## DISCUSSION PAPER SERIES

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Corinna Frodermann
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**Corinna Frodermann**
*IAB*

**Katharina Wrohlich**
*DIW Berlin and IZA*

**Aline Zucco**
*DIW Berlin*

# ABSTRACT

# Parental Leave Reform and Long-Run Earnings of Mothers*

Paid parental leave schemes have been shown to increase women's employment rates but decrease their wages in case of extended leave durations. 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 on long-run earnings of mothers, we use a difference-in-difference 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 high-income mothers. Nevertheless, we find a positive long-run effect on earnings for mothers in this group. This effect cannot be explained by changes in working hours, observed characteristics, changes in employer stability or fertility patterns. 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 prior-to-birth earnings, however, we do not find any beneficial labor market effects of this parental leave reform.

**Corresponding author:**
Katharina Wrohlich
DIW Berlin
Mohrenstr. 58
10117 Berlin
Germany
E-mail: kwrohlich@diw.de

# 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 this 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 mothers. Second, while the duration of job-protection has not been changed, the maximum duration of paid leave was cut from 24 to 12 months. Depending on household income and individual prior-to-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 prior-to-birth earnings. For mothers with low prior-to-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 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: High-income mothers' labor supply decreased in the first year after giving birth, i.e. their average leave duration increased. Low-income mothers, in contrast, increased labor supply in the second year after giving birth (see. e.g. Bergemann and Riphahn, 2011; Bergemann and Riphahn, 2015; Geyer, Haan, and Wrohlich, 2015; Kluve and Schmitz, 2018; Kluve and Tamm, 2013; Welteke and Wrohlich, 2019).

However, much less is known on the medium- and long-run effects of the parental leave reform. A recent study by Kluve and Schmitz (2018) has shown that the parental leave reform had several positive effects, in particular for high-income mothers, in the medium-run. The authors find that after the reform, mothers have a higher probability to return to their previous employer, which in turn leads to higher job quality in the medium run.

Evaluation studies that analyzed previous reforms of maternity leave in (West) Germany from the 1970s, 1980s and 1990s has 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).

In this paper, we broaden the focus from the short and medium-term perspective to long-term outcomes and investigate the effects of changes in the duration of mothers' employment interruptions on their earnings up to nine years after giving birth to a child. To this end, we use 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' wages we follow previous literature on short-term effects of parental leave in Germany and exploit the quasi-experiment that was set by the introduction of the parental leave benefit in 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 rule out seasonal differences, 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-difference approach.

Our results confirm previous findings and show that the parental leave reform has increased employment interruptions for high-income mothers by almost 3 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, mothers with high prior-to-birth earnings who were eligible for the new parental leave benefit have higher earnings than mothers in the control groups. However, for low-income mothers, we do not find any positive effects of the parental leave reform on earnings in the medium or in the long run.

In our empirical analysis, we are able to rule out that the positive earnings effects are caused by a change in working hours, socio-demographic characteristics of working mothers, changes in fertility patterns or changes in employer stability. Although we find that employer stability increases, i.e. a higher share of mothers who give birth after the reform return to their prebirth employer, we find no differences in the earnings effect between mothers who return to their previous employer and mothers who return to the labor market with a new employer. One potential mechanism that increases mothers' earnings in the first couple of years after giving birth could be the increased share of fathers getting involved in childcare. Descriptive evidence shows that fathers whose partner has high earnings showed the strongest reaction to the introduction of the "daddy quota" and started taking parental leave at much higher rates than the average. This 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

2

perspectives. In contrast, mothers with high prior-to-birth earnings even experience positive effects on their wages. 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 has 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. Low-income mothers potentially not only lost income due to the cut of the maximum duration period. Moreover, they did not gain higher earnings in the short, medium or long run. Also, fathers from low-income families had a lower probability to take parental leave. If family policy aims at facilitating the work-life balance also of mothers with lower earnings potential, the parental leave scheme should be reformed for example by providing higher earnings replacement rates for parents with low income.

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, in particular in comparison to the United States, rather generous with respect 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 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: Up until the end of 2006, families with a new born 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.

