Change in the gender division of domestic work after mothers or fathers took leave: Exploring alternative explanations

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Abstract

This study investigates how the durations of childcare leaves taken by mothers and fathers in Germany relate to the gender division of housework and childcare after labour market return. It examines to what extent changes in economic resources because of leave take-up may account for adaptations in the division of domestic work of dual-earner couples. Using data from the German Socio-Economic Panel (1992-2012) on about 800 couples with a first or second birth, we applied OLS regression models with lagged dependent variables. 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. Fathers' leave take-up was associated with a more equal division of family work. Lower relative earnings, e.g. as a result of changes in job-related skills after the leave, did not account for the shift in the gender division of family work.

Key words: childcare; gender division of labour; housework; parenthood; parental leave; family policy

Introduction

This study investigates whether the durations of leave German mothers and fathers took after childbirth were associated with medium-term changes in the gender division of domestic work in dual-earner couples from before birth until after the end of the parental leave entitlement when both partners have returned to the labour market. Across Western countries, women continue to perform a larger share of household labour than men (Kan et al. 2011). Parenthood is often the starting point of increasing gender inequality in the division of housework over the course of relationships, irrespective of prenatal differences in relative economic resources (Grunow et al. 2012, Kühhirt 2012, Nitsche and Grunow 2016). A growing cross-nationally comparative literature suggests that maternal and paternal domestic work contributions vary across contexts with one important variation relating to parental leave entitlements for mothers and fathers (e.g., Hook 2006, Sullivan et al. 2009). However, transmission mechanisms of these policies to the couple level, such as traditionalising 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 fourteen countries providing job-protected leave for two years or more in 2016 (Koslowski et al. 2016). Several countries also implemented or extended fathers' parental leave rights to encourage longer-term paternal childcare involvement. We contribute to the literature by exploring how the length of maternal and paternal leave take-up following childbirth relates to medium-term changes in housework and childcare time in German couples. Furthermore, we examine to what extent altered economic resources and bargaining power may explain these changes and discuss alternative explanations relating to childrearing skills and identity adaptations.

Previous Research on Parental Leave and Domestic Work after Childbirth

Few studies so far have investigated whether the durations of maternal employment interruptions may affect the gender division of labour beyond the period of leave or non-employment. Studies of domestic work time, which differentiated between short-term and long-term unemployment (Brines 1994, Burda and Hamermesh 2009) or considered women's past experience of full-time

employment (Cunningham 2007), generally lend some support to the importance of past labour market experiences. One recent cross-sectional study examined the relationship of mothers' labour market interruptions with subsequent domestic work division in one federal state in Germany. The authors found that couples where mothers had taken longer leaves practised a more traditional division of housework (Schulz and Rost 2012).

International comparative studies found that fathers spend more time on childcare in countries with paid parental leave schemes and where fathers have an individualised right to leave (Reich et al. 2012, Hook 2006). Fathers are relatively less involved in housework in countries with very long parental leave, as these tend to be taken up by mothers leading to a more traditional gender division of domestic work (Hook 2010, Fuwa and Cohen 2007). These studies cannot tell us more about the mechanisms how parental leave policies relate to the gender division of labour. Based on a cross-sectional survey of 31 countries, Meil (2013) found a positive association of fathers' leave take-up in the previous year and their frequent involvement in childcare. Single-country 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 childcare. Having taken any leave was also positively related to paternal childcare involvement in the US and the UK (Tanaka and Waldfogel 2007, Pleck 1993), whereas associations with weekday and sole childcare proved largely not significant in Australia (Hosking et al. 2010) and Germany (Wrohlich et al. 2012). Many of these studies apply cross-sectional designs, often with retrospective questions, which increase the risk of bias as a result of more involved fathers being more likely to take some, and longer, leave. Our longitudinal analysis extends these studies by observing how housework and childcare contributions of fathers and mothers develop from before childbirth until after the end of the parental leave entitlement when both partners have returned to the labour market.

A few Scandinavian and German evaluation studies of paternity leave reforms, which increased the take-up of leave by fathers, provide the most rigorous, yet somewhat contradictory, evidence

on causal effects of paternity leave reforms on the division of domestic work. These studies exploit longitudinal data and estimated differences in means between parents whose children were born just before and just after a reform or applied difference-in-differences or regression discontinuity designs. 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 fewer conflicts over housework than respondents with children born before the reform. 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). After the introduction of two daddy months and income-related leave compensation in Germany in 2007, Kluve and Tamm (2013) found that fathers' relative childcare contributions had not changed significantly in the first year after birth. However, Schober (2014) found that fathers' absolute childcare time on weekdays of West German fathers increased in the first couple of years after childbirth. One drawback of these studies is that they are unable to provide a more detailed account of underlying mechanisms, as most of them did not consider actual take-up of leave. We contribute to these studies by investigating descriptively the relationship between length of leave take-up and housework and childcare contributions of both mothers and fathers. One recent longitudinal German study found that fathers who had taken parental leave increased their childcare and, only in case of longer take-up, also housework contributions more than fathers who did not take leave (Bünning 2015). We complement this study by examining also the effects of maternal leave durations and the importance of altered economic resources and bargaining power as opposed to other mechanisms underlying the observed medium-term changes in the gender division of labour.

