless, our analysis of actual take-up and how it may impact the division of domestic work extends and complements previous studies which could not investigate more in detail the mechanisms of how policy reforms impacted the gender division of labour.

By following couples from before birth to beyond the end of the statutory job protection period, our research extended many previous studies which were not longitudinal or covered only very short periods after paternal leave take-up. However, it may be possible that the differential changes in division of housework and child care after childbirth for parents who took different amounts of leave reverse over time. This may be because parents' salient identities shift towards

their jobs or careers or because men adapt to mothers' labour market return by increasing their domestic work involvement only with some time lag (Gershuny et al. 2005). Future studies should aim at following couples for an even longer period after childbirth and leave take-up and investigate these dynamics more closely.

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Table 1: Descriptive statistics for couples by birth parity and employment status in the fourth year after childbirth

	First birth				Second birth			
	Mother		Mother		Mother		Mother	
	not employed	employed	not employed	employed	not employed	employed	not employed	employed
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Maternal Leave (months)	31	8.1	23	11	34	5	24	11
Parental Leave: no leave	.96	.20	.90	.30	.98	.14	.94	.24
Parental Leave: <= 6 months	.02	.14	.04	.21	.01	.12	.03	.17
Parental Leave: > 6 months	.02	.15	.06	.23	.01	.07	.03	.18
Parental Leave together	.01	.08	.04	.20	.01	.07	.03	.17
Mother's housework hours	3.8	1.8	2.3	1.4	4.3	2.2	2.6	1.4
Mother's relative housework share	88	15	77	22	90	13	79	21
Father's housework hours	.51	.64	.77	.92	.46	.60	.70	.75
Mother's child care hours	12	5.9	6.3	4.2	10	5.9	7	4.8
Mother's relative child care share	84	12	72	20	84	12	75	18
Father's child care hours	1.8	1.4	2.2	2.1	1.8	1.9	2.1	1.9
Mother's prenatal housework hours	2.3	1.6	1.9	1.1	3.7	1.9	2.8	1.6
Mother's prenatal housework share	.75	.23	.72	.24	.85	.18	.80	.21
Father's prenatal housework hours	.75	.71	.80	.73	.63	.84	.70	.80
Mother's prenatal child care hours					9.4	5.7	7.8	5.6
Mother's prenatal relative child care share					81	15	78	18
Father's prenatal child care hours					2	2.5	1.9	1.7
Mother's year of birth	1972	5.6	1972	5.5	1969	5.9	1970	5.6
Child's age in months	42	3.5	43	3.4	42	3.3	43	3.2
Mother's educational attainment: low	.15	.36	.08	.27	.22	.41	.11	.31
Mother's educational attainment: medium	.61	.49	.54	.50	.58	.49	.56	.50
Mother's educational attainment: high	.24	.43	.38	.49	.20	.40	.34	.47
Education Mother < Education Partner	.30	.46	.16	.36	.36	.48	.24	.43
Mother's immigration background	.27	.44	.18	.39	.33	.47	.17	.38
Unmarried cohabiting	.06	.25	.11	.32	.04	.20	.06	.23
Maternal employment bef. birth: none	.27	.44	.13	.33	.71	.45	.40	.49
Maternal employment bef. birth: short part-time	.02	.13	.02	.15	.09	.28	.15	.35
Maternal employment bef. birth: long part-time	.09	.29	.08	.27	.11	.31	.24	.43
Maternal employment bef. birth: full time	.62	.49	.77	.42	.09	.29	.22	.41
Change in maternal working hours since bef. birth	-28	18	-9.3	18	-7.4	14	6.8	18
Mother's prenatal relative wage: < 40 %	.24	.43	.23	.42	.14	.35	.24	.43
Mother's prenatal relative wage: 40 – 60 %	.57	.50	.66	.47	.51	.50	.57	.50
Mother's prenatal relative wage: > 60 %	.18	.39	.11	.31	.34	.47	.19	.39
Change in relative wage rate since before birth			-.03	.14			-.07	.17
Father's immigration background	.27	.44	.17	.38	.33	.47	.20	.40
Father's prenatal work hours	40	15	41	15	41	14	42	13
Change in father's work hours since before birth	4.9	17	1.3	17	3.4	15	1.4	15
Father's monthly net income bef. birth (EUR)	1561	645	1629	1256	1798	845	1820	849
Father's monthly net income (EUR)	2117	892	1932	929	2259	1134	2119	1169
County unemployment rate	10	4.5	11	5	9.8	4.3	10	4.4
East Germany	.12	.32	.24	.42	.12	.32	.21	.41
Post 1998 parental leave reform	.58	.49	.73	.44	.57	.50	.76	.43
Post 2001 parental leave reform	.41	.49	.54	.50	.36	.48	.57	.50
Post 2007 parental leave reform	.08	.27	.14	.34	.08	.27	.16	.36