In 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 in 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 stylized 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 ended 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 have decreased, while they have increased in the second year.

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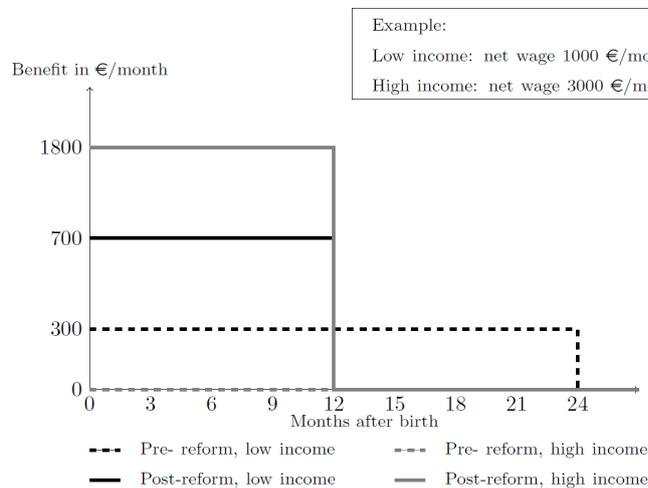


Source: Welteke and Wrohlich (2019)

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), Bergemann and Riphahn (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 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.[1]

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 affect 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.

Against this 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 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. 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 unlimited work contracts, there might also be positive effects on wages in the medium and long run.

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[1] There 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.

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 winter, however, might differ in their labor market outcomes from mothers with children born in spring.[2] 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-difference 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:

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

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 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 $\delta$ 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.

The identification of the causal effect is only valid if the assignment of mothers into treatment and control groups is random. As already mentioned, the reform was announced in June 2006 and came into effect in January 2007 (Kluve 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

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[2]Previous 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, Oreffice, and Quintana-Domeque, 2019).

Figure 2: Depiction of treatment and control groups
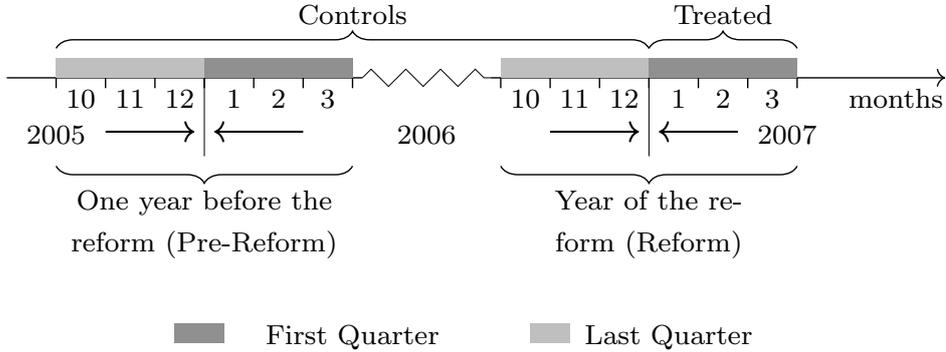


Source: Own depiction

the treatment group around the cut-off date by postponing birth[3] we exclude all mothers who have given birth to a child 14 days before and after January 1, 2007.

## 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, receive benefits in accordance with Social Code Book II 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 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 ended. However, this approach is based on the expected date of birth which may differ from the real date. Since we exclude births that took place two weeks before or after January 1st, it is unlikely that we confound treated and controls.

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[3]Neugart 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)

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 the statuses and wages depicted exactly at each day. This allows us to use a data-consuming empirical methodology. The quasi-experimental setting needs 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.[4] Hourly wages cannot be computed, since information about the hours worked is not available in this data set. We, therefore, use 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 wage 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 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 is 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.[5]

Since the changes in economic incentives induced by the parental leave reform differ by prior-to-birth earnings of the mother, we run separate estimations for mothers with high, and

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[4]As 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.

