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Maternal labor market return, parental leave policies, and gender inequality in housework

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Abstract

This study investigates how the duration of the work interruption and the labor market status of mothers upon their return affect the division of housework in couples after a birth. By observing several parental leave policy reforms in Britain and West-Germany, this research also explores how extended leave entitlements for mothers influence the division of housework. The analysis uses multilevel multiprocess models for 1220 birth events of British couples and 1785 births to German couples based on data from the British Household Panel Survey (1991-2008) and the German Socio-Economic Panel (1985-2009). The results suggest that mothers increase their housework hours with every additional month of employment interruption. Mothers' full-time return seems more effective than a short labor market time-out in altering men's housework contributions and reducing the trend towards a more traditional division of housework. Parental leave policy extensions for mothers were associated with the division of housework only indirectly through their impact on the length of women's work interruptions.

Key words: Parenthood; parental leave policy; maternal employment; housework; gender division of labor; Britain; Germany

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Introduction

This study investigates whether short work interruptions and returning to work full-time rather than part-time after a birth protect against increasing gender inequality in the division of housework in couples. By observing several leave policy reforms in Britain and West-Germany, this research also provides a more detailed analysis than previous studies of how parental leave policies are likely to impact on the gender division of housework. Many studies have observed that gender differences in time spent on paid and unpaid work and wage differentials between men and women tend to widen after a birth event (Gangl and Ziefle 2009; Sanchez and Thomson 1997; Sigle-Rushton and Waldfogel 2007). Parenthood also appears to be the main driver of increasing gender inequality in couples' division of housework over the course of relationships (e.g.,Grunow, Schulz and Blossfeld forthcoming). The process of how parenthood gives rise to a continuing trend towards greater gender inequality in the division of housework, however, is not well understood yet. Despite the large number of economic studies showing that women's longer employment interruptions increase the gender or family pay gap (e.g., Gangl and Ziefle 2009; Joshi, Makepeace and Dolton 2007; Waldfogel 1998), so far the traditionalizing effect on the division of housework of periods which women spend outside the labor market has not been investigated. Sociological studies have explored how women's labor market transitions or variations in earnings are associated with changes in housework time of women and men across the population (e.g., Brines 1994; Gershuny, Bittman and Brice 2005; Kan 2008). These did not consider the length of women's labor market interruption and selection processes related to childbearing and labor market return. Studies which focused specifically on birth events either only described changes in the time women and men spend on paid and unpaid work (Gershuny 2004; Gjerdingen and Center 2005) or explored associations with prenatal characteristics, such as earnings and gender ideologies of both partners (e.g., Kluwer, Heesink and Vliert 2002; Sanchez and Thomson 1997; Schober 2011). I contribute to this literature by

considering in detail the importance of the timing and the nature of women's return to the labor market for changes in housework time of women and men after childbirth.

Recently, a growing body of research has explored the importance of socio-political context for the level of gender inequality in the domestic division of labor. There is evidence that the division of domestic work in couples varies with national levels of gender empowerment (Fuwa 2004), economic development (Knudsen and Waerness 2008), equality of labor market access (Fuwa and Cohen 2007), levels of female employment (Hook 2006), and divorce legislation (Cooke 2007b). Hook (2006; 2010) has argued that policies which facilitate reconciling work and family for women and men are likely to have a more direct impact than most other contextual variations. Among the latter types of measures, public provisions of childcare for children under three and entitlements to maternity/paternity or parental leave are the most salient for couples who just had a child. They may have a relatively direct effect of time for unpaid work by reducing their childcare time or by freeing mothers or fathers from work duties while allowing them to return to a (similar) job later. Previous studies reported stronger associations with parental leave policies than with the level of childcare provision (Hook 2006; 2010). Hook (2006) found that fathers spent less time on unpaid work in countries with longer parental leave for mothers and more in countries where fathers were eligible to take leave and where employed women on average worked longer hours. Hook (2010) found that men spend less time and women more time on typically female housework tasks in nations where men's work hours and leave for parents were long. Women did less housework in countries with greater availability of public child care provision and where men were eligible to take parental leave. By contrast, Fuwa and Cohen (2007) found that countries with longer parental leave had lower levels of housework inequality but full-time employment reduced women's housework share less in countries with long parental leave. These studies were based on (repeated) cross-sectional comparisons of individuals or couples in a large

number of relatively diverse countries. These studies therefore give us an idea of broad associations of macro-level indicators and micro-level housework behavior but do not allow a more detailed study of the transfer mechanisms from policies or social norms to housework time allocation within couples.

Comparing the housework changes in couples after several policy reforms in Britain and West-Germany, this paper provides a more detailed specification of possible mechanisms. The impact of parental leave extensions on the speed of labor market return of mothers has been widely confirmed. Most studies suggest a curvilinear relationship with parental leave extensions for mothers up to about one year speeding up mothers' return to work, whereas longer leave provisions tend to extend mothers' time outside the labor market (Ondrich et al. 2003; Pronzato 2009; Waldfogel, Higuchi and Abe 1999). So far subsequent changes in housework time of mothers and their partners after such a reform have not been investigated. I explore whether the association of parental leave policy reforms with housework time of men and women is mediated by the actual employment interruption of mothers or whether parental leave policies are also directly associated with housework time, e.g. by shaping social norms of mothers' and fathers' caring roles, as suggested by Hook (2006; 2010).

Britain and West-Germany are interesting cases to study the effects of parental leave extensions due to large differences in the average length of leave entitlement. Furthermore, they allow me to explore reforms with expected positive and negative effects on mothers' labor market return. Maximum leave entitlements in the UK remained within one year, which should encourage mothers' labor market return. By contrast, leave reforms in West-Germany also include extensions well beyond one year and should therefore show a curvilinear relationship with the speed of labor market return for mothers.

Theoretical framework

Mothers' labor market return

Around the birth of a child, the negotiations between men and women in couples may be conceptualized as an implicit agreement which is supposed to allow an eventual return to a (usually less traditional) division of labor similar to the one the couples practiced before having the child. In many couples, this agreement entails that the woman interrupts her employment and temporarily accepts to do more domestic work after the birth while the male partner remains in employment. When the child grows older and needs less care, it is assumed that the couple will return to a division of labor dependent on the prenatal distribution of relative resources (Becker 1981; Lundberg and Pollak 1996), women's ability to pay for childcare (Gupta 2007; Schober 2011), or gender ideologies before the birth (West and Zimmerman 1987). Empirical results provide partial support for all of these influences with some variations depending on the institutional context (Sanchez and Thomson 1997; Schober 2011; Singley and Hynes 2005).