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29

Table 2: Regression models with two-step Heckman-selection correction for mothers' housework hours, relative housework share, and fathers' housework hours after a first birth

	Mother's housework hours				Mother's housework share				Father's housework hours			
	M1		M2		M3		M4		M5		M6	
	b	RSE	b	RSE	b	RSE	b	RSE	b	RSE	b	RSE
Maternal leave in months	0.02**	0.01	0.00	0.01	0.32**	0.11	0.16	0.11	-0.01*	0.01	-0.01	0.00
Paternal leave <=6 months	-0.53†	0.33	-0.49	0.33	-9.78†	5.91	-8.45	5.51	0.33	0.29	0.28	0.23
Paternal leave > 6 months	-0.24	0.40	-0.40	0.39	-8.40	7.47	-5.09	6.70	0.89*	0.37	0.72*	0.30
Paternal leave joint take-up	-0.15	0.44	0.14	0.42	-0.45	8.04	1.36	7.22	-0.49	0.40	-0.54†	0.32
Mother's birth year	-0.01	0.02	0.00	0.02	-0.70†	0.36	-0.44	0.31	0.03†	0.02	0.02	0.01
Child's age in months	0.00	0.02	-0.00	0.02	0.35	0.40	0.21	0.34	-0.02	0.02	-0.02	0.02
Education medium <sup>a</sup>	-0.85**	0.28	-0.84**	0.27	-2.45	5.33	-1.58	4.62	-0.14	0.18	-0.02	0.15
Education high <sup>a</sup>	-0.76*	0.31	-0.92**	0.30	-2.22	6.04	-3.79	5.21	-0.31	0.22	-0.14	0.18
Mother has lower education	0.03	0.24	0.13	0.23	-8.41†	4.58	-6.01	3.99	0.54*	0.22	0.42*	0.18
Immigration background <sup>a</sup>	-0.37†	0.19	-0.16	0.18	-4.27	3.71	-1.27	3.19	-0.06	0.14	-0.10	0.12
Unmarried cohabiting	-0.29	0.22	-0.25	0.21	-1.55	4.67	-1.32	3.78	-0.13	0.23	-0.12	0.18
East Germany	-0.51*	0.21	-0.27	0.21	1.51	4.31	1.71	3.70	-0.30	0.22	-0.31†	0.18
Post 1998 reform	0.27	0.24	-0.07	0.24	8.32†	4.70	3.23	4.15	-0.42†	0.23	-0.28	0.19
Post 2001 reform	-0.30	0.18	-0.25	0.18	1.52	3.77	0.39	3.15	-0.03	0.19	0.01	0.15
Post 2007 reform	-0.03	0.23	-0.13	0.22	1.04	4.71	0.13	3.89	-0.17	0.24	-0.16	0.19
Prenatal housework hours/ share <sup>b</sup>	0.33***	0.06	0.32***	0.06	0.21***	0.06	0.22***	0.05	0.28**	0.09	0.29***	0.07
Prenatal employment of mother:												
Short part-time	0.30	0.50	-0.37	0.49	3.00	8.69	-3.49	8.17	-0.24	0.43	-0.08	0.35
long part-time	0.55	0.34	-0.73†	0.38	11.07†	6.24	-1.23	6.49	-0.34	0.31	0.02	0.28
Full-time	0.25	0.28	-1.42***	0.38	12.09*	5.23	-4.73	6.36	-0.57*	0.26	-0.07	0.27
Prenatal work hours of father	0.01	0.01	-0.00	0.01	0.24†	0.13	0.39**	0.14	-0.00	0.01	-0.01*	0.01
Prenatal income of father	-0.04	0.07	-0.04	0.09	-4.62***	1.24	-1.58	1.46	0.23***	0.06	0.09	0.06
Mother's rel. prenatal wage 40-60%	-0.36*	0.16	-0.27	0.17	-9.26***	2.63	-6.61*	2.82	0.27*	0.13	0.15	0.11
Mother's rel. prenatal wage > 60 %	-0.08	0.28	-0.11	0.30	-4.70	4.71	-1.79	4.99	0.15	0.23	-0.03	0.21
Change in work hours of mother			-0.04***	0.01			-0.37***	0.10			0.01**	0.00
Change in work hours of father			-0.01	0.01			0.38***	0.11			-0.02***	0.00
Change in mother's rel. wage rate			-0.35	0.60			-7.92	10.09			0.18	0.41
Constant	18.41	34.61	-1.23	33.82	1408.21*	702.12	911.07	603.62	-56.88	35.24	-39.67	28.47
Lambda	0.38	0.51	-0.27	0.55	27.41**	10.03	14.01	9.62	-1.47**	0.49	-1.08*	0.42
N	798		798		798		798		798		798	
N uncensored	362		362		362		362		362		362	
Adj. R squared <sup>c</sup>	0.21		0.28		0.20		0.26		0.21		0.28	