[5]Since 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).

low prior-to-birth earnings in all our regressions. In this context, we define mothers with low prior-to-birth[6] 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 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 10 to 13 in the Appendix. Table 10 gives the descriptive statistics of daily earnings for high- and low-income mothers in treatment and control group(s) for all years starting from two years before giving birth up to nine years after giving birth based on IEB data. With two exceptions, we observe no differences in daily earnings between the treatment and the control groups for mothers with high and low prior-to-birth earnings. The first exception occurs in the first year after birth for high-income mothers: The earnings in the treatment group is around 10 euro higher than in the control groups, while the number of observation in this group is substantially smaller. This relationship indicates that mothers with high prior-to-birth earnings who worked during the first year after birth even though they were eligible for the new benefit, represent a highly labor market attached group of mothers. The second exception affects low-income mothers in the second year after birth, in which the earnings in treatment group and number of observation is higher than in the control groups. This finding, in contrast, might reflect a negative selection of working mothers pre-reform. That is, mothers who worked, even though they were eligible for the old benefit, could not afford not to work during the second year after childbirth. This descriptive results emphasize the differences in the financial incentive pre- and post-reform for high- and low-income mothers, since the *Never-Takers* lead to opposed selection effects for both income groups.

Table 11 summarizes descriptive statistics for all relevant control variables for the same groups nine years after giving birth based on IEB data. Similarly, Tables 12 and 13 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.

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

# 5 Results

In this section, we first describe the effects of the parental leave reform on the duration of mothers' employment interruptions. Following this, we present the effects on daily earnings and on average weekly working hours. Next, we show the potential changes in the socio-demographic characteristics of working mothers and changes in their probability to return to their pre-birth employer caused by the parental leave reform. Finally, we discuss the effects of changes in fertility patterns and 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 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. In particular, we find an increase in the duration of the employment interruptions in the first year after giving birth for high-income mothers (Figure 3, right panel). A considerably larger share of high-income mothers in the treatment group chooses employment interruptions up to 12 months as compared to mothers in the control groups. 12 months after giving childbirth, however, employment rates of high-income mothers do not differ by treatment and control groups. 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 high-income mothers by 2.8 months on average (Table 1, column II).

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



(a) Low-income mothers                    (b) High-income mothers
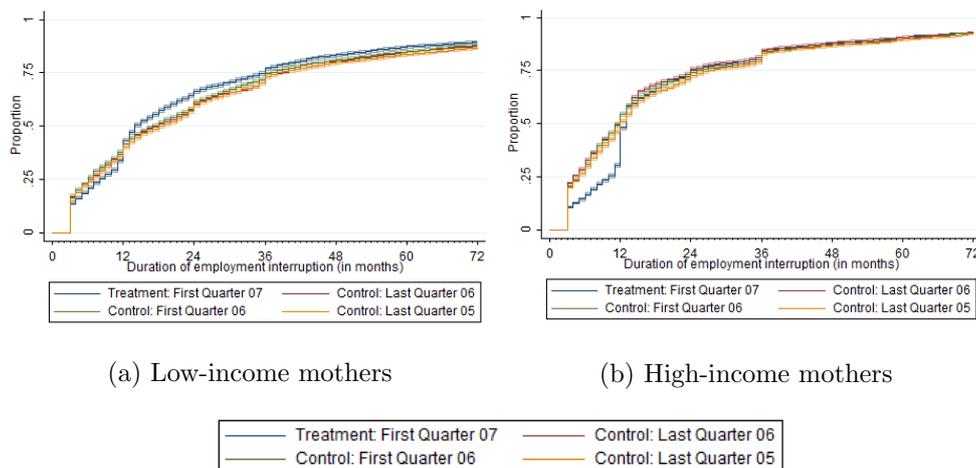
Source: IEB 1976-2016; own calculations.

Table 1: 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** | -0.869* |
| | (0.511) | (0.412) |
| Reform (vs. Pre-reform) | -1.467* | -2.081*** |
| | (0.494) | (0.406) |
| First quarter * Reform | -1.309 | 2.844*** |
| | (0.680) | (0.560) |
| Constant | 31.436*** | 23.472*** |
| | (0.368) | (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.

The effects for low-income mothers are shown in the left panel of Figure 3 and in column (I) of Table 1: 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 reform had on average no effect on the duration of employment break for mothers with low prior-to-birth earnings.

