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Parental Leave Policy and Long-run Earnings of Mothers*

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Abstract: Paid parental leave schemes have been shown to increase women's employment rates but to decrease their wages in case of extended leave duration. In view of these potential trade-offs, many countries are discussing the optimal design of parental leave policies. We analyze the impact of a major parental leave reform on mothers' long-term earnings. The 2007 German parental leave reform replaced a means-tested benefit with a more generous earnings-related benefit that is granted for a shorter period of time. Additionally, a "daddy quota" of two months was introduced. To identify the causal effect of this policy mix on long-run earnings of mothers, we use a difference-in-differences approach that compares labor market outcomes of mothers who gave birth just before and right after the reform and nets out seasonal effects by including the year before. Using administrative social security data, we confirm previous findings and show that the average duration of employment interruptions increased for mothers with high pre-birth earnings. Nevertheless, we find a positive long-run effect on earnings for mothers in this group. This effect cannot be explained by changes in the selection of working mothers, working hours or changes in employer stability. Descriptive evidence suggests that the stronger involvement of fathers, incentivized by the "daddy months", could have facilitated mothers' re-entry into the labor market and thereby increased earnings. For mothers with low pre-birth earnings, however, we do not find beneficial long-run effects of this parental leave reform.

JEL: H31, J13, J22, J24, J31

Keywords: Parental leave, wages, labor supply

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1 Introduction

Paid parental leave as it is common in many industrialized countries has been shown to be associated with higher women’s employment rates on the one hand, but lower relative wages at extended durations of paid leave on the other hand (e.g. Ruhm, 1998). A synthesis of many empirical studies from various countries and institutional settings shows that there seems to be a non-monotonic relationship between the length of the leave and mothers’ labor market outcomes (e.g. Olivetti and Petrongolo, 2017). Besides promoting work-family life balance, family policy often defines additional goals such as child well-being and financial security for families that might conflict with the goal of strengthening the labor market attachment and, thereby, the economic independence of mothers. Against the background of various potential trade-offs, many countries are currently discussing the optimal design of parental leave policies. Germany implemented a parental leave reform in 2007 that changed the old parental leave benefit scheme in three important ways. First, it replaced a means-tested benefit targeted at lower-income families by an earnings related transfer that is paid to all families. Second, while the duration of job-protection (36 months) has not been changed, the maximum duration of paid leave was cut from 24 to 12 months. Depending on household income and individual pre-birth earnings, this changed work incentives for mothers in the first and second year after giving birth. Incentives to take a leave for one year have strongly increased for mothers with high pre-birth earnings. For mothers with low pre-birth earnings and low household income, incentives to take up employment in the second year after giving birth have increased. Third, the new parental leave scheme introduced a ”daddy quota” of two months. This means that two out of 14 months are earmarked individually to each parent. If one (non-single) parent does not take parental leave, the maximum duration of paid parental leave for the family is twelve months.

Several empirical evaluation studies have shown that this reform had the expected short-run labor supply effects for mothers: Labor supply of mothers with high pre-birth earnings decreased in the first year after giving birth, whereas labor supply of mothers with low pre-birth earnings increased in the second year after giving birth (see, e.g. Bergemann and Riphahn, 2011, 2015; Geyer, Haan, and Wrohlich, 2015; Kluve and Schmitz, 2018; Kluve and Tamm, 2013; Welteke and Wrohlich, 2019). Much less, however, is known about the medium- and long-run effects of this parental leave reform. One study by Kluve and Schmitz (2018) has shown that the parental leave reform positively affected job characteristics such as duration of contract in the medium run, in particular for high-income mothers, in the medium-run. Evaluation studies that analyzed previous reforms of maternity leave in (West) Germany from the 1970s, 1980s and 1990s have shown that extensions of paid leave and the job-protected leave have increased the employment interruptions of mothers (Schönberg and Ludsteck, 2014). These longer employment

interruptions had – with one exception – no negative effects on mothers’ earnings in the medium term (i.e. up to six years after giving birth).¹

Our paper contributes to the literature in two ways. First, we broaden the focus from the short and medium-term perspective to long-term outcomes, i.e. up to nine years after giving birth. Second, we investigate the effects of the 2007 parental leave reform on mothers’ earnings - an outcome that has not been analyzed in this context so far. To this end, we use administrative data from the Integrated Employment Biographies (IEB) of the Institute of Employment Research (IAB) that contain information on the total population of individuals in Germany who have an employment contract subject to social security contributions. For the identification of the causal effect of the parental leave reform of 2007 on mothers’ earnings we follow previous literature on short-term effects of parental leave in Germany and exploit the quasi-experiment that was provided by the unanticipated introduction of the parental leave benefit in January 2007. In particular, we compare mothers whose first child was born in the last quarter of 2006 (control group) to mothers whose first child was born in the first quarter of 2007 (treatment group). In order to take seasonal differences into account, we add first-time mothers who gave birth to a child in the last quarter of 2005 and the first quarter of 2006 and employ a difference-in-differences approach.

Our results confirm previous findings and show that the parental leave reform has increased employment interruptions for mothers with high pre-birth earnings by almost three months on average. However, these longer employment interruptions did not lead to lower earnings in the long run. On the contrary, we find that two to nine years after giving birth, these mothers have higher earnings. This result is obtained both, in a sample of all mothers who have been employed prior to giving birth as well as in a sample of mothers returning to work after giving birth. For mothers with low pre-birth earnings, on the other hand, the results are different: we do not find positive effects on earnings in the medium and longer run (i.e. 5 to 9 years after giving birth).

Based on further empirical analyses, we are able to rule out that the positive earnings effects of mothers with high pre-birth earnings are caused by a change in working hours, socio-demographic characteristics of working mothers, changes in fertility patterns or changes in employer stability.

One potential mechanism causing the increase in mothers’ earnings in the first couple of years after giving birth could be the increased share of fathers getting involved in childcare due to the reform. Descriptive evidence shows that fathers whose partner has high earnings had the strongest reaction to the introduction of the “daddy quota” and started taking parental leave

¹The reform of 1986 extended the maternity benefit period beyond the job protection period and is the one that caused the strongest reduction in maternal employment. It is also the only reform that has lowered mothers’ earnings 6 years after childbirth. (Schönberg and Ludsteck, 2014) conclude that job protection seems to be a very important determinant of mothers’ postbirth careers.

at much higher rates than the average. Previous studies have shown that paternity leave can increase fathers' involvement in childcare and has the potential to reduce gender specialization in market work and unpaid care work. Thus, we hypothesize that the increased involvement of fathers in parental leave could have facilitated mothers' re-entry into the labor market, increased their productivity and thereby also increased their earnings.

From a policy perspective, our results show that granting a more generous benefit in the first year in order to provide a financial safeguard for families with young children together with introducing a 'daddy quota' within the parental leave scheme has increased the duration of employment interruptions for certain groups of mothers without harming their long-term career perspectives. In contrast, mothers with high pre-birth earnings even experience positive effects on their earnings. Thus, the suspected trade-off between providing a safeguard for families with a new-born child and strengthening mothers' labor market attachment and their long-term economic independence does not seem to be empirically relevant in the context of the German parental leave reform of 2007. In fact, there is suggestive evidence that this trade-off could have been mitigated by simultaneously incentivizing the use of parental leave by fathers, thereby facilitating the re-entry into the labor market for mothers after their family-related employment interruptions.

However, our results also reveal that only mothers with medium or high incomes benefited from this parental leave reform in terms of higher long-term earnings. Low-income mothers potentially lost income due to the cut of the maximum duration period, and they did not gain higher earnings in the medium or long run.