Note: For the Probit models of selection, see Table 6. <sup>a</sup> Education level and immigration status refer to mothers in M1 to M4 and to fathers in M5 and M6. <sup>b</sup> These refer to the lagged dependent variables in the respective models. <sup>c</sup> This is based on OLS models without selection correction. †  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29

Table 3: Regression models with two-step Heckman-selection correction for mothers' housework hours, relative share, and fathers' housework hours after a second birth

	Mother's housework hours				Mother's housework share				Father's housework hours			
	M1		M2		M3		M4		M5		M6	
	b	RSE	b	RSE	b	RSE	B	RSE	b	RSE	b	RSE
Maternal leave in months	0.00	0.01	-0.00	0.01	0.18 <sup>†</sup>	0.10	0.11	0.10	-0.01 <sup>*</sup>	0.00	-0.01 <sup>†</sup>	0.00
Paternal leave ≤6 months	0.75	0.47	0.75	0.45	10.38	7.76	9.95	7.11	-0.09	0.26	-0.07	0.26
Paternal leave > 6 months	0.32	0.48	0.33	0.46	-0.67	7.71	0.89	7.21	-0.01	0.27	-0.08	0.26
Paternal leave joint take-up	-0.95 <sup>†</sup>	0.53	-0.58	0.50	-18.47 <sup>*</sup>	8.66	-13.38 <sup>†</sup>	8.03	0.31	0.29	0.23	0.29
Mother's birth year	-0.01	0.02	-0.00	0.02	-0.24	0.29	-0.17	0.26	0.01	0.01	0.01	0.01
Child's age in months	-0.03	0.02	-0.03	0.02	0.33	0.41	0.17	0.37	-0.02	0.01	-0.02	0.01
Education medium <sup>a</sup>	0.45 <sup>†</sup>	0.24	0.35	0.23	0.85	4.06	-0.33	3.65	-0.04	0.12	-0.01	0.12
Education high <sup>a</sup>	0.43	0.28	0.31	0.26	-0.08	4.83	-2.13	4.28	-0.08	0.14	-0.02	0.14
Mother has lower education	0.01	0.20	0.04	0.19	-1.00	3.47	-1.51	3.08	0.13	0.11	0.15	0.11
Immigration background <sup>a</sup>	-0.07	0.24	0.15	0.24	1.21	4.15	5.53	3.85	-0.18 <sup>†</sup>	0.10	-0.21 <sup>*</sup>	0.10
Unmarried cohabiting	-0.13	0.30	0.06	0.29	-8.68	5.39	-6.44	4.73	0.18	0.17	0.18	0.17
East Germany	-0.53 <sup>**</sup>	0.21	-0.29	0.20	2.13	3.60	2.72	3.30	-0.19 <sup>†</sup>	0.12	-0.20 <sup>†</sup>	0.12