Institutional Context: Parental Leave and Other Early Years Policies in Germany

Until the mid-2000s, the German family policy model may be classified as supported familialism (Hook, 2015; Keck and Saraceno, 2013). It suppressed employment of second earners through joint taxation for couples, longer and low-paid parental leave entitlements and a lack of state-subsidised childcare services for children under three years, especially in West Germany. Germany provides

an interesting case to study the relationship between leave take-up of mothers and fathers and involvement in housework and childcare, as both parents have been entitled to up to 36 months of parental leave ("Erziehungsurlaub") since 1992. Parents on leave were entitled to a child-rearing benefit ("Erziehungsgeld") of about €300 per month for at least six months and up to 24 months depending on household income. Two small reforms in 1998 and 2001 introduced more flexibility in the take-up period and rate of reimbursement, and permitted simultaneous leave take-up with the other parent or with part-time employment, respectively.

Since the mid-2000s, the German government has expanded the availability of state-subsidised childcare services for children below three ("Kinderförderungsgesetz") and introduced a major parental leave reform ("Bundeselterngeldgesetz"). In 2007, the German government introduced an income-related reimbursement of leave of between 65 and 100 per cent of net earnings for 12 out of the 36 months of leave entitlement. The income reimbursement rate is higher for low-earners and it is capped at 1,800 Euros per month (for details, see Koslowski et al. 2016). The reform also included a two-month individual leave entitlement reserved for each parent, which increased fathers' leave take-up (Wrohlich et al. 2012). However, the vast majority of leave-taking fathers used only up to two months of leave (Trappe 2013). 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 may be extended by another year. For further extensions or for reductions of leave, a notice period of seven weeks and the employer's approval are needed. The recent reforms may be conceptualised as a change from supported to optional familialism (Stahl and Schober 2017), as the combination of continued familialistic support with defamilialist policies of shorter well-paid leave and an entitlement to early formal childcare provides families with greater choice. These contextual changes provide considerable variation in the length of leave mothers and fathers took and allow us to explore whether the relationship between maternal leave duration and the gender division of domestic labour altered after recent policy reforms.

Theoretical Framework: Childcare Leaves and Domestic Work

Three widely used micro-level approaches to explain changes in the gender division of domestic work include 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, Stryker and Burke 2000). We discuss how each of these may contribute to explaining firstly, how couples choose to divide up parental leave and, secondly, how each partner's leave take-up may influence the medium-term gender division of domestic work in dual-earner couples.

The neo-classical economic theory (Becker 1981) would predict that, to maximise household income, the partner with the greater relative potential earnings will specialise in market work and therefore take shorter or no leave, whereas the other partner will take longer leave and spend more time on household labour. Even small biological comparative advantages of women in nursing infants or higher relative wages of men would result in a gendered division of leave and a more gender-traditional division of domestic work during the leave. Economic theory presumes longer employment interruptions to lead to depreciation of labour market relevant knowledge of the respective partner, which is assumed to lower the future earning potential by slowing down career progression or due to discrimination by employers. Additionally, the specialised division of housework and childcare might influence partners' relative skills and, more importantly, strengthen the bonds between the leave-taking parent and the child. Thus, longer leaves of mothers are likely to increase gender differences in bonds with children, whereas leave take-up for fathers is likely to reduce the gap. Smaller differences in skills and bonds with children will make it easier to transfer the responsibility for childcare tasks to the other parent and facilitate a less specialised division of labour in the medium-term. The transformative effect of new housework and childcare skills may be stronger after first birth than further births (Knoester and Eggebeen 2006) and may be acquired by fathers already after leave durations of at least one month especially when they were mainly or solely responsible for childcare (Chesley 2011, Rehel 2014, O'Brien and Wall 2017).