Periods of mothers' labor market interruption have been treated as a black box, even though similar theoretical mechanisms continue to be at work during this time. With growing duration of women's employment interruption, women's bargaining power and possibility to sanction men's deviant behaviors decrease (Lundberg and Pollak 1996). The specialization of women in household labor may also involve improved household skills for them and depreciation of their partners' skills (Becker 1981). Furthermore, some women may adapt their expectations of the gender division of labor to the more traditional practice experienced since childbirth (Schober and Scott forthcoming). In each case, an increase in men's housework contribution and a decrease in women's, which would be needed to return to a less traditional pre-birth division of labor, become less likely. This outcome has also been described as habit formation or inertia, where special impulses would be necessary to change

the established division of labor, in particular when it is in line with predominant traditional social norms. As a result of these mechanisms, women will spend more time on housework and their partners less with increasing length of women's labor market interruption (*Hypothesis 1*). It is well established that mothers do more housework and their partners do less during times when mothers are not working for pay (e.g., Gershuny, Bittman and Brice 2005). Hypothesis 1 assumes that the relationship can be better understood also taking into account the time since the last labor market exit.

The second, possibly interrelated, decision which mothers face is whether to return to the labor market part-time or full-time. Full-time work limits women's availability to do time-inflexible housework tasks, which need to be performed every day, such as cooking, and in particular housework tasks connected with childcare, such as cleaning up after children's meals. Several studies have shown that full-time employed mothers spend similar amounts of time talking and playing with their children than mothers working fewer hours and reduce mainly their hours of passive childcare and their housework time on weekdays (Bianchi 2000; Bianchi, Robinson and Milkie 2006). On a normative level, women's part-time work signals that their primary responsibility is in the home. Thus, gender segregation in housework remains unchallenged. Mothers' decisions to return to full-time employment is likely to provide a stronger impetus for couples to reverse a traditional division of housework – by reducing women's and increasing men's housework time - than returning to part-time work or education which usually involves fewer and more flexible hours (*Hypothesis 2*).

Parental leave reforms and other contextual variations

The male breadwinner/ female part-time carer model has become the predominant arrangement how couples with young children combine earning and caring in the UK and West-Germany (Crompton and Harris 1999; Lewis, Campbell and Huerta 2008; Misra, Budig

and Böckmann 2010). This constitutes a compromise between a need or preference for women's employment and the expectation that women should be primary caregivers. This model has been supported by national level policies in both countries through the promotion of part-time work. Part-time workers in Germany have been entitled to the same employment protection rights as full-time workers since 1985, whereas in the UK this was only implemented in 2003. Laws regulating the right to request a reduction of working time came into force in Germany in 2001 and in the UK in 2003. In Germany, the share of part-time employed women as percentage of all employed women increased from 25 percent in 1985 to 38 percent in 2008 (OECD 2010). Over the same time period, the UK has seen a slight decrease from 41 percent to 38 percent. Historically, this was accompanied by a very low level of publicly subsidized childcare provision (in terms of places as well as opening hours) for children under the age of three and a lack of encouragement for fathers to share parental leave. Despite recent improvements, in 2008 still only 14 percent of children under three in Germany and 22 percent in the UK attended formal daycare facilities when measured in full-time equivalent (OECD 2011).

Several reforms of parental leave policies have taken place in both countries since the mid-1980s. In Germany, the maximum entitlement to paid or unpaid leave (including maternity and parental leave) after a birth for mothers was extended from 6 months in 1985 to 12 months in 1986, to 14 months in 1988, to 17 months in 1990, to 20 months in 1991 and to 36 months in 1992. After the eight-week mother protection period with income-related reimbursement, payment in Germany was a means-tested flat rate of about €300 per month after 1986. This was paid to all mothers for the first six months and to mothers in families with net household income of below €15,000 Euros for the whole period or up to 24 months from 1992 to 2006. In 2007, this was changed to an income-related reimbursement at 67 per cent of net earnings or a minimum of €300 Euros for 12 months.

In the UK, maternity leave has been an individual entitlement of the mother which varied by the period of employment with the same employer before the birth. For women with less than one year tenure with the same employer at the time of childbirth, the provision of statutory leave with some pay has been extended from 7 to 14 weeks in 1994, to 26 weeks in 2003, and to 33 weeks in 2007 (Moss and O'Brien 2006; Ringen 1997). Before 2003, women with tenure over one or two years had rights to longer paid leaves of 18 and 29 weeks, respectively. The first six weeks were paid at a maximum of 90 per cent of the previous salary followed by a flat rate which changed slightly with every reform from a maximum of £75 per week before 1994 to £129 per week in 2007.

Fathers were entitled to share the leave with mothers in Germany following a reform in 2000; however only about 2 per cent of fathers took up any leave before the recent reform in 2007, which included two 'daddy months' reserved for fathers. In the UK, entitlements to two weeks of paternity leave for fathers around the birth and to three month unpaid parental leave for each parent was introduced in 2003. Parental leave is not considered in the description above as take-up by British mothers and fathers is low and only 4 weeks can be taken each year (Moss and O'Brien 2006). Transferring some of the paid maternity leave from mothers to fathers was not permitted in the UK until a reform in April 2011.

The division of housework has been more traditional in West-Germany than in the UK. Based on data from the International Social Survey Programme in 2002, women in West-Germany spent on average 21 hours per week on housework in contrast to 14 hours for British women. There was little difference in housework time of men between the two countries.

In addition to other policy differences including income taxation rules and childcare costs, longer parental leave for mothers may have contributed to the more gendered division of unpaid work in West-Germany compared to the UK. Due to a lack of cross-nationally comparable housework measures, this study focuses on housework variations in couples and

associations with leave policies within each country over time. East-Germany is excluded in this analysis as most of the parental leave reforms in Germany occurred before or around the German reunification and the sample of East-German couples that can be observed between reforms is small. This makes it difficult to control for cultural differences between the two regions in Germany, which remain substantial, as can be seen from larger rates of full-time employment for East-German women.