Post 1998 reform	-0.31	0.26	-0.48 <sup>†</sup>	0.25	1.58	4.44	-0.78	4.07	-0.12	0.14	-0.13	0.14
Post 2001 reform	0.08	0.21	-0.08	0.20	1.05	3.57	-1.74	3.24	-0.03	0.11	-0.00	0.12
Post 2007 reform	-0.09	0.22	-0.09	0.20	1.06	3.88	0.86	3.36	-0.02	0.12	-0.04	0.12
Prenatal housework hours/ share <sup>b</sup>	0.34 <sup>***</sup>	0.04	0.32 <sup>***</sup>	0.04	0.23 <sup>***</sup>	0.06	0.23 <sup>***</sup>	0.05	0.27 <sup>***</sup>	0.05	0.25 <sup>***</sup>	0.05
Prenatal employment of mother:												
Short part-time	0.41	0.35	-0.25	0.36	7.75	5.98	0.55	5.74	-0.11	0.18	-0.07	0.18
long part-time	0.32	0.34	-0.70 <sup>†</sup>	0.37	11.45 <sup>*</sup>	5.69	1.81	5.83	-0.29 <sup>†</sup>	0.17	-0.23	0.19
Full-time	0.38	0.35	-1.02 <sup>*</sup>	0.41	7.95	5.73	-4.61	6.38	-0.18	0.17	-0.09	0.20
Prenatal work hours of father	0.01	0.01	0.01	0.01	0.26 <sup>*</sup>	0.12	0.57 <sup>***</sup>	0.13	-0.01 <sup>*</sup>	0.00	-0.02 <sup>***</sup>	0.00
Prenatal income of father	0.04	0.07	0.09	0.08	-0.04	1.09	2.50 <sup>†</sup>	1.29	-0.00	0.04	-0.06	0.05
Mother's rel. prenatal wage 40-60%	-0.11	0.17	-0.18	0.17	-2.14	2.74	-0.56	2.68	0.02	0.10	-0.05	0.10
Mother's rel. prenatal wage > 60 %	-0.42 <sup>†</sup>	0.24	-0.43 <sup>†</sup>	0.24	-3.09	3.76	0.01	3.74	0.03	0.13	-0.09	0.14
Change in work hours of mother			-0.03 <sup>***</sup>	0.01			-0.24 <sup>*</sup>	0.09			0.00	0.00
Change in work hours of father			0.01	0.01			0.47 <sup>***</sup>	0.11			-0.01 <sup>**</sup>	0.00
Change in mother's rel. wage rate			-0.97 <sup>*</sup>	0.49			0.96	7.74			-0.35	0.28
Constant	24.90	32.29	6.73	30.80	476.09	558.73	333.48	500.41	-11.82	18.47	-12.97	18.60
<i>Lambda</i>	0.61	0.70	-0.06	0.72	22.20 <sup>†</sup>	12.04	11.42	11.73	-0.47	0.33	-0.49	0.34
<i>N</i>	762		762		762		762		762		762	
<i>N uncensored</i>	396		396		396		396		396		396	
<i>Adj. R squared</i> <sup>c</sup>	0.21		0.26		0.17		0.22		0.14		0.16	