The paper is organized as follows. In the next section we describe the institutional setting and summarize the related literature. Section 3 presents the empirical approach, while section 4 provides information on the data. We present the results of our empirical analysis in section 5 and section 6 concludes.

2 Institutional Background and Previous Literature

In Germany, parental leave legislation is rather generous with respect to job protection and monetary benefits. First, there is maternity leave, which assures employed women a leave of six weeks before and eight weeks after giving childbirth and financial benefits that replace their total net prior-to-birth earnings. After this, each parent can take parental leave from his or her job and is granted employment protection for a maximum of three years. However, not all of this maximum parental leave period is or has been paid: Until the end of 2006, families with a newborn child could draw a cash benefit amounting to 300 euro per month for a maximum period of 24 months (*Erziehungsgeld*). This benefit was means-tested at the household level and income thresholds were set to target the median of household income of families with young children.

Above this income threshold, families did not get any financial benefit after the maternity leave period expired.²

On January 1st 2007, Germany implemented a major parental leave reform that had three goals. First, it was meant to increase financial stability for families with young children and providing a financial safeguard during the first year of a child's life. Second, an explicit aim stated in the law was to increase economic independence of both parents, in particular mothers', by shortening employment interruptions of mothers. Finally, gender equality goals were also explicitly stated in the law: Fathers should be encouraged to take a more active role in child care by introducing financial incentives such as a fathers' quota in the parental leave benefits scheme.

The *Elterngeld* that was introduced for all children born on or after January 1st 2007 replaced the *Erziehungsgeld*. In contrast to this previous benefit, the new *Elterngeld* is not means-tested and more generous for most families. It replaces 67 percent of prior-to-birth net earnings of the parent on leave, up to a maximum of 1,800 euro per month. The minimum amount of *Elterngeld* awarded is 300 euro per month, which is equivalent to the monthly benefit paid under the previous *Erziehungsgeld*. However, it is paid for a shorter period of time (12 months if only one parent takes leave or 14 months if both parents take leave).

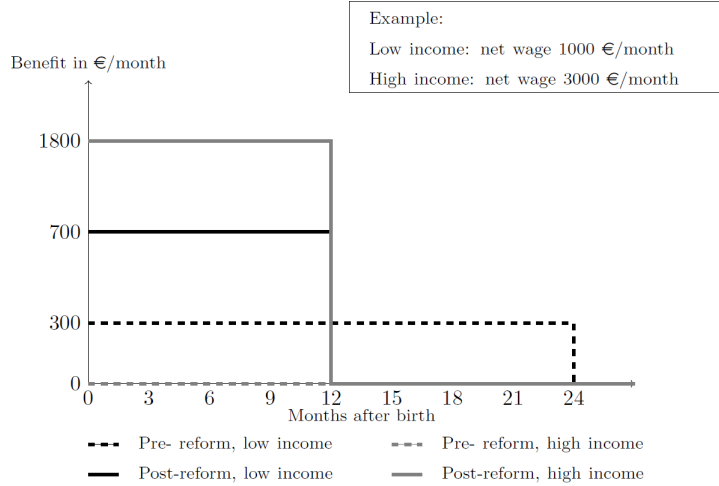
Figure 1 summarizes the changes in financial incentives for two exemplifying mothers who earn 1,000 euro and 3,000 euro per month, respectively. Depending on prior-to-birth earnings and household income, the reform changed financial incentives to work in a different way during the first two years after the child is born. For mothers with high prior-to-birth earnings, incentives to stay at home in the first year after the maternity leave period increased strongly. For mothers with no or low prior-to-birth earnings and below-median net household income, incentives to go back to work in the first year decreased, while they increased in the second year.

The parental leave benefit reform of 2007 has been evaluated in several empirical studies. For example, Kluve and Tamm (2013) exploit the quasi-experimental setting of the reform and find that the probability that mothers return to work during the first year after giving birth to a child has declined, in particular for high-income mothers. This finding has been confirmed in later studies, e.g. by Bergemann and Riphahn (2011, 2015), Geyer et al. (2015), and Welteke and Wrohlich (2019). Kluve and Schmitz (2018) analyze mothers' employment responses not only in the first and second year after giving birth but also in the third to fifth year. Based on data from the German Microcensus, they find a large and significant increase in the employment rate of mothers with three to five year old children. Moreover, they find that the reform increased employer continuity, i.e. a higher share of mothers returned to their pre-birth

²Actually, there were two different income thresholds around the median income. If household income exceeded the higher threshold (22,086 Euro net household income per year in 2006), the benefit was withdrawn completely. Below the lower threshold (16,500 Euro net household income per year in 2006), it was granted fully. In between these two thresholds, the benefit was diminished by 5.2 percent of the income exceeding the lower threshold.

employer. Moreover, Welteke and Wrohlich (2019) show that the reform changed social norms regarding the length of parental leave via social interaction effects among coworkers.³

Figure 1: Changes in financial incentives due to the 2007 parental leave reform



Source: Welteke and Wrohlich (2019)

Research analyzing several parental and maternity leave reforms from earlier periods (Ludsteck, 2014) has shown that extending parental leave in the 1970s, 1980s and 1990s in (West) Germany prolonged mothers' employment interruptions, however, did not affect mothers' earnings in the medium run, i.e. up to 6 years after giving birth. Only one reform that strongly extended the period of paid leave (from 6 to 22 months) has been shown to decrease medium-term earnings to a small extent. Similarly, Lalive, Schlosser, Steinhauer, and Zweimüller (2014) have shown for Austria that reforms that have increased the maximum duration of paid leave in combination with job-protection have prolonged mothers' employment interruptions quite strongly, however did not harm mothers' earnings in the medium run. Similar results have also been found for the parental leave scheme introduced in California (e.g Baum and Ruhm, 2016), Canada (Baker and Milligan, 2008) and Australia (Broadway, Kalb, McVicar, and Martin, Forthcoming). As summarized by Rossin-Slater (2018), the general conclusion from the literature is that leave entitlements up to one year can improve job continuity for women and increase their labor market attachment, however, longer leaves can negatively affect their earnings, employment and career advancement.

³There are many further studies analyzing the effect of the 2007 parental leave reform with respect to other outcomes. For example, Cygan-Rehm (2016) and Raute (2019) analyze its effects on fertility, Huebener, Kuehnle, and Spiess (2019) the effects on child outcomes, Cygan-Rehm, Kuehnle, and Riphahn (2018) look at parents' living arrangements, and Tamm (2019) evaluates the effects on father's childcare involvement.

Against the background of previous empirical findings and the way how the 2007 parental leave reform in Germany changed incentives to work during the first and second year after childbirth, we expect the following effects on earnings: Given that the reform has ambiguous effects on the duration of employment interruption of mothers with low pre-birth earnings, later labor market outcomes of this group could be either zero, positive or negative. On the other hand, the expected longer employment interruptions of mothers with high pre-birth earnings resulting from the parental leave reform, could potentially lead to negative effects on long-term labor market outcomes for this group. However, since it has been shown by previous research (Kluve and Schmitz, 2018) that this reform has yielded some positive labor market effects for high-income mothers in the medium run, such as higher employer stability and a larger share of permanent work contracts, there might also be positive effects on earnings in the medium and long run.

Due to these ambiguous mechanisms, the sign and the magnitude of the long-term effects of the 2007 parental leave reform on mothers' earnings remain an empirical question that will be analyzed in the remainder of this paper.