In line with previous studies (e.g. Ondrich et al. 2003; Pronzato 2009; Waldfogel, Higuchi and Abe 1999), I expect leave extensions up to durations of 1 year to speed up mothers' labor market return. Following Hypothesis 1, women's faster labor market return in turn is assumed to indirectly reduce women's own housework time and increase their partners'. For leave extensions beyond one year, such as those that took place in Germany in the 1990s, I predict a delay in women's labor market return leading indirectly to a more traditional division of housework. I therefore assume that parental leave policies impact indirectly on the time mothers and fathers with young children spend on housework by influencing the length of women's labor market interruption (Hypothesis 3a).

Parental leave extensions may additionally influence the housework contributions of men and women by shaping their normative expectations of what it means to be a good mother or father. Following Hook (2010), leave extensions beyond one year may reinforce traditional assumptions of motherhood and fatherhood. They may be associated with a more traditional division of housework in couples, even after controlling for the actual length of mothers' labor market interruption (Hypothesis 3b).

Data and Method

The data to test these hypotheses are drawn from couple responses in the British Household Panel Study (BHPS) from 1991 to 2008 and in the German Socio-Economic Panel (SOEP)

from 1985 to 2008. The BHPS is a probability sample of households from Great Britain in the year 1991. The SOEP started with a probability sample of households from West-Germany in 1984 and was then extended to East-Germany in 1989 and includes also some refresher probability samples from 1998, 2000 and 2006 (for a detailed description, see Wagner, Frick and Schupp 2007). The regional extension samples for Wales, Scotland and Northern Ireland and the German subsamples which oversample individuals with foreign nationalities or high income households are not used in this analysis. A great strength of both surveys is that all members of the household are interviewed annually. In addition to retrospective fertility and employment histories, both surveys have asked each respondent annually about time spent on housework and paid work.

From a statistical point of view, women's employment decisions and the time allocations to housework of both partners after a birth are endogenous, as they may affect each other and unobserved factors such as work-family orientations might affect all three processes simultaneously. Ignoring such unobserved characteristics will probably result in overestimating the effects of mothers' labor market return decisions on housework inequality in couples. Issues are complicated further by findings that parents are a select group which vary from childless couples, for instance, in their family orientations and educational qualifications (e.g., Henz 2008; Rendall and Smallwood 2003). The level of selectivity increases with birth order. Furthermore, in countries such as Germany, where many women exit the labor market for at least one year, regression models based on yearly panel data for the sample of women whose labor market return is observed may result in bias if unobserved selection factors in the timing of this return are not considered.

To address these issues, I use a multilevel multiprocess model where a system of regression equations with random coefficients is estimated simultaneously (for a similar approach see

e.g., Baxter, Hewitt and Haynes 2008; Steele et al. 2005). The multiprocess model includes two linear mixed models of women's and men's housework hours, respectively, over four years following a first or second birth, a piecewise-linear log-hazard duration model of the risk of labor market return in a respective month after the birth, a probit model of whether the woman returns to work full-time or part-time. To account for time-constant unobserved factors such as work-family orientations, the individual-specific random coefficients are allowed to correlate between all processes. As repeated birth events for the same couple and related changes in paid and unpaid work are not independent, birth transitions are nested within couples. Previous tests with parity-specific individual fixed effects models suggested that the nature of the effects of women's return to work decisions is very similar for first and second births, so treating them as repeated events seemed appropriate. All the models consist of a two-level hierarchical structure where repeated birth observations are considered to be clustered within couples. The random intercepts allow me to capture time-constant between-individual variation. In another terminology, the system of regressions can also be understood as a family fixed effect model for exploring the within-couple variation specifically for women's labor market return decisions and both partners' housework changes after a birth.

To control for selection effects as a result of unobserved factors which correlate with the decision to have a(nother) child and women's time allocation to paid and unpaid work, I use three probit models of whether the couple has a first, second or third child, respectively, during the observation period in the panel. To capture unobserved variations in the propensity of couples to become parents and have more children, I include a joint unobserved heterogeneity term in the three probit models which is allowed to correlate with the random intercepts of the other four processes. This is equivalent to Heckman-type selection correction for nested models. I cannot use hazard models to also account for the timing until the next birth event because the start of the relationship is not known for German couples and some

second-time parents are not observed at the first birth. All random intercepts are assumed to be normally distributed. The models are estimated simultaneously using the software aML. The results proofed robust to reestimation with Huber-corrected standard errors to correct for possible heteroscedasticity issues.

To reduce the risk of reverse causation, all explanatory and control variables (except ages and number of children) are measured before the respective outcome variable. All prenatal control variables are measured at least nine months before the birth in order to reduce the risk of couples adapting their division of housework already in anticipation of parenthood. Despite these precautions and the explicit consideration of time-constant unobserved characteristics correlated with the outcomes, there still remains a risk of bias due to unobserved time-varying factors influencing women' labour market return and housework time of men and women. Instrumental variables would provide even stronger evidence to draw causal inferences. This technique was not chosen at the outset because of the growing literature on potential influences of parental leave policies on the division of housework. I conducted additional tests using individual-level fixed effect models with parental leave policy changes as instrumental variables for mothers' return to work timing which gave qualitatively similar results.

Sample selection

The sample is restricted to couples, irrespective of marital status, where women are between 20 and 45 years old when they have their first or second child. Unmarried cohabiting couples are included, as childbearing increasingly occurs before a marriage in both countries. Teenage mothers are excluded because the dynamics in their division of labor with partners are likely to be driven by other factors such as education and family networks. The selection of couples who became parents is based on women's fertility history. The observed birth is the first or second one for the female partners, but it may not the same birth order for the male partners.

Including a dummy variable for whether the man fathered a child in a previous relationship however does not affect the results. I include couples who have given full interviews before the woman becomes pregnant (calculated as 9 months before the birth date) and at least once after the birth of the child. Based on these restrictions, I observe 742 first births and 770 second births in the UK. In West-Germany, there are 1084 first births and 1066 second births. 595 German couples and 450 couples in Britain experience both birth events during the panel observation period. These couples provide the information on unobserved characteristics associated with repeated birth events. The comparison group of couple who remain childless over the observation period include 920 British and 1367 German childless couples with women in the same age range (20-45) who can be observed continuously for at least two waves. Of the couples with two children, 199 British couples and 347 German couples go on to have a third child during the observation period.