Note: For the Probit models of selection, see Table 6. <sup>a</sup> Education level and immigration status refer to mothers in M1 to M4 and to fathers in M5 and M6. <sup>b</sup> These refer to the lagged dependent variables in the respective models. <sup>c</sup> Based on OLS models without selection correction. <sup>†</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29

Table 4: Regression models with two-step Heckman-selection correction for mothers' child care hours, relative share, and fathers' child care hours after a first birth

	Mother's child care hours				Mother's child care share				Father's child care hours			
	M1		M2		M3		M4		M5		M6	
	b	RSE	b	RSE	b	RSE	b	RSE	B	RSE	B	RSE
Maternal leave in months	0.11***	0.02	0.07**	0.02	0.52***	0.10	0.33**	0.10	-0.03*	0.01	-0.01	0.01
Paternal leave ≤6 months	-2.85*	1.14	-2.66*	1.12	-12.29*	5.47	-10.15*	4.97	0.82	0.59	0.68	0.55
Paternal leave > 6 months	0.12	1.32	0.37	1.37	-7.42	6.65	-2.91	5.93	2.46***	0.73	2.02**	0.67
Paternal leave joint take-up	-0.75	1.45	-0.19	1.46	1.40	7.20	3.94	6.37	-1.61*	0.78	-1.71*	0.71
Mother's birth year	0.03	0.06	0.09	0.06	-0.60†	0.32	-0.26	0.27	0.09**	0.04	0.07*	0.03
Child's age in months	-0.06	0.06	-0.09	0.07	-0.22	0.34	-0.43	0.29	-0.02	0.04	-0.01	0.03
Education medium <sup>a</sup>	1.14	0.92	1.14	0.94	1.12	4.68	1.80	4.00	-0.26	0.37	0.01	0.36
Education high <sup>a</sup>	1.66	1.02	1.11	1.06	6.55	5.26	4.01	4.49	-0.48	0.44	-0.03	0.41
Mother has lower education	1.48†	0.79	2.04*	0.85	-3.38	4.10	0.46	3.57	1.13**	0.44	0.71†	0.40
Immigration background <sup>a</sup>	-1.28*	0.62	-0.63	0.66	-2.91	3.23	0.90	2.76	-0.12	0.30	-0.18	0.28
Unmarried cohabiting	-1.25†	0.72	-1.19	0.78	-6.86†	3.91	-6.62*	3.14	0.26	0.45	0.28	0.37
East Germany	-1.51*	0.68	-1.34†	0.77	2.62	3.69	2.26	3.20	-0.59	0.42	-0.51	0.38
Post 1998 reform	1.72*	0.76	0.61	0.83	8.27*	3.99	1.84	3.51	-0.64	0.45	-0.28	0.40
Post 2001 reform	-1.17†	0.61	-1.34*	0.66	-1.25	3.25	-2.93	2.70	-0.39	0.37	-0.26	0.32
Post 2007 reform	0.30	0.75	0.07	0.80	4.51	4.00	3.57	3.28	-0.64	0.46	-0.61	0.39
Prenatal housework hours/ share <sup>b</sup>	0.20	0.21	0.15	0.21	0.02	0.05	0.02	0.04	0.28†	0.17	0.30†	0.16
Prenatal employment of mother:												
Short part-time	-0.84	1.65	-2.61	1.69	5.58	7.96	-2.98	7.34	-1.24	0.87	-0.81	0.82
long part-time	0.81	1.13	-2.45†	1.34	2.37	5.56	-14.77*	5.77	-0.13	0.61	0.81	0.64
Full-time	-0.26	0.95	-4.53***	1.34	4.20	4.68	-18.42***	5.71	-0.88†	0.52	0.41	0.63
Prenatal work hours of father	0.03	0.03	0.05†	0.03	0.15	0.12	0.41**	0.13	-0.00	0.01	-0.03†	0.01
Prenatal income of father	-0.55*	0.25	-0.16	0.31	-1.40	1.21	2.49†	1.36	0.08	0.13	-0.27†	0.15
Mother's rel. prenatal wage 40-60%	-0.18	0.53	0.15	0.56	-6.21*	2.50	-2.15	2.54	0.57*	0.26	0.25	0.27
Mother's rel. prenatal wage > 60 %	-0.92	0.94	-0.74	1.01	-6.29	4.45	-1.04	4.49	0.77	0.48	0.26	0.50
Change in work hours of mother			-0.09***	0.02			-0.48***	0.09			0.03**	0.01
Change in work hours of father			0.04†	0.02			0.53***	0.10			-0.05***	0.01
Change in mother's rel. wage rate			-2.16	2.01			-4.39	9.01			0.29	0.99
Constant	-55.32	115.65	-156.08	126.24	1242.66*	615.44	577.49	529.31	-179.60*	69.91	-132.13*	62.20
<i>Lambda</i>	-0.19	1.73	-3.08	2.03	17.81*	8.95	-0.12	8.64	-2.48*	0.99	-1.37	0.97
<i>N</i>	797		797		797		797		797		797	
<i>N uncensored</i>	361		361		361		361		361		361	
<i>Adj. R squared</i> <sup>c</sup>	0.12		0.16		0.14		0.26		0.14		0.21	