3 Empirical Approach

To identify the causal effects of the reform on mothers' long-run labor market outcomes, we exploit the introduction of the new parental leave benefit scheme in January 2007 as a natural experiment. Due to the timing of this reform, parents of children born in the first quarter of 2007 could not know that they would be eligible for the new benefits at the time of conception of their child (see, e.g. Kluve and Tamm, 2013). Comparing mothers with children born in the first quarter of 2007 (treatment group) to mothers with children born in the last quarter of 2006 (control group) thus identifies the intention-to-treat effect (ITT) of the reform.

Mothers with children born in the last quarter of a year, however, might differ in their labor market outcomes from mothers with children born in the first quarter of a year.⁴ To control for these potential seasonal effects, we add observations from the last quarter of 2005 and the first quarter of 2006 and employ a difference-in-differences estimation strategy. Moreover, this approach allows controlling for potential seasonality in the labor demand or for seasonal bonus payments. In particular, we estimate the effect of the parental leave reform using the following equation:

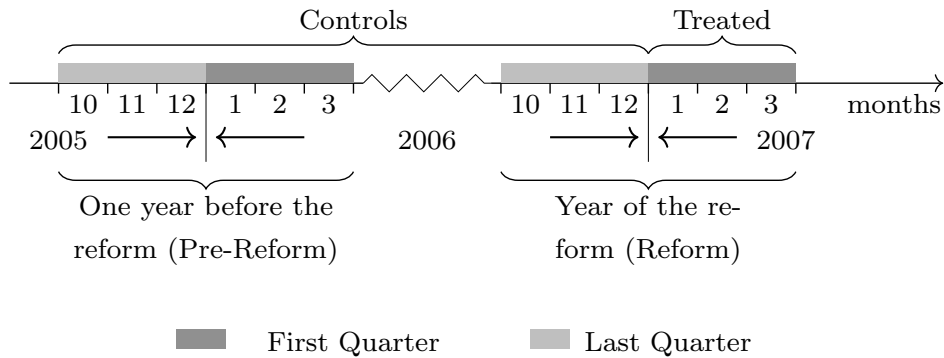
$$Y_{it} = \alpha + \beta \text{FirstQuarter}_{i0} + \gamma \text{Reform}_{i0} + \delta \text{FirstQuarter}_{i0} \cdot \text{Reform}_{i0} + \omega X_{it} + \epsilon_{it} \quad (1)$$

where Y_{it} denotes the log of the daily wage of mother i in year t . The dummy variable *FirstQuarter* takes on the value 1 if the mother has given birth to her first child in the first quarter of the

⁴Previous studies for the U.S. and the Czech Republic have shown that the season of birth is correlated with socio-demographic factors of the mother and the child's later outcomes (Bobak and Gjonca, 2001; Buckles and Hungerman, 2013; Clarke, Orefice, and Quintana-Domeque, 2019).

year 2006 or 2007 and 0 if the birth has taken place in the last quarter of 2005 or 2006. The dummy variable *Reform* takes on the value 1 if the mother gave birth to a child in the months around the implementation of the reform, i.e. in the last quarter of 2006 or in the first quarter of 2007, and 0 if the birth has taken place in the year before. Under our identifying assumptions, the coefficient δ of the interaction term of these two dummy variables is the causal effect of the parental leave reform. Figure 2 shows the definition of the treatment and control groups in our setting graphically.

Figure 2: Depiction of treatment and control groups



Source: Own depiction

For the identification of the causal effect of the parental leave reform on mothers earnings we make use of the fact that the reform was announced in June 2006 and came into effect in January 2007 (Kluge and Tamm, 2013). This timing implies that parents whose child was born in the first three months of 2007 could not know that they would be eligible for the new benefits at the time of conception of their child. To exclude potential selection into the period after the cut-off date by postponing birth⁵ we exclude all mothers who have given birth to a child 14 days before and after January 1.

4 Data

For the empirical analysis we mainly use individual information generated from labor administration of the German Federal Employment Agency and from social security data processing (IEB) based on the integrated notification procedure for health, pension, and unemployment insurances. The IEB is provided by the IAB and contains the total population of individuals in Germany who have either an employment contract subject to social security contributions,

⁵Neugart and Ohlsson (2013) and Tamm (2013) show that some mothers, in particular employed mothers, postponed their birth after January 1st, 2007. The timing of birth around cut-off points has also been found for other reforms (Dickert-Conlin and Chandra, 1999; Gans and Leigh, 2009)

receive benefits in accordance with Social Code Book II, Social Code Book III or are registered with the Federal Employment Agency as a job-seeker.

From these data, we select a sub-sample of all mothers for whom we can identify the first birth of a child in the last quarter of 2005 or 2006 or the first quarter of 2006 or 2007 and who have been employed 10 months before childbirth. For these individuals, we observe their whole employment history (since 1975) and wages up until nine years after giving birth.

As the date of childbirth is not directly observed in the IEB data, we apply the birth identification strategy developed by Müller and Strauch (2017). This approach allows us to calculate the expected date of delivery since the data offers information on the reason why an (un-)employment episode has ended⁶. However, this approach is based on the expected date of birth which may differ from the real date. In order to exclude births that were potentially postponed from December to January due to the parental leave reform, we exclude births that took place two weeks before or after January 1st.

One major advantage of the IEB data is that it contains the universe of women working subject to social security. Therefore, the data offer a very large number of observations and their employment statuses and gross earnings depicted exactly at each day. These data allow us to use observations from a very narrow time window around the introduction of the new parental leave benefit in order to identify truly causal effects of the reform. However, one shortcoming of the IEB data is that it only contains daily earnings.⁷ Hourly wages cannot be computed, since information about the hours worked is not available in this data set. We, therefore, use gross daily earnings as the main outcome variable of interest. In order to obtain the earnings in the years after (before) birth, we use the daily earnings information exactly 365 days after (before) birth for $t+1$ ($t-1$), 730 days for $t+2$ ($t-2$) and so forth.

Daily earnings, however, depend on the hours of work and, therefore, differ between part-time and full-time employees. Employment patterns with respect to hours of work, however, may also have changed as a result of the reform. If, for example, more women are working part-time as a result of the reform, we would find a negative effect of the reform on daily earnings. In that case, these results should not be interpreted as an effect of the parental leave reform on mothers' hourly wages but as a combined effect on working hours and (potentially) hourly wages.

In order to disentangle potential effects on daily earnings by changes in working hours and changes in hourly wages, we additionally need to analyze the long-term effects on working hours. To this end, we analyze data from the German Microcensus. The German Microcensus is a one percent random sample of the population living in Germany and includes more than 800,000

⁶Note that according to the maternity protection law in Germany, all pregnant mothers have to take mandatory maternity leave 6 weeks before the expected date of delivery and 8 weeks after the actual date of birth. In this period, they are paid a maternity leave benefit that replaces a high percentage of their net earnings.

⁷As earnings in the IEB are top-censored above the contribution limit for the pension insurance, we estimate earnings above this limit. However, the censoring affects only two percent of our sample.

individuals in more than 350,000 households per year. We use the waves 2008 to 2016 and select mothers who gave birth to a child in the last six months of 2005 or 2006 or in the first six months of 2006 to 2007. Based on these data, we are able to identify the effect of the parental leave reform on working hours one to nine years after giving birth to a child. Further, the socio-economic variables in the Microcensus allow us to examine whether effects in earnings may come from sample selection. However, a major drawback of this data set is that it does not provide information on the past such as previous wage. Therefore, we use the level of education as a proxy for previous earnings. In particular, we define individuals with "high level of formal education" as those with a tertiary degree. In contrast, we refer to "low level of formal education" as persons without vocational training or A-levels.⁸

Both data-sets, the IEB and the Microcensus, have no or very limited information on fathers' use of parental leave. Therefore, we complement our results based on the IEB and the Microcensus with analyses on fathers' use of parental leave based on data from the German Socio-Economic Panel. The German Socio Economic Panel (SOEP) is a yearly panel survey with detailed information from approximately 30,000 people from 15,000 households. From this data set, we select fathers who had a child between 2000 and 2015 and match the educational level of their partner.