Non-response

In order to maximize the number of observed births, an unbalanced panel of up to four years after a first or second birth is used. I have investigated the potential of bias due to wave non-response by examining the correlation with all main explanatory variables and, in line with Uhrig (2008), found a very low rate of wave non-response among couples with young children. I also compared the analysis sample with couples who joined the panels after the start of the respective pregnancy. For the UK, I can observe that the latter on average have shorter relationship durations. In both countries, women with lower education are more likely to start cohabiting only after the start of pregnancy and therefore the samples slightly under-represent the less well educated. To reduce the risk of bias as a result of attrition between the first and the fourth year after the birth, correlates of non-response such as home ownership, poor health of either partner, and interviewer changes are included in all models in addition to the other explanatory and control variables.

Of all observed birth events, 365 and 302 include some non-response in one of the dependent variables in West-Germany and in the UK, respectively. The questions with the largest amount of missing information are housework hours of men. For missing information on earnings, I use the imputed information from the cross-national equivalent files of the BHPS and the SOEP. For all other control variables, dummy variables are included to flag missing items in each variable. The final sample size of birth events included in the regression analysis is 1210 in the UK and 1785 in West-Germany.

Measures and descriptive statistics

The two key dependent variables in this analysis are housework hours of men and women spent on female-typed tasks like cooking, cleaning, and doing laundry. The questions on housework time differ between the BHPS and the SOEP. The BHPS asks male and female respondents in all households to provide estimates of their own weekly hours spent on housework, whereas the SOEP asks how many hours a person spends on housework on a typical weekday. Weekend estimates are not asked every year in Germany and are therefore excluded in this longitudinal design. Direct survey questions of housework are generally more prone to overreporting than time diary questions (Kan and Gershuny 2008). Controlling for the respondent's housework hours at the previous wave should reduce this risk of bias. The German measure of housework hours on a weekday may underestimate men's housework time, as some men tend to do less than an hour of housework per day and may therefore indicate zero hours if there is no minute option. I tested this risk of underestimation by comparing a random sample of the SOEP 2009 with the SOEP Pretest 2010, which included a minute option for the housework question. The differences were not statistically significant. The effect of women's full-time work on their own/partners' housework time may be over/underestimated in Germany if full-time employed women and their partners' compensate

for women's lower housework hours on a weekday by doing more housework on weekends. To test this, I examined differences in weekend housework hours between couples where mothers return to work full-time and those who return part-time for the years where weekend data was available. I found that women who return to work part-time do more and their partners less housework on the weekend compared to couples where mothers work full-time suggesting a very limited risk of bias. A dummy variable is included to account for measurement error in Germany as a result of a reduction from two questions on different housework tasks to one combined housework question in 1990.

The labor market return decisions of mothers are captured in two variables. The duration of women's labor market interruption after a birth is measured as the number of consecutive months after the birth of the child which a woman records her labor force status as either on maternity/parental leave or as looking after the family until she experiences her first spell back in employment or education. The term labor market interruption therefore also includes education interruptions. Length of labor market interruption is not used to refer to actual take-up of maternity or parental leave entitlements, as reliable information on this is not available, but rather as the time period away from paid work or education. The second variable measures whether a woman returned to the labor market full-time or part-time based on her total weekly work hours or employment status in the survey after she re-entered the labor market. In line with OECD definitions, part-time is classified as up to 30 hours per week. Part-time work and education are included in one category, as education usually allows some time flexibility and previous results did not show significant differences in housework time between women in part-time jobs and those in education. Robustness tests using a 35-hour-cut-off for part-time work gave similar results.

A couple is coded as experiencing a birth if the woman is observed having a baby while both partners lived in the same household. The birth parity is defined based on women's fertility

history. Women for whom the birth parity is unknown because of missing fertility histories are excluded.

Descriptive statistics for the dependent variables are shown in Table 1. In the four years following a first or second birth, mothers and fathers in Britain spent on average 17 and 5 hours per week on housework, respectively. West-German mothers spent just under 4 hours on housework on a typical weekday, whereas the equivalent figure for fathers was only 40 minutes. Women's housework share relative to the couple's total is 75 per cent in Britain as opposed to 85 per cent in West-Germany. 68 percent of British mothers and 63 percent of mothers in West-Germany returned to the labor market within 4 years after the birth. The average length of labor market interruption was 20 months in West-Germany compared to 10 months in the UK. 29 per cent of British mothers who re-entered the labor market within 4 years went back to a full-time position compared to 17 per cent in West-Germany.

[Table 1 about here]

All explanatory variables except the age of the youngest child were measured before the respective dependent variable. The key explanatory variables for the changes in housework time of mothers and fathers are the length of women's labor market interruption (in months) since the month of birth and whether the woman already re-entered the labor market and if so, whether this was part-time or full-time.

Indicator variables are included for each period of significant changes in the maximum duration of paid or unpaid leave which most women could take at the time of childbirth. These period dummies can vary between different parities for the same mother if a policy change took place between the first and second birth. To distinguish associations with parental leave policies changes from cohort trends, I include a continuous measure of the mother's year of birth. Period dummies for changes in part-time work regulations and

eligibility of fathers to take some leave after childbirth have been tested but were not significant in any of the models.

To test for the risk of reverse causation, women's housework share is included in the models of women's labour market return. Fathers' work hours are controlled as previous studies found men's long market hours to decrease their own contributions to unpaid work and to increase their partners' (Cooke 2007a; Hook 2010). To control for differences in couples' relative and absolute economic resources, women's absolute hourly wage rate before pregnancy is used as a measure of opportunity costs and their ability to outsource childcare and housework to the market. A categorical indicator of women's wages relative to their partners' was tested but was not significant. Men's hourly gross earnings are included as a measure of men's economic resources. All earnings variables were adjusted for inflation with base year 2000 and converted to Euros.

I differentiate between three levels of educational attainment for women and men: university degree, high school degree, and less than high school. I control for women's age at birth and marital status before the pregnancy because couples that become parents at an older age or are unmarried may have a less traditional division of domestic work. To account for the amount of housework required, I included the age of the youngest child in months and the number of children in the household. Controls for the number of rooms in the property, the use of external help with housework, in particular cleaning services, and the presence of time-saving household appliances such as a dishwasher and a microwave did not change the results qualitatively. These variables were not included in the final model as they may be the result of women's employment decisions rather than a cause. In the childbearing selection models, I include lagged variables of age, education, and earnings of both partners, marital status, age of the youngest child and women's housework share.