Note: For the Probit selection models, see Table 6. <sup>a</sup> Education level and immigration status refer to mothers in M1 to M4 and to fathers in M5 and M6. <sup>b</sup> These refer to individuals' own hours in M1-M2 and M5-M6 and to the share for M3 and M4. <sup>c</sup> Based on OLS models without selection correction. †  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29

Table 5: Regression models with two-step Heckman-selection correction for mothers' child care hours, relative share, and fathers' child care hours after a second birth

	Mother's child care hours				Mother's child care share				Partner's child care hours			
	M1		M2		M3		M4		M5		M6	
	b	RSE	b	RSE	b	RSE	B	RSE	b	RSE	b	RSE
Maternal leave in months	0.09***	0.02	0.08***	0.02	0.28**	0.09	0.20*	0.08	-0.01	0.01	-0.01	0.01
Paternal leave ≤6 months	-2.40	1.75	-2.20	1.72	-8.05	7.84	-6.58	6.69	0.66	0.64	0.60	0.64
Paternal leave > 6 months	-3.07†	1.68	-2.79†	1.65	-9.04	7.28	-7.86	6.24	-0.71	0.62	-0.80	0.62
Paternal leave joint take-up	2.45	1.89	2.94	1.88	-8.07	8.49	-3.81	7.28	2.24**	0.71	2.03**	0.70
Mother's birth year	-0.06	0.06	-0.05	0.06	-0.41	0.29	-0.31	0.24	0.00	0.02	-0.00	0.02
Child's age in months	-0.05	0.08	-0.02	0.08	0.50	0.40	0.41	0.34	-0.05†	0.03	-0.04	0.03
Education medium <sup>a</sup>	0.28	0.84	0.14	0.83	1.35	3.97	-0.10	3.36	-0.27	0.29	-0.20	0.29
Education high <sup>a</sup>	0.16	0.99	0.19	0.98	3.72	4.85	1.99	4.08	-0.48	0.33	-0.33	0.33
Mother has lower education	-0.41	0.68	-0.44	0.67	-3.90	3.29	-4.50	2.75	0.36	0.25	0.36	0.25
Immigration background <sup>a</sup>	-1.46†	0.87	-1.59†	0.89	-7.89†	4.26	-4.99	3.68	-0.11	0.24	-0.17	0.24
Unmarried cohabiting	0.10	1.02	0.39	1.02	-7.22	5.27	-4.81	4.43	0.40	0.38	0.34	0.37
East Germany	-1.04	0.69	-0.02	0.72	-2.62	3.50	-0.24	3.02	0.31	0.26	0.33	0.27
Post 1998 reform	0.56	0.86	0.68	0.87	9.25*	4.27	7.59*	3.64	-0.03	0.30	0.02	0.30
Post 2001 reform	0.42	0.68	0.48	0.68	1.53	3.34	-0.21	2.83	-0.21	0.25	-0.08	0.25