Since the changes in economic incentives induced by the parental leave reform differ by pre-birth earnings of the mother, we run separate estimations for mothers with high, and low pre-birth earnings in all our regressions. In this context, we define mothers with low pre-birth⁹ earnings as those who had daily earnings of up to the 25th percentile (42.3 euro per day) and those with high prior-to birth earnings as those who had daily earnings above the 75th percentile (91.7 euro per day). As a robustness check, we will also estimate the effects for mothers with medium prior-to-birth-earnings, defined as earnings between these two thresholds.

While the IEB data allows us to observe gross earnings *exactly* one, two or more years before and after birth, the survey data in the Microcensus gives information only to one specific day of the year. Thus, for the Microcensus, we have to assume that the information at the date of the interview in 2008 corresponds to the employment status one year after birth, 2009 to two years after birth, and so forth. Thus, it is possible that the working hours differ between the date of the interview and the date of the corresponding year after birth. However, we do not expect this potential bias to be correlated with the treatment status.

Descriptive statistics on the dependent variables daily earnings and working hours based on IEB and Microcensus data can be found in Tables 1 to 4 in the Online Appendix.¹⁰ Table 4 gives

⁸Since the Microcensus is substantially smaller than the IEB, we estimate the reform effects for both groups of mothers in one single regression. In order to differentiate the causal effect for high- and low-educated, we add an interaction term of the treatment variable and the level of education to equation (1).

⁹In accordance with Frodermann, Müller, and Abraham (2013), we define *prior-to-birth* as ten months before the expected date of birth.

¹⁰The Online Appendix can be accessed following this https://doi.org/10.25652/diw_data_S0022.1.

the descriptive statistics of daily earnings for high- and low-income mothers in the respective treatment and control group for all years starting from two years before giving birth up to nine years after giving birth based on IEB data. We observe no difference between treatment and control groups before giving birth. In the first year after giving birth, the earnings of treated mothers are lower, which is probably due to negative labor supply effects of the parental leave reform in this period. From the second year on earnings in the treatment group exceed those of the control group.

Table ?? summarizes descriptive statistics for all relevant control variables for the same groups nine years after giving birth based on IEB data. Similarly, Tables ?? and ?? summarize working hours (conditional on working) and control variables, respectively, for all mothers in treatment and control groups based on the Microcensus. None of these tables indicates any differences in the control variables or the number of working hours between the treatment and control groups.

5 Results

In this section, we first describe the effects of the parental leave reform on mothers' labor supply and the duration of mothers' employment interruptions after giving birth. Following this, we present the effects on earnings, both for all mothers and the sample of working mothers. After that, we show the effects on average weekly working hours (conditional on employment) and on potential changes in socio-demographic characteristics of working mothers as well as changes in job characteristics. Finally, we discuss the effects of changes in fathers' take-up of parental leave before presenting the results of analyses of the reform effects on earnings for several socio-economic subgroups.

5.1 Effects on Labor Supply and the Duration of Employment Interruptions

The analysis of the effect of the introduction of the new parental leave benefit on mothers' employment interruptions based on the IEB data confirms the predictions of a standard economic model of labor supply – given the changes in financial incentives – as well as the findings of previous studies. Defining daily earnings greater than zero as labor force participation in order to analyze the extensive margin of labor supply, we find that mothers with high pre-birth earnings reduce labor supply in the first year after giving birth (-3.2 percentage points; see Table 1). After the second year, we do not find any differences in labor force participation as a result of the parental leave reform for this group of mothers. For low income mothers, we also find negative labor supply effects in the first year (-3.9 percentage points), but positive effects in the

second, third and fourth year of giving birth. For all other years, we do not find changes in labor force participation of mothers in this group.¹¹

Table 1: Effects of the parental leave reform on mothers' labor supply (2 years before up to 9 years after giving birth)

Labor force participation (in pp)	Low-income mothers	High-income mothers
	low-income	high-income
t-2	-0.006 (0.008)	-0.002 (0.002)
t-1	-0.002 (0.008)	-0.002 (0.002)
t+1	-0.039*** (0.007)	-0.032*** (0.005)
t+2	0.038*** (0.009)	-0.010* (0.004)
t+3	0.021* (0.009)	0.003 (0.005)
t+4	0.024** (0.009)	0.005 (0.004)
t+5	0.012 (0.009)	-0.001 (0.004)
t+6	0.001 (0.009)	0.000 (0.004)
t+7	0.011 (0.009)	-0.001 (0.003)
t+8	0.013 (0.009)	0.003 (0.003)
t+9	0.006 (0.009)	0.004 (0.003)
N	35,808	40,762

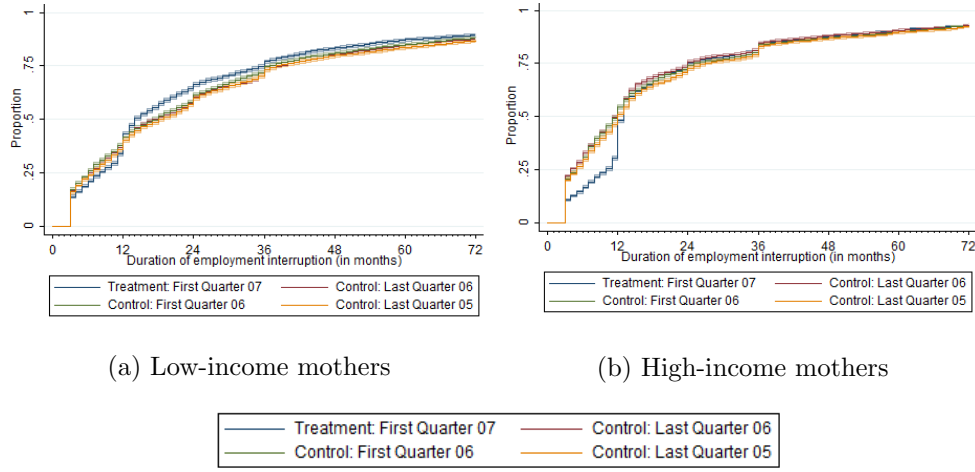
Source: IEB 1976-2016; own calculations. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Looking at the duration of employment interruptions after giving birth, we find similar patterns (Figure 3, right panel). Results from an estimation of equation (1) with the duration of the employment break (measured in months) as the dependent variable show that the reform increases the employment interruption for mothers with high pre-birth earnings by 2.8 months on average (Table 2, column II).

The effects for low-income mothers are shown in the left panel of Figure 3 and in column (I) of Table 2: For these mothers, the probability to return to employment in the first year after giving childbirth has slightly decreased, while it has increased in the second year. However, the

¹¹Using annual earnings as an alternative specification for labor force participation, we find very similar results. Results from these estimations can be obtained from the authors upon request.

Figure 3: Effects of the parental leave reform on the duration of employment interruptions



reform had no statistically significant effect on the duration of employment break for mothers in this group.