From a resource-bargaining perspective (Lundberg and Pollak 1996), the partner with the higher relative earnings is assumed to use these to negotiate lower contributions to housework, and thus shorter leave take-up. Bargaining power is, however, likely to be more relevant for the division of housework than for childcare (Raley et al. 2012, Bianchi et al. 2012), as the former is often perceived as more onerous and less satisfying than the latter (Hallberg and Klevmarken 2003). Childcare time is also more often combined with leisure activities (Craig and Mullan 2011). In line with the neoclassical economic theory and the resource-bargaining perspective, previous studies have found that German fathers are more likely to take some parental leave when their partners have higher earnings (Reich 2011, Trappe 2013). As a result of lower future earning potential, longer leave take-up may reduce the bargaining power of the respective partner to negotiate a lower contribution to housework for herself when both partners have returned to the labour market.

Following identity theories and a role occupancy perspective (Stryker and Burke 2000, Knoester and Eggebeen 2006), mothers who identify with more egalitarian ideologies before childbirth will choose to take shorter leaves, whereas fathers with such identities will be more likely to take up (longer) leave and solo leave instead of joint leave with the mother. During the leave period, each parent's identity is likely to adapt to the new experiences of the practised work and care arrangements (Schober and Scott 2012, Himmelweit and Sigala 2004), especially when they contradict prenatal identities. Through altered identities, the take-up and length of both parents' leave may impact the division of housework and childcare even beyond labour market return. After labour market return, couples have been found to adapt the division of housework partially and with a time lag to a more equal division of breadwinning (Gershuny et al. 2005). As parents tend to perceive spending time with children as more fulfilling and compatible with leisurely pursuits than housework (Hallberg and Klevmarken 2003), such changes in identities are more likely to explain medium-term changes in the division of childcare than for housework.

Following these three approaches, we expect that mothers and fathers who have taken longer childcare leaves will continue to spend more time (in relative and absolute terms) on housework and childcare even after both partners have returned to the labour market (*Hypothesis 1*).

If longer leaves are reflected in lower relative earnings and reduced bargaining power in negotiating the subsequent post-leave division of labour, we expect a stronger positive association of the leave duration with changes in the division of housework than with childcare *(Hypothesis 2)*. A stronger association with childcare of longer leave, and of leave taken alone by fathers, might instead lend support to improved childcare skills or altered gender or parent identities.

If changes in partners' relative wages after labour market return were to fully or partly account for the associations of leave durations with the division of housework, this would lend support to the argument of depreciation of labour market skills and the relevance of earnings for bargaining processes *(Hypothesis 3)*.

Data and Method

To test the hypotheses, we draw on 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). Annually all members of SOEP households are asked to report how many hours on a typical weekday they spend on housework and childcare. Furthermore, respondents provide monthly histories on employment and leave take-up for the past year, which we matched with fertility histories.

To investigate how the durations of leaves which mothers and fathers took after a first or second childbirth are associated with both parents' involvement in housework and childcare after labour market return, we focused on dual earner couples after the end of the three-year job protection period in the fourth year after childbirth. We applied Ordinary Least Squares regression models with lagged dependent variables to estimate the association of the leave taken by mothers lm_i and

by fathers lf_i with absolute or relative time use on domestic work d_i of mothers or fathers, respectively, as shown in Eq. 1. d_i may stand for the mother's relative share of housework or childcare or either partner's absolute hours, which are estimated in separate models. a_i includes a set of variables measured before childbirth capturing selection factors into leave take-up, such as prenatal employment status and partners' relative wages. Δw_i accounts for changes in the relative wage rate since the year before childbirth, capturing a possible mediator of any effects of leave duration. x_i is a vector of (mostly) time-invariant demographic characteristics and ε_i denotes the random variation. Parents' unobserved characteristics, such as their identities with respect to parenting and work, may influence parents' leave take-up as well as the post-natal division of labour. The models therefore include a variable of the prenatal division of housework or absolute housework hours of either partner measured in the year prior to childbirth to control for time-invariant variation in such unobserved characteristics. Hence, especially for housework, we are essentially modelling change in time use and in the division of labour, respectively, from the year before childbirth to the fourth year after birth.

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

To examine whether the relationship between leave length and the gender division of domestic work varied between housework and childcare, we estimated seemingly unrelated regression models (Zellner 1962). They allow testing for significant differences in the coefficients of independent variables across regression models based on the same sample. Furthermore, we tested for differences between first and second births. 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.

In our sample, about half of the mothers were not active in the labour market in the fourth year after childbirth either because they had another child and were on parental leave again or did not return to their job after the job protection period. Only 6 per cent of fathers were unemployed.

Whereas in the German context fathers' unemployment may be assumed to be largely involuntary, non-employed mothers differ systematically from those who already returned to work with respect to education level, migration background, prenatal employment and housework hours (see Table A1 in the appendix). By accounting for a large number of covariates including prenatal labour market participation of mothers and fathers, wages, education levels, and testing several measures of work and family orientations, we attempted to take account of some potential selection bias due to observed and unobserved heterogeneity as much as possible given the available data. We considered using a Heckman-type selection correction. However, the requirement of an exclusion restriction proved problematic from a theoretical and empirical point of view. As even small violations of the exclusion restriction assumption may amplify bias, we did not pursue this strategy.