Post 2007 reform	1.03	0.79	1.34†	0.79	6.60	4.02	6.65*	3.35	-0.02	0.29	0.01	0.29
Prenatal child care hours/ share <sup>b</sup>	0.26***	0.05	0.24***	0.05	0.23**	0.08	0.24***	0.06	0.41***	0.05	0.42***	0.05
Prenatal employment of mother:												
Short part-time	0.18	1.12	-0.91	1.15	9.04†	5.33	2.80	4.65	0.00	0.37	0.10	0.39
long part-time	1.13	1.07	-1.00	1.19	11.90*	5.06	1.90	4.69	-0.12	0.35	0.05	0.40
Full-time	1.35	1.12	-1.85	1.35	10.20*	5.20	-3.48	5.13	0.04	0.36	0.26	0.45
Prenatal work hours of father	-0.00	0.03	-0.01	0.03	0.16	0.11	0.35**	0.11	-0.01	0.01	-0.02*	0.01
Prenatal income of father	0.15	0.26	-0.10	0.30	1.09	1.03	2.54*	1.09	-0.08	0.10	-0.24*	0.11
Mother's rel. prenatal wage 40-60%	-0.63	0.61	-0.49	0.61	-0.81	2.52	-0.16	2.26	0.14	0.23	0.09	0.23
Mother's rel. prenatal wage > 60 %	-1.27	0.86	-0.97	0.87	-0.19	3.49	1.33	3.18	-0.31	0.32	-0.42	0.33
Change in work hours of mother			-0.09***	0.02			-0.36***	0.08			0.01	0.01
Change in work hours of father			-0.02	0.03			0.27**	0.09			-0.03**	0.01
Change in mother's rel. wage rate			1.54	1.70			-5.46	6.34			0.54	0.64
Constant	116.92	117.15	107.37	117.32	784.02	560.04	599.59	473.78	-3.77	43.40	8.18	43.67
<i>Lambda</i>	0.79	2.26	1.82	2.35	25.56*	11.06	19.46*	9.74	-0.07	0.68	0.21	0.70
<i>N</i>	752		752		752		752		752		752	
<i>N uncensored</i>	390		390		390		390		390		390	
<i>Adj. R squared</i> <sup>c</sup>	0.14		0.18		0.22		0.28		0.23		0.24	

Note: For the Probit models of selection, see Table 6. <sup>a</sup> Education level and migration status refer to mothers in M1 to M4 and to fathers in M5 and M6. <sup>b</sup> These refer to the lagged dependent variables in the respective models. <sup>c</sup> The adjusted R-Squared is based on OLS models without selection correction. †  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29



Table 6: First-step of Heckman selection correction models: Probit regression of maternal employment in fourth year after a first or second birth