Results

Analytical strategy

The system of regressions described in (1) to (7) below was estimated simultaneously. It includes two linear mixed models of housework hours of women (1) and men (2), a piecewise-linear log-hazard duration model of the risk of labor market return (3), a probit model of whether the woman returns to work full-time or part-time (4) and three probit models with a joint random intercept for whether the couples has child 1, 2, or 3 (see regressions 5, 6 ,and 7). α denotes the couple-specific random intercept of the respective model. Fixed unobserved characteristics associated with these processes are controlled by allowing the five random intercepts to correlate.

Hypothesis 1 assumed that housework hours of mothers would increase with each additional month of labor market/education interruption. Starting from baseline models of women's housework hours (H^w) and men's housework (H^m) with lagged dependent variables and controls, Hypothesis 1 is tested by adding an interaction term between whether the woman is still out work (N) or returned already (R) and the time since childbirth which she has spent out of work (I). The interaction term is needed as I expect a significant effect of longer interruptions on change towards a more traditional division of housework while the woman was out of work but not after she returned to the labor market. After the return, her labor market status is assumed to be more influential for the division of housework. To test this, as proposed in Hypothesis 2, I add binary variables whether the woman returned full-time (F) or has not returned yet (N). Part-time return is the omitted category.

X denotes a vector of control variables included in all models. A control for women's housework share before pregnancy, or in the previous year, is included in the hazard model of labor market return (3), in the probit model of full-time versus part-time return (4), and in the childbearing models (5-7), respectively.

(a) $H^w = b_1^w + b_2^w\, H_{t-1}^w + b_3^w I \times N + b_4^w I \times R + b_5^w F + b_6^w N + b_7^w X + \alpha^w$

(b) $H^m = b_1^m + b_2^m\, H_{t-1}^m + b_3^m I \times N + b_4^m I \times R + b_5^m F + b_6^m N + b_7^m X + \alpha^m$

(c) $\text{Ln}\, h(t)^i = b_1^i + b_2^i\, (H^w/(H^w + H^m)) + b_3^i X + \alpha^i$

(d) $\Pr(F = 1) = b_1^f + b_2^f\, (H^w/(H^w + H^m)) + b_3^f X + \alpha^f$

(*e*) $\Pr(C1 = 1) = b_1^{c1} + b_2^{c1}\, (H_{t-1}^w/(H_{t-1}^w + H_{t-1}^m)) + b_3^{c1} X + \alpha^c$

(f) $\Pr(C2 = 1) = b_1^{c2} + b_2^{c2}\, (H_{t-1}^w/(H_{t-1}^w + H_{t-1}^m)) + b_3^{c2} X + \alpha^c$

(g) $\Pr(C3 = 1) = b_1^{c3} + b_2^{c3}\, (H_{t-1}^w/(H_{t-1}^w + H_{t-1}^m)) + b_3^{c3} X + \alpha^c$

Women's labor market return and housework in couples

Table 2 presents models of housework hours for men and women in Britain and West-Germany, respectively. In both countries, the length of women's work interruption since childbirth is positively associated with an increase in housework hours of women while they are out of work. A six-month longer work interruption increases women's housework time by 18 minutes per week in the UK and by 4 minutes per weekday in West-Germany. The effects on men's housework hours are not statistically significant. Hypothesis 1 is therefore rejected for men but not for women. I also tested whether the associations with the length of women's labor market interruption varies between couples where mothers returned to work full-time or part-time but found no significant differences (not shown).

The strongly significant effects of women's full-time return to work on changes in housework time of men and women provide support for Hypothesis 2. Women who return to work full-time reduce their housework time by 4 hours per week or 1 hour per weekday more than those returning to part-time positions in Britain and West-Germany, respectively. Fathers respond to their partners' full-time labor market return by increasing their housework contribution by about 1 hour per week in Britain and by half an hour per weekday in West-Germany,

respectively, compared to couples where mothers go back part-time. Log likelihood tests comparing models which include indicators for the timing and extent of mothers' labor market return with baseline models of control variables suggest a significantly better fit.

[Table 2 about here]

The regression models focus on change in housework hours after a birth controlling for pre-birth characteristics and time-varying factors. The combined variations in these time varying variables including a lagged dependent variable, the number of children in the household, lags of fathers' paid work hours, year-on-year variation in the age of the youngest child and the timing and nature of women's labor market return together determine the trend in housework hours over the first four years after childbirth. To better understand if returning quickly and full-time may prevent the shift towards a more traditional division of housework, Figures 1 and 2 show estimates of trends in absolute housework hours for mothers and fathers in Britain and West-Germany, respectively. Based on average housework hours before a first or second pregnancy, they depict housework trends in couples for five different combinations of timing and nature of labor market return distinguishing women who 1) return full-time after 10 months, 2) return full-time after 20 months, 3) return part-time after 10 months, 4) return part-time after 20 months, and 5) women who do not return to the labor market or education within four years after a birth. The work interruptions of 10 and 20 months are chosen because these represent the mean durations in the two countries. Both figures show that women increase their housework hours during their work interruption. A full-time return slows down this increase in the UK, whereas it effectively halts the trend at the respective level of women's housework hours in West-Germany. If these women were to interrupt for a shorter period of only a couple of months, we would see hardly any change in housework hours in Germany and only a slight increase in the UK. For the two scenarios of women who

return part-time, the increase in housework hours compared to women who do not return to work is less steep after they re-enter the labor market but the upward trend nevertheless continues at a rather fast pace in both countries. Fathers in Britain whose partners return to a full-time job after 10 months contribute about as much to housework as before the respective pregnancy, whereas in West-Germany such fathers increase their housework time compared to before the birth. For couples where mothers do not return within four years or return only part-time, men's housework contributions trend towards zero by the fourth year after the birth.
[Figures 1 and 2 about here]

Leave policies and housework in couples

To test Hypotheses 3a and 3b regarding effects of parental leave reforms, period indicators of extensions in leave entitlements for mothers are included in the housework models for mothers and fathers and in the hazard model of mothers' labor market return. Hypothesis 3a predicted that macro-level parental leave extensions for mothers will be associated housework time of mothers and father indirectly through the impact on the length of women's labor market interruption. In this case one would expect a curvilinear association with parental leave extensions up to about one year speeding up women's labor market return but delaying it when parental leave provisions for mothers exceed one year. Hazard models of the likelihood of women's labor market return are shown in Table 2. In the UK, the extension of statutory maternity leave in 1994, 2003 and 2007 are associated with faster labor market return of mothers compared to before 1994. The 1994 reforms seems to have raised the odds of women's labor market return by 50 per cent whereas the 2007 reform was associated with increases by 19 per cent. There is no significant difference before and after the 2003 reform. In combination with the significant individual-level effect of the length of labor market interruption on women's housework time, this provides some support for an indirect

association of parental leave policies with British women's housework time, as suggested by Hypothesis 3a.