Sample Selection and Nonresponse

Our analysis sample included all women aged 20 to 45 years in couples who were observed from the year before birth up to the fourth year after childbirth. The fourth year was chosen, as the maximum duration of job-protected leave is three years and attrition rates increased significantly when following couples for even longer periods. 10 per cent and 16 per cent 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. The results did not differ substantially from OLS models based on the sample with complete information presented in the tables. The analysis samples varied slightly between housework and childcare models and included at least 797 couples experiencing a first or second birth, of whom 97 couples experienced both births during the observation period.

Operationalisation of Dependent and Independent Variables

The dependent variables refer to hours spent on housework or childcare by mothers or fathers, respectively, on a typical weekday, measured at the interview in the fourth year after childbirth. These measures were self-reported by all SOEP respondents and capture very broadly primary and secondary time spent on these tasks. In addition, the mother's relative share is operationalised as mothers' weekday hours relative to the sum of both partners' hours spent on housework and childcare, respectively. The mother's relative housework share in dual-earner couples amounted to 77 per cent and the childcare share to 73 per cent. The lagged dependent variables of housework hours or relative share were measured at the interview in the year before the most recent childbirth. The key independent variables were the duration of maternal and paternal leave take-up based on monthly leave histories reported by respondents each year. We used a continuous measure of the length of mothers' maternal leave in months but also tested a categorical variable of durations up to 12 months, 12 to 24 months and more than 24 months. As shown in Table A1, the average length of maternal leave was about 24 months for employed mothers.

For fathers, a categorical variable distinguished between no leave at all, a period of leave up to 6 months, and more than 6 months. Only 9 per cent of fathers took some leave with about half of these taking more than six months. We also tested leave durations of less than two months, which, however, became very common only since the introduction of the 'father quota' of two months in 2007. We also tested a dummy variable, which indicates whether the father took at least part of the leave on his own.

We included a rich set of control variables measured before childbirth, which previous studies and our own additional analysis had found to affect the length of leave taken by mothers and fathers as well as time spent on housework and childcare (for model results predicting leave take-up by mothers and fathers, see Table A2). As indicators of labour market attachment and of the right to return to the same job, 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 measures of relative potential earnings and bargaining power, we considered

mothers' wages relative to couples' combined wages before birth. For mothers who were not employed before childbirth, we estimated their potential earnings using a wage equation with Heckman selection correction. In the wage equation, we considered the mother's age and age squared, education level and interactions with years of full-time work experience, marital status, number of children, region, parental leave policy periods, and the county level unemployment rate. Based on these estimated wages, we distinguished three categories of mothers earning per hour less than 40 per cent, between 40 and 60 per cent and over 60 per cent of both partners' combined wages.

For educational attainment, we differentiated between i) college degree, ii) high school degree or vocational qualification, and iii) secondary school certificate or less. We also created a dummy variable for whether the mother had lower educational qualifications 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 dummy variables to control for parental leave policy reforms in 1998, 2001, and 2007. As parents in East Germany are still more accepting of maternal employment than in West Germany (Stahl and Schober 2017), we included a binary indicator of the region of residence.

We also tested several other control variables mentioned in previous studies by including both partners' occupational status, employment sectors before birth, and irregularly collected measures of the importance respondents attached to different life domains, such as having children or a successful career. These variables showed no significant associations with domestic work division and were excluded in the final model to allow for a larger sample size. Unfortunately, other measures of identities with respect to the gender division of labour were not collected.

Results

Estimation Strategy

In the first modelling step to test Hypotheses 1 and 2, we included the leave length of mothers and fathers in addition to prenatal domestic work involvement and prenatal or time-invariant control variables. In a second step to test Hypothesis 3, we explored whether changes in partners' relative

wages after labour market return mediated the relationship between length of leave taken and changes in domestic work involvement. Tests for multicollinearity using variance inflation factors only pointed to high correlations between the variables of fathers' leave take-up for less than 6 months and joint leave. We, therefore, excluded the latter. Table 1 presents the results for a baseline model of mother's relative housework and childcare share (M1), and a second model including changes in the relative wage rate as a mediation variable (M2). As the models did not differ significantly, Table 2 shows the results only for the second modelling step for mothers' and fathers' absolute hours of housework and childcare, respectively.