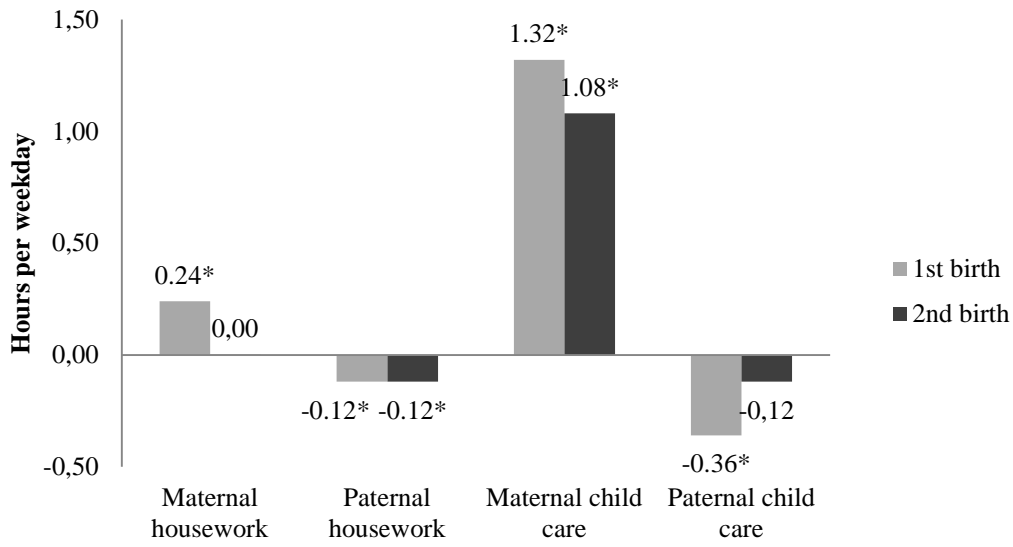
	First Birth				Second Birth			
	M1		M2		M1		M2	
	b	RSE	b	RSE	b	RSE	b	RSE
Mother's birth year	-0.03**	0.01	-0.03**	0.01	-0.02	0.01	-0.02	0.01
Child's age in months	0.02	0.01	0.02	0.01	0.03*	0.02	0.03*	0.02
Maternal education medium <sup>a</sup>	0.00	0.18	0.00	0.18	0.13	0.16	0.13	0.16
Maternal education high <sup>a</sup>	0.19	0.21	0.19	0.21	0.31	0.20	0.31	0.20
Mother lower education than father	-0.30*	0.13	-0.30*	0.13	-0.14	0.13	-0.14	0.13
Immigration background of mother	-0.13	0.13	-0.13	0.13	-0.44***	0.13	-0.44***	0.13
Unmarried cohabiting	0.09	0.18	0.09	0.18	-0.16	0.23	-0.16	0.23
Post 1998 reform	0.38**	0.14	0.38**	0.14	0.43**	0.14	0.43**	0.14
Post 2001 reform	0.12	0.14	0.12	0.14	0.13	0.14	0.13	0.14
Post 2007 reform	0.25	0.17	0.25	0.17	0.13	0.18	0.13	0.18
East Germany	0.37*	0.18	0.37*	0.18	0.40*	0.19	0.40*	0.19
Mother employed before birth	0.46***	0.13	0.46***	0.13	0.62***	0.11	0.62***	0.11
Housework share before birth	-0.00	0.00	-0.00	0.00	-0.00	0.00	-0.00	0.00
Net monthly income of father	-1.01***	0.27	-1.01***	0.27	-0.63*	0.27	-0.63*	0.27
County unemployment rate	-0.42*	0.17	-0.42*	0.17	-0.28	0.18	-0.28	0.18
County unemployment rate x Father income	0.06*	0.02	0.06*	0.02	0.03	0.02	0.03	0.02
Constant	70.21**	23.26	70.21**	23.26	40.94 <sup>†</sup>	23.45	40.94 <sup>†</sup>	23.45
<i>lambda</i>	-0.19	1.73	-3.08	2.03	0.79	2.26	1.82	2.35
<i>N</i>	797		797		752		752	
<i>N uncensored</i>	361		361		390		390	

Note: The models shown are the first-step of the estimation of mother's child care hours shown in Tables 4 and 5.

<sup>†</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29

Figure 1: Predicted changes in domestic work hours of mothers and fathers from the year before to the fourth year after childbirth after one additional year of maternal leave



Note: The calculations are based on M1 and M5, respectively, in Tables 2, 3, 4, and 5.

†  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

Source: Socio-Economic Panel (SOEP), data for years 1992-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29