I also find support for an indirect effect on mothers' housework time in West-Germany. The associations between parental leave policy reforms and the speed of women's labor market return in West-Germany are in line with the expected curvilinear relationship. The increase in leave entitlement from 6 months to 12 months in 1986 is positively associated with mothers' odds of reentering the labor market. All subsequent extensions beyond 12 months until 2007 were associated with delays in the labor market returns of mothers. Some of these associations do not reach statistical significance due to the relatively short periods for which they were in place and the small number of mothers affected. The extension from 20 to 36 months in 1992 had the strongest effect lowering mothers' odds of labor market return by 40 per cent or more relative to all previous periods. The 2007 reform which reduced the maximum period of paid leave to 12 months and provided parents with relatively high income-related reimbursement had the reverse effect significantly speeding up mothers' labor market return.

Hypothesis 3b proposed an additional direct positive association with women's housework hours and a negative association with men's for reforms which involved maximum leave periods of more than one year, as in Germany after 1989. The models of housework time however provide no evidence in support of such a direct association. Changes in leave policies are not significantly associated with housework time of mothers and fathers in either country.

Unobserved heterogeneity and control variables

The random intercepts of all models are statistically significant. Correlation coefficients for the unobserved heterogeneity terms are shown in Table 3. In both countries, mothers who are more likely to return to the labor market tend to spend less time on housework and are less

likely to have children. Unobserved factors related to childbearing decisions however are not correlated with unobserved heterogeneity in housework time of men or women in either country. In British couples where women spend more time on housework, men seem to do less housework. Some fixed unobserved characteristics also seem to increase women's timing of labor market return and the likelihood to return to a full-time job in Britain whereas the random intercepts of the two decisions are not significantly correlated in West-Germany.
[Table 3 about here]

The results for control variables in the models of mothers' labor market return, housework time of both partners and probability of having a first, second and third child are generally consonant with previous studies (estimation results are available from the author on request). Due to space limitations, I summarize only some covariates of particular interest. In both countries, more educated and higher earning women are more likely to return to work quickly and full-time and do less housework. Men's higher levels of education are negatively associated with a fast and full-time return to the labor market for mothers. Women's own earnings are negatively associated with housework time only in the UK. Recent cohorts of mothers in both countries are more likely to return to the labor market fast and full-time and spend less time on housework. Men's housework hours have increased in recent cohorts only in West-Germany. Both partners' housework hours decrease as the youngest child gets older but only mothers' housework hours increase with the number of children. Second-time mothers are less likely to return to work full-time than those having a first birth. The prenatal division of housework or absolute hours of either partner are not significantly associated with mothers' labor market return or with the likelihood of having a first, second or third child in the UK. In West-Germany, the only significant associations are a negative relationship between women's prenatal housework share and their speed of re-entering the labor market and a positive association of greater housework inequality and the likelihood of a third birth.

Discussion

The question whether mothers' fast and full-time return to work reduces the trend towards a more traditional division of housework can be answered in the affirmative. The duration of women's work interruption influences the level of housework inequality by resulting in a steady increase in women's responsibilities for housework while they are at home full-time to take care of children. Even interruptions between six months and one year, which are considered of moderate length from a European perspective, reinforce a longer-term trend towards greater inequality in housework between mothers and fathers. Women's full-time return to the labor market slows down and even halts this trend in Britain and West-Germany, respectively. In line with Gershuny et al. (2005), not only women but also men adjust their housework contributions to women's labor market transitions. Full-time employment for women is more effective in altering men's behaviors in the home than a short work interruption. After controlling for the duration of mothers' labor market interruption, part-time employment increases men's housework contributions significantly in the UK but not in West-Germany. I also reran the multilevel multiprocess model with women's housework share instead of separate measure of housework hours of each partner which gave substantively similar results.

The findings provide support for an indirect influence of changes in macro-level parental leave policies on mothers' housework hours, mediated by their return to work decisions. Hook (2010) found significant associations of macro-level parental leave policies with housework time of working-age men and women based on repeated cross-sectional time use surveys from 19 countries even after controlling for women's work hours at the individual level. I provide new evidence on this relationship by examining potential pathways of policy effects on mothers and fathers after a birth. The findings suggest that the association with housework time is most likely mediated by individual-level changes in the timing of women's labor

market return. The significant effects on the speed of mothers' labor market return are consonant with previous studies in both countries (Dex et al. 1998; Ondrich et al. 2003; Spiess and Wrohlich 2008; Waldfogel, Higuchi and Abe 1999). I do not find any direct associations of leave policy reforms in the UK and West-Germany with changes in housework for mothers and fathers following a birth. The results in both countries strengthen the evidence that leave policies matter for the gender division of housework but mainly indirectly by influencing mothers' labor market behavior in a non-linear fashion. The significant associations of parental leave policies with housework found by Hook (2010) after controlling for individual work hours can be reconciled with my findings. The effects of parental leave policies on women's labor market return after a birth probably have long-term implications for trends in housework division which persist irrespective of later changes in women's labor market status.

In line with previous studies on prenatal predictors of change in the division of housework after childbirth (Sanchez and Thomson 1997; Schober 2011), women's and men's education and women's earnings are significantly associated with mothers' labor market return decisions in both countries. As I find weaker or non-significant associations with housework time of women and men, most of their influence on the division of housework appears to be indirect, mediated by the speed and extent of mothers' re-entry to the labor market. This research shows that gendered choices relating to time availability are important in understanding the process of increasing gender inequality in housework after parenthood transitions but it also confirms that these choices are influenced by observed and unobserved prenatal characteristics and circumstances.