## 5.2 Effects on Daily Earnings

Estimation results of the earnings effects based on the difference-in-difference model show that mothers with low prior-to-birth earnings face higher earnings in the second year after giving birth (Table 2 and Figure 4).[7] Two years after giving birth, earnings of treated mothers in this group are on average 5 percent higher than for mothers in the control group. 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 (see table 10 in the Appendix). However, this positive effect on earnings disappears already in the next 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 prior-to-birth earnings.

For mothers with high prior-to-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 high-income 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 (Table 2, and Figure 4).

[7]The entire regression for low- and high-income mothers nine years after giving birth is shown in table 16 in the Appendix.

Table 2: Effects of the parental leave reform on daily earnings for mothers with high and low prior-to-birth earnings

| Log earnings | Low-income mothers | | | High-income mothers | | |
|---|---|---|---|---|---|---|
| | Control mean[1] | Difference T-C | Difference T-C with controls[2] | Control mean[1] | Difference T-C | Difference T-C with controls[2] |
| $y_{t-2}$ | 24.04 | −0.035 | −0.025 | 110.98 | −0.006 | −0.013* |
| | | (0.021) | (0.016) | | (0.016) | (0.006) |
| $y_{t-1}$ | 23.84 | 0.006 | −0.003 | 118.16 | 0.011 | 0.010* |
| | | (0.016) | (0.013) | | (0.013) | (0.004) |
| $y_{t+1}$ | 15.08 | 0.016 | 0.036 | 56.13 | 0.091 | 0.067 |
| | | (0.042) | (0.036) | | (0.050) | (0.040) |
| $y_{t+2}$ | 15.89 | 0.044 | 0.054* | 60.05 | 0.085*** | 0.099*** |
| | | (0.031) | (0.025) | | (0.025) | (0.018) |
| $y_{t+3}$ | 18.30 | 0.030 | 0.029 | 65.35 | 0.061** | 0.066*** |
| | | (0.031) | (0.024) | | (0.024) | (0.017) |
| $y_{t+4}$ | 19.90 | 0.023 | 0.012 | 68.03 | 0.041 | 0.047** |
| | | (0.027) | (0.021) | | (0.022) | (0.016) |
| $y_{t+5}$ | 21.74 | −0.016 | −0.024 | 66.56 | 0.040 | 0.038* |
| | | (0.027) | (0.021) | | (0.021) | (0.016) |
| $y_{t+6}$ | 22.84 | −0.006 | −0.013 | 67.25 | 0.044* | 0.046** |
| | | (0.027) | (0.021) | | (0.021) | (0.014) |
| $y_{t+7}$ | 23.51 | 0.039 | 0.022 | 67.30 | 0.041* | 0.033* |
| | | (0.026) | (0.021) | | (0.021) | (0.013) |
| $y_{t+8}$ | 24.11 | 0.017 | 0.004 | 67.30 | 0.034* | 0.020 |
| | | (0.026) | (0.020) | | (0.020) | (0.013) |
| $y_{t+9}$ | 27.81 | 0.025 | 0.014 | 74.03 | 0.040* | 0.024 |
| | | (0.026) | (0.020) | | (0.020) | (0.013) |