Leave Length and Changes in the Division of Domestic Work

In line with Hypothesis 1, the results provided some support for significant associations of leave durations of both parents and their absolute or relative domestic work involvement, which persisted after labour market return. One additional year of leave taken by mothers was associated with a 3-percentage point larger increase in mothers' housework share and with a 5-percentage point larger childcare share after labour market return (Table 1). Mothers who took longer leave increased their housework time more and performed more childcare on a weekday, whereas their partners performed less (see Table 2). Separate models for first and second births showed that the change was slightly larger after a first birth than a second birth but an interaction term with leave duration of mothers in the joint model did not prove statistically significant. Additionally, models with a categorical variable of maternal leave duration provided no support for a non-linear relationship (results available on request).

For fathers' leave taking, the results also provide support for Hypothesis 1. For the most part, some leave take-up was positively associated with a more equal division of housework and childcare in couples (see Table 1). However, sometimes the relationship with the leave duration was not linear. Mother's housework share after labour market return was about 4 and 12 per cent lower when the partner had taken less than 6 months and more than 6 months of leave, respectively. However, the

differences between no leave and less than 6 months of leave was not statistically significant. Mothers performed 10 and 13 percent less childcare if fathers had taken less than and more than 6 months of leave, respectively, compared to no leave. The changes in the relative division of housework after paternal leave take-up seem to be driven most strongly by fathers who took long leave spending about half an hour per day more on housework (see Table 2). The more equal division of childcare seemed to be driven by increases in fathers' childcare time after long leaves usually including some leave alone. However, mothers also reduced their childcare time in families where fathers took up to 6 months of leave. For roughly the same duration, the associations of the division of housework and childcare with fathers' leaves were about twice as strong as those with mothers' leave durations. However, the effect sizes of leave taken by mothers are still of substantive importance, especially in couples where mothers took several years of leave.

Hypothesis 2 assumed a stronger association of the leave durations with changes in the division of housework than with childcare if longer leaves were reflected in lower relative earnings and reduced bargaining power in negotiating the subsequent post-leave division of labour. We ran seemingly unrelated regression models and tested for significant differences in the size of the coefficients of the leave variables between the housework and childcare regressions. For mother's relative share as well as fathers' absolute hours, the associations of the length of leave taken by mothers and fathers proved significantly stronger for childcare compared to housework. Only fathers' leave was more strongly associated with mothers' absolute hours of housework compared to childcare, whereas the association with maternal leave duration did not vary significantly. Therefore, overall Hypothesis 2 had to be rejected.

If longer leave take-up of mothers and fathers, respectively, were to reduce their own earning potentials and bargaining power, as assumed in Hypothesis 3, we would expect changes in the relative wage rate to mediate the relationships with domestic work, especially for housework, and to be statistically significant. Across all models, we found no evidence of this, as a reduction in the

mother's relative wage rate was not significantly associated with the changes in the gender division of housework and childcare and did not mediate the associations with either parent's leave take-up. Hypothesis 3, therefore, had to be rejected.

The prenatal measures of housework share or hours of mothers and fathers were strongly significant in all the housework models and in predicting fathers' childcare hours. They reduced the associations of leave length taken by mothers and fathers with the division of housework and with fathers' childcare hours 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. Mothers' prenatal hours and the share of housework were not significantly associated with the division of childcare and with mothers' childcare hours. However, we also reran the childcare models just for second births including a lagged dependent variable of childcare share or hours before birth and the results did not differ substantively.

Among the control variables, the most significant predictors of the change in the division of domestic work after labour market return were father's prenatal work hours and mothers' relative wage rates before childbirth. Couples in which mothers earned about the same or more than their partners shared domestic work a lot more equally after labour market return. In some of the models, also education of the mother, migration background, region, cohort and parental leave policy period showed significant associations in expected ways.

Sensitivity Analysis

Gershuny et al. (2005) suggested that mothers and, in particular, fathers may adapt their involvement in domestic work only slowly after mothers' labour market returns or an increase in working hours. We examined whether the traditionalising effects of the durations of leave taken by mothers are likely to persist after labour market return or may be subject to slow adaptation and return to a less traditional division of labour. We tested interaction terms between maternal leave

length and age of the youngest child in all models but did not find any statistically significant associations.

Tests with leave variables indicating whether fathers took leave either alone or jointly showed that fathers who took leave only jointly with the mother increased their housework time less. However, due to the rather small number of fathers who took leave and high correlations between the variables of fathers' leave take-up and joint leave, results should be interpreted with caution.

To examine whether changes 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 birth events since the 2007 reform. We also estimated the same models restricting the sample to West Germany. Both provided similar results and suggest very consistent relationships of maternal leave duration with changes in the gender division of family work after childbirth across contexts.