I have suggested that multilevel multiprocess models offer a suitable approach for analyzing interrelated family processes, including mediating pathways, after life course transitions

where some potential determinants are unobserved. This method reduced the risk of bias as a result of fixed unobserved heterogeneity associated with parallel time allocation decisions in couples. I found evidence of significant correlations between fixed unobserved characteristics related to women's labor market return decisions and housework time in both countries. This provides support for the argument that time allocations to paid and unpaid work are commonly determined and underlines the importance of using suitable statistical methods to account for this interdependence. As I found no significant direct associations of parental leave policies with housework, I conducted robustness tests using parental leave variations for mothers as instrumental variables for the length of mothers' labor market interruption and the results did not vary substantively. The mostly not-significant associations of prenatal housework division or hours with women's labor market return also suggest a small risk of reverse causation. There remains a risk of bias due to time-variant unobserved factors. Previous UK studies exploring changes in gender ideologies after transition to parenthood however found significant change only in a minority of couples and attitude change seemed to be more often a result than a cause of women's return to work decisions (Schober and Scott forthcoming).

Due to panel attrition, the analysis was limited to a period of four years after a birth. The analysis is therefore likely to provide conservative estimates of the associations of housework time with women's leave length after return to work, as the associations may have been larger if mothers with longer employment interruptions had been included. The associations with macro-level policies should be regarded as largely descriptive, as the samples of birth during some parental leave reform periods were quite small. I have argued that changes in parental leave policies have been important developments in the family policies of both countries over the last decades. However, with these data it is impossible to perfectly isolate these from other policy changes during the period. I conducted additional tests by including indicators for other

family policy changes, such as rights for equal treatment of part-time workers or extensions of leave rights to fathers, and found no significant associations. Over the past decade formal childcare provision has been improved in both countries. These changes may have helped to speed up women's labor market return in the UK, whereas they may have attenuated the negative effects of recent periods with very long leave entitlements in Germany. In this research I was not able to distinguish between competing explanations, such as task specialization and habits, attitude adaptations or reduced bargaining power, for the increase in women's housework time when they take care of their infants full-time. This seems a promising avenue for future qualitative research. A more nuanced analysis of the effects of short and long part-time hours on housework would be fascinating but was not feasible as models with ordered outcomes cannot easily be combined with the multiprocess framework used in this study.

The results suggest that the increase in gender inequality in housework after childbirth in Britain and West-Germany can be strongly reduced by a fast and full-time labor market return of mothers. Germany has already cut down its paid parental leave entitlement for mothers to one year and both countries recently increased fathers' leave entitlements after a birth. It remains to be seen whether fathers increase their housework contributions to a similar extent as mothers during periods when they look after children full-time. In both countries childcare availability remains an obstacle to full-time employment following the end of parental leave entitlements. Many British families struggle with the cost of childcare, whereas the quality of care for 0-3 year olds is more problematic in Germany. Both countries have established a strong part-time employment culture for mothers. An important question for future research is to what extent policies encouraging fathers' leave taking and current plans to extend childcare coverage can counteract the traditionalizing influence of mothers' part-time work on the division of unpaid work in couples.

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Table 1: Descriptive statistics for pooled 4-year sample of couples with a first or second birth

	Britain		West-Germany	
	Mean/	SD	Mean/	SD
Women's housework hours (UK:weekly, WG:weekday)	17.42	10.04	3.78	0.50
Men's housework hours (UK:weekly, WG:weekday)	5.29	4.99	0.67	0.89
Women's share of housework of couple	75.12	19.05	85.15	17.96
Women who returned within 4 years after birth	67.60		63.40	
Months of labor market/education interruption	10.23	10.65	20.33	14.83
Women returned to full-time job of those who returned	29.55		16.73	
Low education	34.58		17.96	
Medium education	44.19		58.75	
High education	21.23		23.29	
Woman's prenatal wage (Euros)	5.91	15.38	6.40	9.25
Partner low education	33.06		17.12	
Partner medium education	44.62		59.03	
Partner high education	22.32		23.86	
Partners' prenatal gross hourly earnings (Euros)	8.61	7.64	13.52	13.25
Partners' work hours	42.70	15.40	40.45	13.84
Parental leave policy periods				
Before 09/1994	11.19			
10/1994-03/2003	57.82			
04/2003-03/2007	22.66			
From 04/2007	8.33			
Before 1986			4.31	
1986-1987			5.08	
1988-1989			5.98	
1990			3.23	
1991			4.07	
1992-2006			71.91	
From 2007			5.43	
Prenatal housework share of woman	69.89	20.84	78.18	22.30
Prenatal housework hours of woman	10.86	9.10	2.97	2.06
Prenatal housework hours of partner	3.98	4.39	0.77	0.97
Married before birth	74.24		80.56	
Woman’s age at birth	29.42	4.66	28.73	4.51
Number of children	1.58	0.54	1.55	0.52
Age of youngest child in years	1.48	1.33	2.02	1.37
Birth cohort of woman	1968.79	6.10	1968.00	6.70
Accommodation owned	84.51		38.85	
Either partner dissatisfied with health	7.99		7.64	
Interviewer change	36.10		12.90	
N birth events	1210		1785	
N years after birth events	3467		5285	

Source: BHPS (1992-2008) and SOEP (1985-2009).

Table 2: Multilevel multiprocess models of housework hours of mothers and fathers and piecewise log-linear hazard models of mothers' labor market return in Britain and West-Germany up to four years after a first or second birth