Table 2: Effects of the parental leave reform on employment interruptions (in months)

Duration of employment break (months)	Low-income mothers	High-income mothers
First quarter (vs. last quarter)	-1.540** (0.511)	-0.869* (0.412)
Reform (vs. Pre-reform)	-1.467* (0.494)	-2.081*** (0.406)
First quarter * Reform	-1.309 (0.680)	2.844*** (0.560)
Constant	31.436*** (0.368)	23.472*** (0.297)
R ²	0.002	0.001
N	39,549	41,836

Source: IEB 1976-2016; own calculations. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

5.2 Effects on Earnings

Estimation results based on the whole sample of mothers who were employed prior to giving birth show that mothers with low pre-birth earnings experience a small drop in daily earnings in the first year after giving birth, which is a result of the negative labor supply effect in this period (see Table 3).¹² In the second, third and fourth years after giving birth, however, we find

¹²The entire regression for low- and high-income mothers nine years after giving birth is shown in table 7 in the Online Appendix.

a small increase of the earnings of mothers in this group. This can be explained by the positive labor supply effects in the second and third year after giving birth. These effects, however, fade out over time: Five years after giving birth, we do not see any changes in earnings caused by the parental leave benefit reform.

For mothers with high pre-birth earnings, on the other hand, we find positive effects in the medium as well as in the long run: While these mothers also experience a drop in earnings in the first year after giving birth (explained by the reduction in labor supply), we find positive earnings effects in all years except for the fifth year after giving birth. Even nine years after giving birth, these mothers have higher daily wages in the magnitude of about 2.2 Euro per day (about 4 percent). The results are similar for the outcome variable of annual earnings, as well as for a specification without the imputation of top-censored earnings, as can be seen from Table 8 in the Online Appendix.

Estimations based on a sample of working mothers show very similar results, both for mothers with high and low pre-birth earnings. Conditional on employment, mothers with low pre-birth earnings get higher earnings in the second year after giving birth as a consequence of the reform (see Table 8 in the Online Appendix). This effect might be the result of a negative-selected group of mothers pre-reform, i.e. women who were eligible for the benefit but who could not afford not to work. However, this positive effect on earnings disappears already in the subsequent year. In the medium or long run, we do not find any effects on earnings resulting from the shorter employment breaks induced by the parental leave reform for mothers with low pre-birth earnings. For mothers with high pre-birth earnings, on the other hand, we find positive effects on daily earnings. In the second year after giving birth, the parental leave reform increases earnings for these mothers by 10 percent. This substantial effect declines gradually in the subsequent years (7 percent in the third, 4 - 5 percent in the fourth and 3 percent thereafter) but is still positive and significant nine years after giving birth (see Table 8 in the Online Appendix).

For mothers with medium pre-birth earnings, i.e. with daily earnings above 42.3 Euro (25th percentile) and below 91.7 Euro (75th percentile), changes in financial incentives induced by the parental leave reform are not as unambiguous as for the high- and low-income mothers. Some medium-income mothers might face financial incentives that increase labor force participation in the first and second year after giving birth, for others, it might be different, depending in particular on the partner's income in the first and second year after the birth of the child. In Table 4 we present the results of estimations of the earnings effects of mothers with medium pre-birth earnings. Just as in the case of mothers with high or low pre-birth earnings, we find a drop in earnings in the first year after giving birth, which is due to a negative labor supply effect in this period.¹³ In the second, third and fourth year after giving birth, earnings increase due to the reform for this group of mothers. These positive effects, however, fade away five years

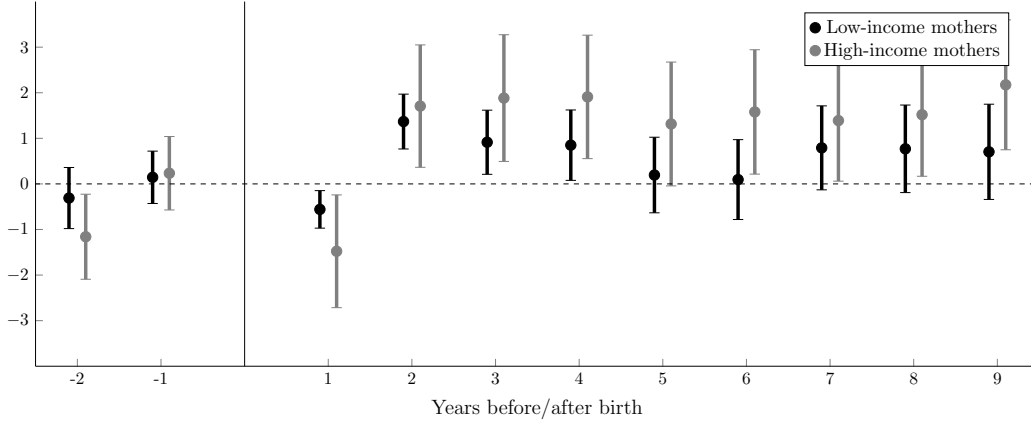
¹³The reform effects on the duration of the parental leave for medium-income mothers are shown in Figure 3 in the Online Appendix. The selection mechanism are similar to those of high-income mothers, i.e. mothers, who

Table 3: Effects of the parental leave reform on daily earnings for mothers with high and low pre-birth earnings

	Low-income mothers			High-income mothers		
Daily earnings	Control mean ¹	Difference T-C	Difference T-C with controls ²	Control mean ¹	Difference T-C	Difference T-C with controls ²
yt-2	18.21	-0.467 (0.410)	-0.310 (0.342)	83.89	-0.863 (0.793)	-1.159* (0.476)
yt-1	20.75	-0.011 (0.347)	0.145 (0.293)	91.89	1.455* (0.694)	0.234 (0.411)
yt+1	4.18	-0.626** (0.223)	-0.559*** (0.210)	20.64	-8.916*** (0.804)	-1.478* (0.631)
yt+2	8.95	1.737*** (0.334)	1.368*** (1.009)	46.80	1.437 (0.307)	1.707* (0.685)
yt+3	12.16	1.296*** (0.392)	0.914* (0.359)	48.06	2.224* (1.020)	1.883** (0.709)
yt+4	15.46	1.035* (0.432)	0.850* (0.394)	50.55	3.554*** (1.033)	1.909** (0.691)
yt+5	17.39	0.524 (0.460)	0.195 (0.423)	53.79	2.024* (1.033)	1.315 (0.693)
yt+6	18.66	0.449 (0.485)	0.095 (0.447)	57.70	1.007 (1.020)	1.579* (0.696)
yt+7	19.94	1.070* (0.026)	0.791 (0.470)	61.79	-0.019 (1.008)	1.389* (0.678)
yt+8	21.01	0.970 (0.026)	0.770 (0.490)	64.30	0.466 (1.016)	1.518* (0.689)
yt+9	24.14	1.009 (0.026)	0.704 (0.533)	69.63	1.013 (1.075)	2.174** (0.727)

Source: IEB 1976-2016; own calculations. All specifications control for seasonal trends (pre-reform dummy), 1 Control mean refers to the average mean of mothers who gave birth in the last quarter of 2006, as daily wage; Controls 2: Pre-birth wage, age at birth, education, experience (ft & pt), rel. duration of unemployment, size of establishment, working time before birth, change of establishment, east Germany, citizenship, no. of children, region, tenure and change of employer after birth. The number of observations is 38,631 for low-income mothers and 42,563 for high-income mothers. Significance levels: * p< 0.05, ** p<0.01, *** p< 0.001.

Figure 4: Effects of the parental leave reform on daily earnings for mothers with high and low pre-birth earnings (in Euro)



Source: IEB 1976-2016; own calculations. The graph plots the causal effect of the reform with the corresponding 95% confidence intervals.

after giving birth. In sum, the results for medium-income mothers resemble those of low-income mothers: positive earnings effects in the medium-run, but no effects on earnings in the long run.