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 7,860 ($y_{t+1}$) and 25,710 ($y_{t-1}$) for low-income mothers and 9,283 ($y_{t+1}$) and 32,901 ($y_{t-1}$) 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 prior-to-birth earnings
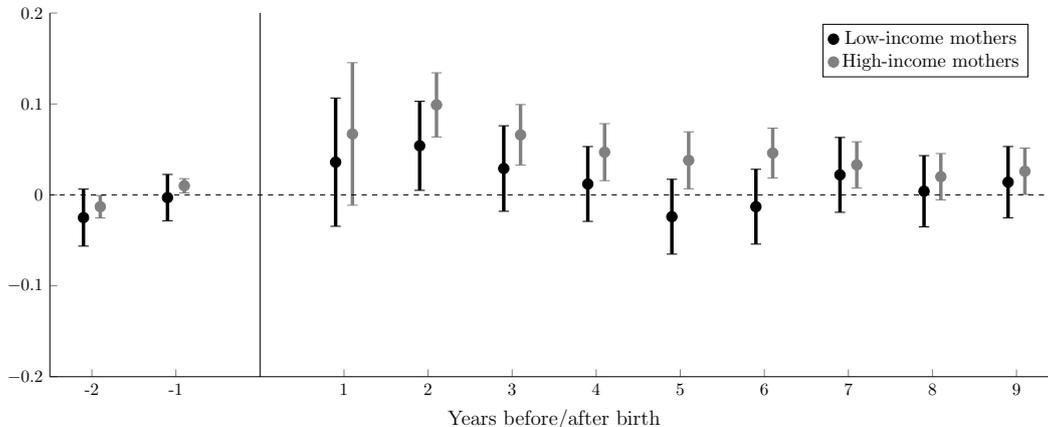


Source: IEB 1976-2016; own calculations. The graph plots the causal effect of the reform with the corresponding 95% confidence intervals.

These positive effects of the parental leave reform on the earnings of mothers with high prior-to-birth earnings are in contrast to predictions of human capital theory, since for this group we find an extension of the duration of the average employment interruption by almost three months. In the next sub-sections, we will analyze potential mechanisms that could explain the positive long-run effects on earnings, in particular potential changes in working hours, socio-demographic characteristics of working mothers (i.e. selection effects on observable characteristics) 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 prior-to-birth earnings could be that - as a response to the parental leave reform - they work longer weekly 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 causal effect of the parental leave reform on weekly working hours of mothers in the years after giving birth (Table 3). This is true for both, mothers with a high level of formal education, and for those with a low level of formal education.

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 3: 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( $\beta$ (Treatment)) and for high-educated P( $\beta$ (Treatment) $+\beta$ (Treatment* 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 4, there is no statistically significant change in the composi-

tion 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 4: Effects of the parental leave reform on the socio-demographic characteristics of working mothers

| | | | | | Year | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | 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 Länder, 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.

## 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 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 3 years has been left unchanged and only the duration and level of payments 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 birth in the second year after giving birth have a 2 percentage points higher probability of returning to their pre-birth employer (Table 5).

Table 5: Effects of the parental leave reform on the probability to change the firm after the employment interruption

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

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 employer with those who return to the labor market with a new employer. Interestingly, the earnings effects are very similar in both groups, in particular for high-income mothers (Table 6). Since the effects on earnings do not significantly differ between mothers who changed the employer after returning to the labor market and those who stayed with the previous employer, we conclude that the increase in job stability cannot explain the positive effects on earnings that we find for the first two to seven years after giving birth. Therefore we conclude that the increased employer stability is not the reason for the positive earnings effects in the medium run.

## 5.6 Fertility Effects and Fathers' Involvement

Positive earnings effects resulting from the parental leave reform could 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. In addition, Kluve and Schmitz (2018) find no effects on the likelihood to have a subsequent birth for mothers with high prior-to-birth income.[8] From this we conclude, that potential changes in fertility patterns 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.

Another potential mechanism that could affect mothers' earnings is the role of fathers. 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

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[8]The 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).