	Britain						West-Germany					
	Weekly housework hours of mothers		Weekly housework hours of fathers		Likelihood of mothers' labor market return		Weekday housework hours of mothers		Weekday housework hours of fathers		Likelihood of mothers' labor market return	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Lagged housework hours	0.18 ***	0.02	0.11***	0.02			0.12 ***	0.01	0.12 ***	0.01		
Not returned x Interruption since birth	0.05 *	0.02	-0.00	0.02			0.01 *	0.00	-0.00	0.00		
Returned x Interruption	-0.01	0.04	0.01	0.02			-0.00	0.006	-0.00	0.00		
Not returned yet	0.78	0.65	-0.55 *	0.27			0.21	0.16	-0.02	0.06		
Returned part-time omitted												
Returned full-time	-3.97 ***	0.54	0.96 ***	0.27			-0.87 ***	0.17	0.55 ***	0.06		
Leave periods:												
before 09/1994 omitted												
10/1994-03/2003	-0.52	0.78	0.29	0.39	0.41 *	0.17						
04/2003-03/2007	0.00	1.15	0.82	0.63	0.34 *	0.17						
from 04/2007	0.37	1.57	0.57	0.94	0.58 *	0.27						
before 1986 omitted												
1986-1987							0.25	0.19	0.01	0.11	0.25	0.26
1988							0.19	0.21	0.03	0.12	-0.34	0.27
1989							-0.13	0.26	-0.17	0.15	-0.53 *	0.27
1990-1991							-0.21	0.25	-0.16	0.16	-0.49 *	0.29
1992-2006							-0.29	0.24	-0.15	0.14	-0.93 **	0.28
2007-2009							-0.19	0.33	-0.13	0.17	0.24	0.38
α	4.48 ***	0.25	2.97 ***	0.11	0.72 ***	0.08	0.89 ***	0.03	0.40 ***	0.02	0.62 ***	0.08

Note: The models are jointly estimated with women's likelihood of returning full-time vs. part-time, and couples' likelihood of having a child of the respective parity. Random intercepts for repeated birth observations within couples, denoted α, are included in each model. All models include a constant and the following control variables: women's birth cohort, woman's age at childbirth, prenatal marital status, age of youngest child, number of children, prenatal education level and hourly earnings of both partners, lags of men's work hours, home ownership, region, whether either partner dissatisfied with health, interviewer change.

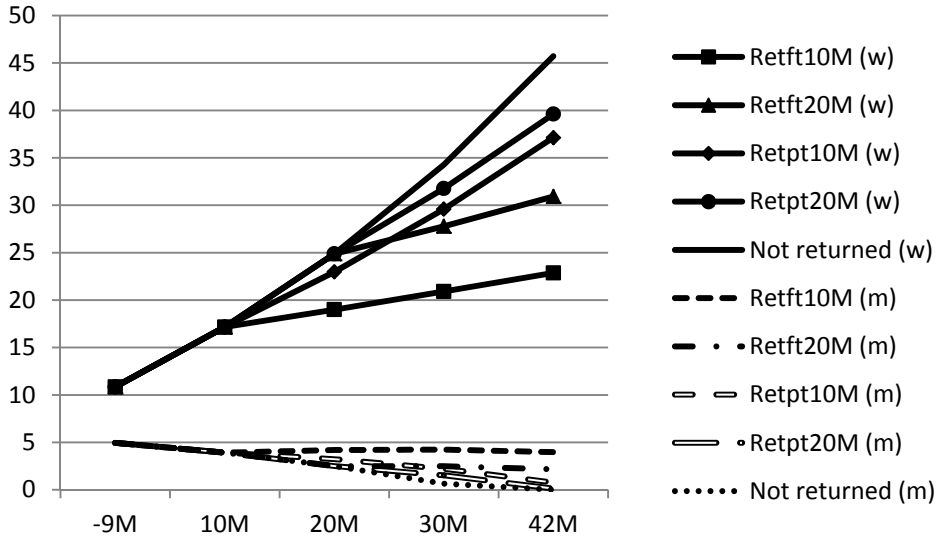
*p< 0.05; ** p< 0.01; *** p< 0.001.

Table 3: Estimated random-effects correlations between individual-specific unobserved heterogeneity terms of each process

Britain	Mothers' housework hours	Fathers' housework hours	Hazard of labor market return	Odds of full-time return
Mothers' housework hours	1			
Fathers' housework hours	-0.13 *	1		
Hazard of labor market return	-0.28 ***	0.16	1	
Odds of full-time return	-0.03	-0.01	0.28 ***	1
Odds of having a(nother) child	-0.00	-0.01	-0.42 ***	-0.16 *
West-Germany				
Mothers' housework hours	1			
Fathers' housework hours	0.02	1		
Hazard of labor market return	-0.39 ***	0.10	1	
Odds of full-time return	-0.00	-0.07	0.13	1
Odds of having a(nother) child	-0.04	0.01	-0.44***	0.00

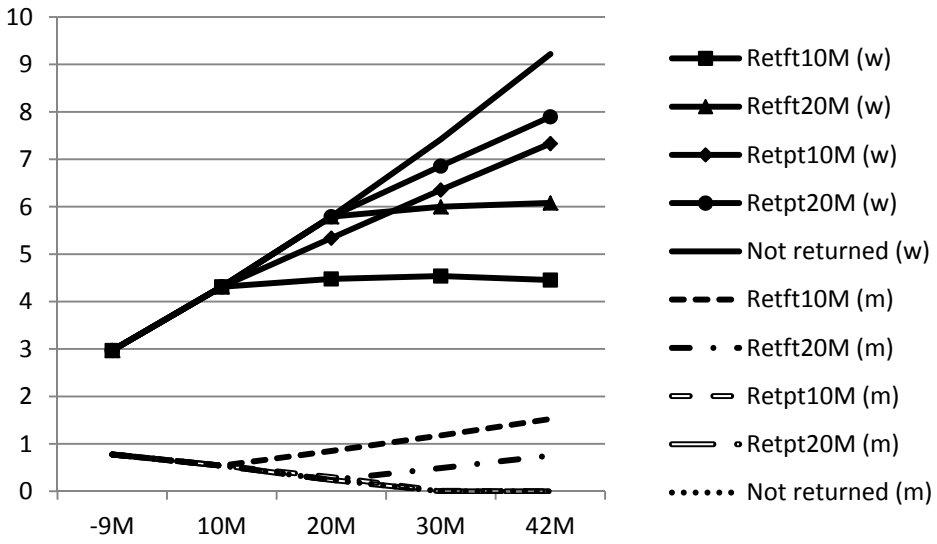
*p< 0.05; ** p< 0.01; *** p< 0.001.

Figure 1: Estimated trends in weekly housework hours of couples in Britain after a birth



Note: The top lines with markers refer to women, the bottom dashed lines to men. The time axis refers to month before and after the birth event. The trends are averaged over first and second birth and account for number of children, age of the youngest child, and other control variables.

Figure 2: Estimated trends in weekday housework hours of couples in West-Germany after a birth



Note: The top lines with markers refer to women, the bottom dashed lines to men. The time axis refers to month before and after the birth event. The trends are averaged over first and second birth and account for number of children, age of the youngest child, and other control variables.