To examine whether our imputations of the potential wage rate for non-employed mothers made a difference, we reran all models setting wages for these mothers to zero. The associations with the leave variables were unaffected. However, some of the associations of mothers' relative wage rates before birth with the division of housework and childcare lost statistical significance. This might suggest that setting wages of mothers who were on leave or not employed before the second birth to zero might result in underestimating the relevance of relative earning potential for the medium-term division of labour.

<Tables 1-2>

Discussion

This study has explored how the length of maternal and paternal leave take-up following childbirth relates to medium-term changes in housework and childcare division of German couples. This study is one of the first studies to consider the duration of leave taken by mothers as well as fathers and to observe changes in time used on domestic work since before childbirth. The results suggest 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 both partners had returned to the labour market. This is in line with a Bavarian study (Schulz and Rost 2012). The medium-term associations of maternal leave durations appeared to be relatively linear and persisted even after considering the prenatal division of housework. The associations were not significantly mediated by changes in relative wages and statistically somewhat smaller for housework than for childcare. Overall, the observed pattern provided no support for reductions in wages and economic bargaining power of mothers as the main drivers.

Fathers' leave take-up was associated with a significantly more equal division of housework and childcare in the medium-term, which is in line with studies from Norway, Sweden and Germany that also considered longer-term developments (Kotsadam and Finseraas 2011, Bünning 2015, Haas and Hwang 2008). The analysis extends several studies from the UK, the US and a large-scale comparative European study (Meil 2013, Tanaka and Waldfogel 2007, Nepomnyaschy and Waldfogel 2007) which found that leave take-up of fathers correlates with a more equal division of domestic work in the short-term. Unfortunately, our sample of fathers who took leave was too small to rigorously examine differences between fathers who took up to two months, up to six months or even longer leave and to more carefully differentiate between fathers who did or did not take some of the leave alone. The results regarding fathers' leave taking therefore have to be treated with greater caution than those for mothers' leave durations. In terms of theoretical mechanisms underlying medium-term changes in the gender division of labour, the economic argument of longer leave take-up by fathers leading to a depreciation of labour market skills and lower relative wages resulting in reduced bargaining power was not supported. This is not surprising given recent findings, that German fathers who took parental leave over the past few years did not experience a wage penalty or slower wage growth (Bünning 2016).

In the conceptual framework, we have suggested two additional explanations of why leave durations are likely to be positively related to the division of domestic work in dual-earner couples

even in the medium-term after labour market return. These concerned improved childcare skills and closer bonds with children or changes in gender and parenting identities during the leave period. For maternal leave durations, the observed linear relationships with the increase in their domestic work share were more in line with identity-related explanations rather than with changes in childcare skills, which would be assumed to increase most strongly in the first year after birth. For leave taken by fathers, the only partly linear patterns as well as the statistically somewhat smaller associations with housework than with childcare may provide some support for both arguments. Unfortunately, we were neither able to draw on detailed time diary indicators of different household chores nor on direct measures of changes in domestic work skills, identities or preferences. To investigate the possibly interconnected processes of skills acquisition and changing identities, particularly after the birth of a first child, and possibly lagged adaptations after labour market return, we require further qualitative and quantitative longitudinal studies that measure these processes directly.

We attempted to account for self-selection into longer leave take-up for mothers and fathers by controlling for changes in many observable and, for the housework division, in time-invariant unobservable characteristics. However, we cannot exclude that time-variant changes in unobservable characteristics, such as responses of employers or social networks to longer leave periods, may bias our results. Nevertheless, our analysis of actual take-up and how it may affect the division of domestic work provides an important extension to many previous studies, which were not able to draw on prospective longitudinal information or covered only short periods after leave take-up. It also complements previous evaluation studies of parental leave reforms, which did not investigate more in detail the mechanisms of how policy reforms influenced the gender division of labour. Most importantly, it is the first study examining more in detail the association of the length of leaves taken by mothers with the subsequent division of housework and childcare after labour market return. Although the associations seem to be smaller than for fathers' leaves, they nevertheless deserve attention of policy-makers, in particular in countries with parental leave

entitlements of several years. From a policy point of view, the findings suggest that, to promote gender equality, parental leave policy designs would be well-advised to avoid incentives for very long maternal leaves of several years and to promote leave take-up of fathers.