Table 6: 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

| Log 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 | 23.44 | −0.034 | −0.029 | 107.92 | 0.008 | 0.005 |
| | | (0.038) | (0.030) | | (0.017) | (0.014) |
| yt-1 | 23.13 | 0.000 | 0.010 | 115.05 | 0.011 | 0.008 |
| | | (0.030) | (0.024) | | (0.013) | (0.009) |
| yt+1 | 15.66 | 0.040 | 0.055 | 70.39 | 0.231 | 0.157 |
| | | (0.083) | (0.078) | | (0.124) | (0.114) |
| yt+2 | 19.21 | −0.015 | 0.008 | 70.86 | 0.025 | 0.007 |
| | | (0.055) | (0.052) | | (0.053) | (0.046) |
| yt+3 | 21.90 | −0.030 | −0.030 | 75.02 | 0.018 | 0.033 |
| | | (0.050) | (0.047) | | (0.048) | (0.041) |
| yt+4 | 24.27 | −0.048 | −0.028 | 77.99 | 0.067 | 0.065 |
| | | (0.046) | (0.043) | | (0.042) | (0.037) |
| yt+5 | 25.30 | −0.116* | −0.088* | 76.81 | −0.004 | −0.019 |
| | | (0.045) | (0.042) | | (0.042) | (0.036) |
| yt+6 | 26.14 | −0.078 | −0.061 | 75.97 | 0.029 | 0.018 |
| | | (0.044) | (0.042) | | (0.038) | (0.032) |
| yt+7 | 27.50 | −0.117** | −0.100* | 76.13 | −0.018 | −0.007 |
| | | (0.044) | (0.041) | | (0.035) | (0.030) |
| yt+8 | 28.26 | −0.072 | −0.052 | 77.80 | −0.002 | 0.008 |
| | | (0.043) | (0.041) | | (0.340) | (0.029) |
| yt+9 | 32.98 | −0.004 | 0.027 | 85.51 | 0.010 | 0.009 |
| | | (0.043) | (0.040) | | (0.034) | (0.029) |

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.

couples where the woman belongs to the highest earnings quartile (Trappe, 2013). Moreover, there is descriptive evidence showing that in many couples, the mothers are working while the fathers are on leave rather than taking leave simultaneously (Wrohlich, Berger, Geyer, Haan, Denise, Spiess, and Thiemann, 2012). Moreover, a recent study by Tamm (2019) shows that fathers who took parental leave spend more time on childcare and housework not only while they are on leave but also several years after their parental leave. Based on this evidence showing that (i) fathers with high-income partners were those who reacted most strongly to the parental leave reform, that (ii) mothers use the leave of fathers to re-enter the labor market and that (iii) fathers who took leave are more likely to undertake more child care and housework in the medium run, we can speculate that the stronger child care involvement of fathers facilitates mothers' re-entry to the labor market and potentially increases their productivity also in the medium and in the long run. This, in turn, could be reflected in higher earnings of mothers. 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 diminish as the child gets older.

## 5.7 Heterogeneity Analysis

In this section, we present the results from separate regressions for mothers living in East and West Germany and for mothers with medium income. As shown in Table 7, there is no difference in the effects of the parental leave reform on the duration of mothers' employment interruptions between East and West Germany. We do not find any effect on the employment interruption of mothers in the lowest quartile of pre-birth earnings in either part of the country, however statistically significant increases in the duration of the employment interruption of mothers with high pre-birth earnings.

The positive effects on earnings that we find for the full sample, however, are only driven by high-income mothers living in West Germany (Table 8 and Figures 5 and 6 in the Appendix). For this sample, we find very similar effects as for the whole sample, i.e. strong positive effects in the second year after giving birth that are diminishing but still significant up until nine years after giving birth. In contrast, for high-income mothers living in East Germany, we only find positive earnings effects in the second year after giving birth.

Table 7: Effects of the parental leave reform of the duration of employment break in West and East Germany

| Duration of employment break (months) | West Germany | | East Germany | |
|---|---|---|---|---|
| | Low-income mothers | High-income mothers | Low-income mothers | High-income mothers |
| First quarter (vs. last quarter) | −1.612* | −1.013* | −1.680* | −0.320 |
| | (0.645) | (0.447) | (0.782) | (0.908) |
| Reform (vs. Pre-reform) | −1.733** | −2.138*** | −1.347 | −1.846* |
| | (0.619) | (0.441) | (0.768) | (0.848) |
| First quarter * Reform | −1.033 | 2.914*** | −1.430 | 2.717* |
| | (0.849) | (0.607) | (1.048) | (1.233) |
| Constant | 33.540*** | 24.387*** | 26.617*** | 15.898*** |
| | (0.465) | (0.323) | (0.563) | (0.630) |
| $R^2$ | 0.002 | 0.001 | 0.003 | 0.003 |
| N | 28,020 | 37,327 | 11,529 | 4,509 |