To sum up, although the parental leave reform prolonged employment interruptions for a large group of mothers, this did not harm their earnings in the years after giving birth. In contrast to predictions of human capital theory, we find that mothers get higher earnings for several years after the birth of their child. For mothers with high pre-birth earnings, these positive effects even show up in the long-run, i.e. up to nine years after giving birth. In the next sub-sections, we analyze potential mechanisms that could explain the positive long-run effects on earnings for mothers with high pre-birth income, in particular potential changes in working hours, socio-demographic characteristics of working mothers or job characteristics.

5.3 Effects on Working Hours

One explanation of the positive effects of the parental leave reform on the daily earnings of mothers with high pre-birth earnings could be that they have longer working hours after they return to the labor market. In order to analyze whether mothers react to the parental leave reform with respect to their working hours, we estimate equation (1) with the weekly working hours as the dependent variable based on the German Microcensus.

Regression results based on this data set show that there is no statistically significant effect of the parental leave reform on weekly working hours of mothers in the years after giving birth (Table 5). This is true for both, mothers with a high level of formal education, and for those with a low level of formal education.

work in the first year after childbirth, although they were eligible for the benefit, represent a highly labor market attached group of women.

Table 4: Effect of the parental leave reform on daily earnings for mothers with medium prior-to-birth earnings

	Medium-income mothers		
	Control mean1	Difference T-C	Difference T-C with controls2
Duration of employment break (month)	25.00	1.038* (0.412)	
y_{t-2}	56.34	-0.481 (0.380)	-0.489 (0.261)
y_{t-1}	60.75	-0.168 (0.326)	-0.268 (0.216)
y_{t+1}	7.73	-2.720*** (0.266)	-0.686** (0.220)
y_{t+2}	19.04	2.129*** (0.371)	1.641*** (0.284)
y_{t+3}	23.54	1.062** (0.402)	0.607* (0.306)
y_{t+4}	27.47	1.154** (0.416)	0.847** (0.309)
y_{t+5}	28.40	0.517 (0.423)	0.332 (0.322)
y_{t+6}	30.28	0.269 (0.426)	0.264 (0.330)
y_{t+7}	32.51	0.325 (0.427)	0.161 (0.329)
y_{t+8}	34.25	0.410 (0.437)	0.344 (0.338)
y_{t+9}	38.00	0.639 (0.468)	0.156 (0.361)

Source: IEB 1976-2016; own calculations. All specifications control for seasonal trends (pre-reform dummy), 1 Control mean refers to the average mean of mothers who gave birth in the last quarter of 2006, as daily earnings; Controls 2: Pre-birth wage, age at birth, education, experience (ft & pt), rel. duration of unemployment, size of establishment, working time before birth, change of establishment, east Germany, citizenship, no. of children, region, tenure and change of employer after birth. Number of observations: 81,140. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Based on this result, we conclude that the parental leave reform had no effect on the working hours of mothers after re-entering the labor market. Thus, the positive effect on daily earnings for high-income mothers does not stem from an extension of their working hours but can rather be interpreted as a positive effect on their hourly wage.

Table 5: Effect of the parental leave reform on working hours

Weekly working hours	Low-educated mothers			High-educated mothers		
	Control mean ¹	Difference T-C ³	Difference T-C with controls ³⁴	Control mean ¹	Difference T-C ³	Difference T-C with controls ³⁴
2008	24.78	6.340	5.525	29.40	1.444	1.408
P($\beta(\text{Treatment}) = 0$) ²		0.108	0.142		0.199	0.249
2009	23.32	1.586	0.175	30.20	-0.265	-0.592
P($\beta(\text{Treatment}) = 0$) ²		0.660	0.958		0.897	0.940
2010	23.29	1.924	3.176	29.18	1.481	1.371
P($\beta(\text{Treatment}) = 0$) ²		0.590	0.345		0.564	0.440
2011	26.28	1.630	2.075	29.28	0.430	0.721
P($\beta(\text{Treatment}) = 0$) ²		0.659	0.440		0.870	0.651
2012	23.66	2.805	2.948	28.64	-0.650	-1.269
P($\beta(\text{Treatment}) = 0$) ²		0.666	0.362		0.847	0.460
2013	22.29	-3.967	-2.630	28.16	0.778	0.365
P($\beta(\text{Treatment}) = 0$) ²		0.224	0.676		0.416	0.676
2014	20.22	1.422	2.656	27.94	0.533	0.523
P($\beta(\text{Treatment}) = 0$) ²		0.630	0.351		0.842	0.818
2015	18.88	2.891	4.314	27.45	-2.306	-1.891
P($\beta(\text{Treatment}) = 0$) ²		0.361	0.154		0.123	0.104
2016	24.53	-3.138	-3.630	28.56	0.150	-0.128
P($\beta(\text{Treatment}) = 0$) ²		0.225	0.300		0.475	0.580

Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus 2008-2016; own calculations. All specifications control for seasonal trends (pre-reform dummy); Treatment dummy equals 1 if the first child is born in the first half of 2007; 1: The control mean equals the average working hours of women who gave birth to their first child in the last half of 2006. 2: F-Test of joint significance: For low-educated $P(\beta(\text{Treatment}))$ and for high-educated $P(\beta(\text{Treatment}) + \beta(\text{Treatment} * \text{High-educated}))$ 3 The size of the coefficient equals the sum of the treatment effect and the interaction of the treatment and the highest educational group. 4 Controls: Age (single and quadratic), number of children, region (East vs. West and Urban vs. Rural), nationality, marital status; The number of observations vary between 905 (2008) and 1,920 (2016). Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

5.4 Changes in Socio-Demographic Characteristics

Since we do not observe any statistically significant changes in weekly working hours of mothers that could explain the positive effects on daily earnings, we analyze whether the selection of working mothers in terms of observable socio-demographic characteristics has changed due to the parental leave reform. To this end, we run several estimations of equation (1) with

socio-demographic characteristics such as education level, age and marital status as dependent variable. As summarized in Table 6, there is no statistically significant change in the composition of working mothers with respect to these characteristics resulting from the parental leave reform in any of the years 2008 to 2016, with only one minor exception. In the year 2013, we find that working mothers in the treatment group have a higher probability to be married than in the control groups. We do not find this result, however, in any other year, and, therefore, argue that this finding is negligible.

Table 6: Effects of the parental leave reform on the socio-demographic characteristics of working mothers

Variable	Year								
	2008	2009	2010	2011	2012	2013	2014	2015	2016
High education									
Control mean	0.63	0.64	0.67	0.70	0.67	0.67	0.69	0.74	0.75
Difference T-C	0.00	-0.04	-0.07	-0.02	0.05	0.07	0.05	0.02	-0.02
Standard Error	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)
Age									
Control mean	30.30	31.53	32.39	33.25	34.32	35.12	35.84	37.32	38.67
Difference T-C	-0.17	-0.57	-0.45	0.60	0.90	0.72	0.66	-0.04	0.48
Standard Error	(0.61)	(0.59)	(0.57)	(0.54)	(0.54)	(0.55)	(0.51)	(0.50)	(0.45)
Married									
Control mean	0.72	0.74	0.75	0.75	0.75	0.73	0.74	0.76	0.76
Difference T-C	0.00	-0.07	-0.08	0.02	0.03	0.07	0.02	0.02	0.03
Standard Error	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)
High-educated									
Age									
Control mean	33.55	34.52	35.27	36.04	37.10	37.96	38.10	39.22	40.46
Difference T-C	-0.44	-0.29	-0.34	0.22	-0.13	0.16	0.45	-0.02	0.54
Standard Error	(0.53)	(0.54)	(0.52)	(0.49)	(0.51)	(0.51)	(0.51)	(0.49)	(0.45)
Married									
Control mean	0.80	0.80	0.84	0.81	0.82	0.80	0.79	0.79	0.79
Difference T-C	-0.05	-0.01	-0.05	0.03	0.01	0.10*	0.02	0.02	0.05
Standard Error	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Low-educated									
Age									
Control mean	26.05	27.26	27.38	28.02	29.79	30.66	31.73	33.31	34.44
Difference T-C	-0.62	-0.65	0.57	1.20	1.17	0.73	0.81	-0.20	1.15
Standard Error	(0.91)	(0.95)	(0.89)	(0.90)	(0.90)	(0.98)	(0.96)	(1.08)	(0.99)
Married									
Control mean	0.59	0.66	0.58	0.60	0.63	0.60	0.61	0.67	0.67
Difference T-C	0.02	-0.10	-0.04	0.02	0.09	0.01	0.07	0.10	-0.01
Standard Error	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.07)