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Table 1: OLS regression models for mother's relative housework share and childcare

	Mother's housework share				**Mother's childcare share**			
	M1		M2		M1		M2	
	b	RSE	b	RSE	b	RSE	b	RSE
Leave taken by mother	.27***	.07	.27***	.07	.37***	.07	.37***	.07
Father leave <=6 months	-4.42	4.18	-4.41	4.18	-10.25**	3.68	-10.25**	3.68
Father leave > 6 months	-11.50*	4.69	-11.47*	4.67	-12.69**	4.35	-12.72**	4.36
Mother's birth year	-.28	.18	-.28	.18	-0.33*	.15	-.34*	.15
Child's age in months	-.03	.22	-.03	.22	-.14	.20	-.14	.20
Mother medium education	-.80	2.81	-.81	2.82	2.32	2.66	2.34	2.66
Mother high education	-2.92	3.23	-2.92	3.23	4.93+	2.91	4.92+	2.91
Mother rel. lower education	1.29	2.02	1.28	2.02	2.46	1.86	2.49	1.86
Mother migration background	.88	2.10	.86	2.10	-3.12	1.91	-3.10	1.91
Unmarried cohabiting	-4.02	2.92	-4.00	2.92	-7.38**	2.74	-7.41**	2.74
Second birth	-.69	1.71	-.69	1.71	-1.09	1.55	-1.09	1.55
East Germany	-1.80	1.94	-1.80	1.94	-3.13+	1.79	-3.13+	1.79
Post 1998 reform	-.67	2.18	-.66	2.18	4.32*	1.96	4.29*	1.96
Post 2001 reform	.34	2.05	.32	2.05	-.84	1.70	-.81	1.70
Post 2007 reform	-.79	2.48	-.79	2.49	1.63	2.05	1.62	2.05
Prenatal housework share	.23***	.04	.23***	.04	.03	.03	.03	.03
Prenatal employment of mother:								
Short part-time	-3.47	2.99	-3.37	3.05	.48	2.71	.34	2.77
long part-time	1.85	2.43	1.97	2.54	-.53	1.99	-.70	2.05
Full-time	-.02	2.05	.12	2.15	-2.27	1.84	-2.46	1.94
Prenatal work hours of father	.26**	.09	.26**	.09	.20**	.07	.21**	.07
Prenatal income of father	-2.61**	.83	-2.58**	.84	-.57	.65	-.61	.66
Mother relative prenat. wage 40-60%	-7.93***	1.80	-8.03***	1.83	-4.65**	1.52	-4.52**	1.57
Mother relative prenat. wage >60 %	-9.99***	2.62	-10.12***	2.70	-4.49+	2.49	-4.31+	2.55
Change in mother's rel. wage			-1.28	5.60			1.66	4.70
Constant	623.30+	347.73	618.34+	348.70	723.79*	303.89	730.26*	305.08
N Couples	803		803		797		797	
Adj. R squared	.18		.18		.16		.16	

Note: [a] Education level and migration background refers to the respective parent's own characteristics. Model 2 (M2) expands Model 1 (M1) by adding the change in the relative wage rate over the 4-year observation period as a potential mediator. RSE = Robust standard errors.
+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 2: OLS regression models for mothers' and fathers' hours of housework and childcare on a typical weekday (M2)

	Mother's housework		**Father's housework**		**Mother's childcare**		**Father's childcare**	
	b	RSE	b	RSE	b	RSE	b	RSE
Leave taken by mother	. 01**	.00	-.01**	.00	.10***	.02	-.02*	.01
Father leave <=6 months	-.13	.17	.17	.15	-1.87*	.79	.79	.50
Father leave > 6 months	-.26	.20	.54*	.24	-.31	.88	1.64**	.57
Prenatal housework hours	.34***	.04	.28***	.05	.24	.15	.46***	.11
Mother relative prenat. wage 40-60%	-.30*	.13	.25***	.07	-.10	.47	.58***	.16
Mother relative prenat. wage >60 %	-.37*	.18	.40***	.11	-.20	.64	.78**	.30
Change in mother's rel. wage	-.01	.38	.12	.24	2.16	1.63	.70	.63
Constant	14.50	20.21	-14.81	12.71	-60.21	69.63	-82.92*	32.93
N Couples	803		803		797		797	
Adj. R squared	.21		.17		.10		.13	

Note: All models contain the same control variables as in Table 1. RSE = Robust standard errors.
+ p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001

Appendix

Table A1: Descriptive statistics for couples by maternal employment status in the fourth year after childbirth