Source: RDC of the Federal Statistical Office and Statistical Offices of the L  nder, Microcensus 2008-2016; *: The control mean equals the average working hours of women who gave birth to their first child in the last half of 2007.; Treatment dummy equals 1 if the first child is born in the first half of 2007. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

Positive earnings effects resulting from the parental leave reform could further be the consequence of differences in the family setting caused by the reform. For example, the new parental leave scheme could have affected subsequent fertility patterns and, thereby, indirectly mothers' earnings in the long run. If the parental leave reform would have decreased the probability to have another child, this could explain positive earnings in the long run. However, the literature finds the opposite: Cygan-Rehm (2016) investigated whether the reform had an effect on timing of higher-order births. She finds that high-income mothers have a higher probability of a next child within 24 months after a previous childbirth. Moreover, Raute (2019) compares fertility rates pre- and post-reform and finds that the reform increased the probability to give birth, in particular for mothers who already have one or two children. On the other, Kluve and Schmitz (2018) find no effects on the likelihood to have a subsequent birth for mothers with high prior-to-birth income.¹⁴ In conclusion, potential increases in fertility would - if at all - lead to a downward bias of our estimation of the reform effect on daily earnings several years after giving birth to the first child.

5.5 Changes in Employer Stability

Previous research has shown that as a result of parental leave reforms, employer stability has increased. For example, studies by Baker and Milligan (2008) and Baum and Ruhm (2016) have shown that in cases where the employment-protected period of leave (paid or unpaid) was introduced, employer stability has increased significantly. Kluve and Schmitz (2018) have shown that even for the German 2007 reform, where the job-protection period of three years has been left unchanged while only the duration and level of parental leave benefit payments have changed, employer stability has increased. In their analysis based on the Microcensus, they find that mothers have a higher probability to return to their pre-birth employer. Our analysis of the IEB data shows very similar results. We find that high-income mothers who return to work in the second year after giving birth have a 2 percentage points higher probability of returning to their pre-birth employer (Table 7).

Kluve and Schmitz (2018) argue that this increased employer stability is rewarded by a higher job-quality in terms of length of contract. Similarly, it could be that employers also reward higher job stability with higher wages. Therefore, we compare the long-run effects on earnings of mothers who return to their pre-birth employer¹⁵ with those who return to the labor market with a new employer. As Table 8 shows, the earnings effects are very similar in both groups, in particular for high-income mothers. Note that both, the decision to return to the labor market as well as the decision to change the employer are endogenous, and therefore our

¹⁴The authors find on average a lower probability to have a subsequent birth. In the Online Appendix, they analyze the probabilities for different sub-samples (e.g. by age or prior-to-birth income).

¹⁵We refer to the employer as the establishment. Note that one company can have several establishments. Thus, we would also identify a change of employer if someone moves to another establishment within the same company.

Table 7: Effects of the parental leave reform on the probability to change the firm after the employment interruption

Probability to change the employer	Low-income mothers		High-income mothers	
	Control mean ¹	Difference T-C	Control mean ¹	Difference T-C
y_{t+1}	0.041	−0.002 (0.009)	0.022	−0.005 (0.006)
y_{t+2}	0.190	−0.016 (0.012)	0.096	−0.020** (0.007)
y_{t+3}	0.276	0.006 (0.008)	0.137	−0.006 (0.013)
y_{t+4}	0.288	−0.003 (0.012)	0.151	−0.001 (0.009)
y_{t+5}	0.299	−0.023 (0.012)	0.147	−0.005 (0.008)
y_{t+6}	0.276	0.010 (0.012)	0.149	0.002 (0.008)
y_{t+7}	0.254	0.003 (0.011)	0.131	−0.002 (0.008)
y_{t+8}	0.244	0.002 (0.011)	0.113	0.003 (0.007)
y_{t+9}	0.254	−0.004 (0.011)	0.119	−0.006 (0.007)

Source: IEB 1976-2016; own calculations. All specifications control for seasonal trends (pre-reform dummy), 1 Control mean refers to the average mean of mothers who gave birth in the last quarter of 2006, as the exponential of the log wage; The number of observations vary between 6,358 (y_{t+1}) and 23,093 (y_{t-1}) for low-income mothers and 8,128 (y_{t+1}) and 34,751 (y_{t-1}) for high-income mothers. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

results might be driven by selection effects. However, the fact that the earnings effects of the parental leave reform do not significantly differ between mothers who changed the employer after returning to the labor market and those who stayed with the previous employer suggests that the increase in job stability is probably not the main driver of the positive effects on mothers' earnings.

Table 8: Differences in the effects of the parental leave reform on daily earnings between mothers who returned to a new employer and those who stayed with the previous employer, for mothers with high and low prior-to-birth earnings

Daily earnings in Euro	Low-income mothers			High-income mothers		
	Control mean ¹	Difference Changer-Stayer	Difference Changer-Stayer with controls ²	Control mean ¹	Difference Changer-Stayer	Difference Changer-Stayer with controls ²
yt-2	18.41	-0.503 (0.856)	-0.282 (0.726)	100.38	-1.051 (1.761)	0.794 (1.349)
yt-1	20.84	0.089 (0.723)	0.330 (0.611)	110.20	1.611 (1.542)	1.456 (1.107)
yt+1	5.72	1.795*** (0.472)	1.563*** (0.421)	15.94	7.403*** (1.801)	3.641** (1.378)
yt+2	15.51	-0.863 (0.701)	-0.442 (0.615)	59.09	-1.955 (2.191)	-3.027* (1.506)
yt+3	17.93	-0.010 (0.721)	-0.482 (0.825)	59.32	0.092 (2.238)	0.193 (1.555)
yt+4	20.77	-0.166 (0.906)	-0.195 (0.792)	61.30	0.295 (2.279)	-0.002 (1.515)
yt+5	21.99	-1.716 (0.970)	-1.516 (0.853)	64.34	-3.253 (2.271)	-1.353 (1.520)
yt+6	22.84	-1.622 (1.022)	-1.174 (1.022)	67.04	0.074 (0.901)	0.779 (1.526)
yt+7	23.83	-2.501* (1.075)	-1.734 (0.947)	70.64	-2.038 (2.203)	-0.122 (1.487)
yt+8	24.00	0.027 (1.122)	0.439 (0.988)	73.67	-0.024 (2.218)	-0.167 (1.510)
yt+9	27.49	0.277 (1.223)	1.206 (1.076)	80.21	-1.080 (2.348)	0.157 (1.592)

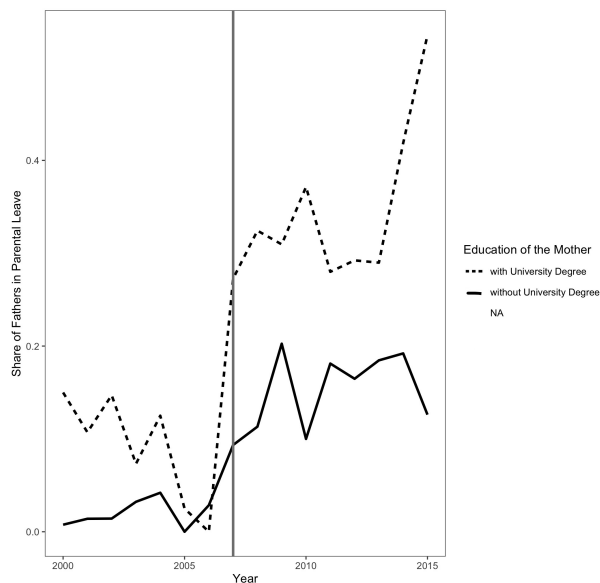
Source: IEB 1976-2016; own calculations. All specifications control for seasonal trends (pre-reform dummy), 1 Control mean refers to the average mean of mothers who gave birth in the last quarter of 2006, as the exponential of the log wage; Controls 2: Pre-birth wage, age at birth, education, experience (ft & pt), rel. duration of unemployment, size of establishment, working time before birth, change of establishment, east Germany, citizenship, no. of children, region, tenure and change of employer after birth. The number of observations vary between 7,895 (y_{t+1}) and 29,179 (y_{t-1}) for low-income mothers and 9,283 (y_{t+1}) and 39,080 (y_{t-1}) for high-income mothers. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Robust standard errors in parentheses.

5.6 Changes in Fathers' Parental Leave Taking

Another potential mechanism that could affect mothers' earnings is the role of fathers. The period after the birth of the first child is a crucial time for the division of household work (e.g. Yavorsky, Kamp Dusch, and Schoppe-Sullivan, 2017). Paternity leave promotes fathers' involvement in childcare (and potentially housework) and thereby has the potential to reduce sex specialization of market work and unpaid care work and increase the mothers' bargaining power. If there is habit persistence and learning in this context, these effects could even last after parental leave has expired (e.g. Patnaik, 2019).

As described in sections 1 and 2, the 2007 parental leave reform not only changed the amount and the duration of the parental leave benefit but also introduced a "daddy quota", i.e. a period of two (out of 14) months of paid parental leave earmarked for each parent. This policy has strongly changed the take-up of parental leave by fathers. Whereas less than three percent of fathers with children born before 2007 have taken parental leave, this number has increased to 15 percent immediately after the reform and has been increasing ever since (Samtleben, Schaeper, and Wrohlich, 2019). Empirical studies have shown that the share of fathers taking parental leave (while the mother has returned to the labor market) has particularly increased for fathers in couples where both spouses have a university degree (Geisler and Kreyenfeld, 2019) and in couples where the woman belongs to the highest earnings quartile (Trappe, 2013). Our analysis based on the SOEP also shows that fathers whose partner has a university degree have reacted much more strongly to the reform. The share of fathers taking parental leave in this group has risen from zero in 2006 to more than twenty percent in 2007 (see Figure 5).

Figure 5: Share of Fathers in Parental Leave by Educational Degree of the Mother



Source: SOEP waves 2010-2016; share of fathers with a spouse and who had a child between 2000 and 2015. Own calculation.

Previous research from other countries has shown that fathers’ parental leave taking causally increases mothers’ wages (e.g. Druedahl, Ernjaes, and Jorgensen, 2019), (e.g. Andersen, 2018). For example, Druedahl et al. (2019) show that the introduction of a period of ear-marked parental leave for fathers in Denmark in 1998 increased the female partner’s share of household income by 1.2 percentage points on average. This effect is most pronounced in the first two years after childbirth and diminishes over time, however remains significant until eight years after birth. The authors can only speculate about the mechanisms, but argue that decreased gender specific specialization in the household can have a positive effect on mothers’ wages (Andersen, 2018). Actually, several studies show that fathers’ parental leave taking causally increases their time devoted to childcare and housework even in the period after their parental leave. Exploiting a parental leave reform in the Canadian province of Quebec, Patnaik (2019) shows that fathers’ leave taking increases their involvement in childcare and housework in later years. Similar results have also been found for Germany. For example, Tamm (2019) shows that even short periods of fathers’ parental leave have long-lasting effects on fathers’ involvement in childcare and housework. Similarly, Schober (2014) finds that fathers’ parental leave taking causally increases their involvement in childcare in the first three years after childbirth.

In the light of these previous findings, we hypothesize that the increase in the take-up of parental leave by fathers after the 2007 parental leave reform in Germany could have increased fathers’ involvement in child care and household work and facilitated mothers’ re-entry to the labor market. The more equal division of unpaid care work could have increased mothers’ labor market productivity, which in turn could be reflected in higher earnings. Additionally, this could explain the diminishing positive effects on earnings over time: The effects are strongest in the first years after re-entering the labor market but fade out as the child gets older.

6 Discussion and Conclusion

The German parental leave reform of 2007, which increased the generosity of the financial benefits for mothers with medium and high pre-birth earnings but cut the maximum duration period, has prolonged employment interruptions of high-income mothers by three months on average. Our estimation results show that these longer employment interruptions did not have a negative effect on mothers’ long-term earnings perspectives. On the contrary, we even find positive effects on mothers’ earnings, which diminish over time: In the short run, mothers with high pre-birth earnings earn ten percent more as a result from the new parental leave scheme. In the medium run, i.e. three to six years after giving birth, they still earn between 4 to 5 percent and in the long run, i.e. seven to nine years after childbirth, 3 percent more than the control groups. This is also true, albeit to a lesser extent, for mothers with medium pre-birth earnings. For mothers with low pre-birth earnings, however, the reform did not affect earnings after giving birth.

In our empirical analysis, we investigate several potential mechanisms that could cause the positive effects on mothers' earnings. We are able to show that these positive effects are not driven by (i) changes in working hours, (ii) changes in observable socio-demographic characteristics of working mothers or (iii) changes in employer stability. Actually, employer stability has increased as a result of the parental leave reform. However, positive earnings effects several years after giving birth are found for both groups of mothers, those who return to their pre-birth employer and those who start working with a new employer after the birth-related employment interruption.

One alternative mechanism that could explain the positive effect on mothers' earnings is the stronger child care involvement of fathers that has been caused by the "daddy quota" that was introduced as part of the 2007 parental leave reform. This policy measure has increased fathers' parental leave taking, in particular among fathers with highly educated and high earnings spouses. It could be that the increased child care involvement of fathers facilitates mothers' re-entry into the labor market and increases their productivity, which in turn could increase their earnings.

From a policy perspective, we interpret our empirical findings as good news: Granting a more generous benefit in the first year in order to provide a financial safeguard for families with young children has led to longer employment interruptions for certain groups of mothers without harming their long-term career perspectives. Actually, we can speculate that the "daddy quota" element of the parental leave reform might have mitigated the potentially negative effect of longer paid leave durations for the group of high-income mothers and even lead to a positive effect on the earnings of this group.

However, from a social policy point of view, it has to be stressed that for mothers with low prior-to-birth earnings, we did not find positive labor market effects. Thus, not only did this group experience cuts in their benefit entitlements, but these mothers did also not benefit in terms of medium- or long-term labor market outcomes. This result is particularly relevant against the background of other recent family policy reforms such as the expansion in subsidized child care that have also been shown to benefit primarily mothers with medium or high socio-economic characteristics (Müller and Wrohlich, 2020).

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