	Mother not employed		Mother employed	
	Mean	**SD**	**Mean**	**SD**
Mother's housework hours	4.07	1.96	2.41	1.38
Mother's relative housework share	88.88	14.33	77.02	22.12
Father's housework hours	0.52	0.75	0.76	0.86
Mother's childcare hours	10.97	5.92	6.72	4.55
Mother's relative childcare share	83.27	13.06	73.32	19.41
Father's childcare hours	2.03	2.25	2.26	2.14
Leave taken by mother (months)	32.34	7.02	23.59	10.82
Leave taken by father: no leave	0.97	0.18	0.91	0.28
Leave taken by father: <= 6 months	0.02	0.13	0.04	0.19
Leave taken by father: > 6 months	0.02	0.13	0.05	0.22
Leave taken only jointly	0.03	0.16	0.05	0.22
Father took at least 50 per cent leave alone	0.01	0.16	0.03	0.18
Mother's prenatal housework hours	3.02	1.91	2.38	1.44
Mother's prenatal housework share	80.22	21.57	75.69	22.94
Father's prenatal housework hours	0.69	0.8	0.76	0.77
Mother's year of birth	1970	5.86	1970	5.59
Child's age in months	42.35	3.35	42.58	3.28
Second child's birth	0.48	0.50	0.52	0.50
Mother's educational attainment: low	0.20	0.4	0.10	0.30
Mother's educational attainment: medium	0.58	0.49	0.54	0.50
Mother's educational attainment: high	0.22	0.41	0.36	0.48
Education Mother < Education Partner	0.32	0.47	0.20	0.4
Mother's migration background	0.31	0.46	0.17	0.38
Unmarried cohabiting	0.05	0.23	0.09	0.29
Maternal employment bef. birth: none	0.50	0.5	0.27	0.45
Maternal employment bef. birth: short part-time	0.05	0.21	0.09	0.28
Maternal employment bef. birth: long part-time	0.10	0.3	0.16	0.37
Maternal employment bef. birth: full time	0.36	0.48	0.48	0.5
Mother's prenatal relative wage: < 40 %	0.28	0.45	0.29	0.46
Mother's prenatal relative wage: 40 – 60 %	0.48	0.5	0.56	0.5
Mother's prenatal relative wage: > 60 %	0.24	0.43	0.14	0.35
Change in relative wage rate since before birth			-0.05	0.15
Change in relative wage rate missing			0.12	0.32
Father's migration background	0.32	0.46	0.19	0.39
Father's prenatal work hours	39.18	15.62	41.23	14.55
Father's monthly net income bef. birth (EUR)	1642.6	750.14	1708.11	1051.88
East Germany	0.13	0.33	0.24	0.43
Post 1998 parental leave reform	0.56	0.5	0.75	0.43
Post 2001 parental leave reform	0.38	0.49	0.55	0.50
Post 2007 parental leave reform	0.08	0.27	0.14	0.35

Table A2: OLS regression models for mothers' and fathers' leave length and logistic regression models of fathers' leave take-up

	Length of leave taken by mother		Length of leave taken by father		Father took any leave (y/n) [a]	
	b	RSE	b	RSE	b	RSE
Birth year of parent	-0.29*	0.12	-0.06	0.05	-0.07+	0.04
Parent medium education	-1.10	1.24	-0.29	0.48	-0.81	0.57
Parent high education	-4.27**	1.45	-0.78	0.57	-0.40	0.60
Mother rel. lower education	0.56	1.01	-0.48+	0.26	-2.45**	0.86
Parent migration background	0.22	0.99	-0.35	0.38	-1.92***	0.55
Unmarried cohabiting	-0.63	1.16	-0.25	0.39	0.60	0.50
East Germany	-3.29***	0.88	-0.65*	0.32	-0.80+	0.43
Post 1998 reform	-1.24	1.17	1.03**	0.33	2.13**	0.78
Post 2001 reform	-0.00	1.06	0.36	0.39	-0.13	0.49
Post 2007 reform	-1.30	1.25	0.26	0.39	2.04***	0.44
Prenatal domestic work share	0.22	0.30	0.60*	0.26	0.26	0.17
Prenatal short part-time mother	-1.59	1.51	-0.16	0.27	-1.27	1.21
Prenatal long part-time mother	-6.04***	1.22	0.30	0.30	0.28	0.62
Prenatal full-time mother	-4.29***	1.10	0.78*	0.33	0.64	0.46
Prenatal work hours of father	0.02	0.05	-0.02	0.01	-0.04*	0.02
Prenatal income of father	0.31	0.31	-0.14	0.12	-0.06	0.12
Father years full-time exp.			-0.10**	0.04	-0.01	0.12
Mother relative prenat. wage 40-60%	0.64	0.94	0.09	0.20	0.43	0.54
Mother relative prenat. wage >60 %	-1.73	1.35	1.46*	0.58	1. 89**	0.60
Mother years full-time exp.	-0.50***	0.11	0.11*	0.05	0.16***	0.04
Number of children	-1.10	0.95	0.06	0.30		
Constant	607.58*	236.00	124.27	88.97	140.47+	85.06
N couples	803		803		803	
Adjusted R-squared	0.16		0.12			
Pseudo R2					0.35	

Note: RSE = Robust standard errors. [a] Coefficients of logistic regression are average marginal effects.
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$