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

Table 8: Effects of the parental leave reform on earnings in West and East Germany

| Log earnings | Low-income mothers | | | High-income mothers | | |
|---|---|---|---|---|---|---|
| | Control mean[1] | Difference T-C | Difference T-C with controls[2] | Control mean[1] | Difference T-C | Difference T-C with controls[2] |
| **West Germany** | | | | | | |
| $y_{t-2}$ | 24.04 | −0.035 | −0.042* | 110.98 | −0.006 | −0.015* |
| | | (0.021) | (0.019) | | (0.008) | (0.006) |
| $y_{t-1}$ | 23.84 | 0.006 | 0.004 | 118.16 | 0.011 | 0.007 |
| | | (0.016) | (0.015) | | (0.006) | (0.004) |
| $y_{t+1}$ | 15.08 | 0.016 | 0.027 | 56.13 | 0.091 | 0.032 |
| | | (0.042) | (0.040) | | (0.051) | (0.046) |
| $y_{t+2}$ | 15.89 | 0.044 | 0.045 | 60.05 | 0.085*** | 0.089*** |
| | | (0.031) | (0.030) | | (0.025) | (0.021) |
| $y_{t+3}$ | 18.30 | 0.030 | 0.034 | 65.34 | 0.061** | 0.067** |
| | | (0.031) | (0.030) | | (0.024) | (0.020) |
| $y_{t+4}$ | 19.90 | 0.023 | 0.017 | 68.03 | 0.041 | 0.045* |
| | | (0.027) | (0.026) | | (0.022) | (0.018) |
| $y_{t+5}$ | 21.74 | −0.016 | −0.017 | 66.56 | 0.040 | 0.041* |
| | | (0.027) | (0.026) | | (0.021) | (0.018) |
| $y_{t+6}$ | 22.84 | −0.006 | −0.008 | 67.25 | 0.044* | 0.050** |
| | | (0.027) | (0.025) | | (0.019) | (0.016) |
| $y_{t+7}$ | 23.51 | 0.039 | 0.029 | 67.30 | 0.041* | 0.038* |
| | | (0.026) | (0.025) | | (0.018) | (0.015) |
| $y_{t+8}$ | 24.11 | 0.017 | 0.020 | 68.24 | 0.034 | 0.028 |
| | | (0.026) | (0.025) | | (0.018) | (0.015) |
| $y_{t+9}$ | 27.81 | 0.025 | 0.027 | 74.03 | 0.040* | 0.029* |
| | | (0.026) | (0.025) | | (0.018) | (0.015) |
| **East Germany** | | | | | | |
| $y_{t-2}$ | 18.05 | −0.013 | −0.013 | 89.16 | 0.016 | −0.007 |

Continued on next page

Table 8 – continued from previous page

| Log earnings | Low-income mothers | | | High-income mothers | | |
|---|---|---|---|---|---|---|
| | Control mean[1] | Difference T-C | Difference T-C with controls[2] | Control mean[1] | Difference T-C | Difference T-C with controls[2] |
| | | (0.039) | (0.031) | | (0.021) | (0.018) |
| $y_{t-1}$ | 17.77 | 0.011 | −0.002 | 96.94 | 0.028 | 0.023* |
| | | (0.032) | (0.025) | | (0.016) | (0.011) |
| $y_{t+1}$ | 11.73 | 0.014 | −0.003 | 63.27 | −0.007 | −0.030 |
| | | (0.089) | (0.083) | | (0.103) | (0.099) |
| $y_{t+2}$ | 17.71 | 0.085 | 0.089 | 78.52 | 0.098** | 0.093*** |
| | | (0.060) | (0.055) | | (0.030) | (0.027) |
| $y_{t+3}$ | 20.87 | 0.091 | 0.089 | 85.40 | 0.041 | 0.029 |
| | | (0.050) | (0.047) | | (0.023) | (0.019) |
| $y_{t+4}$ | 23.66 | 0.046 | 0.048 | 86.86 | 0.029 | 0.016 |
| | | (0.048) | (0.045) | | (0.025) | (0.022) |
| $y_{t+5}$ | 25.77 | −0.027 | −0.033 | 86.00 | 0.032 | 0.018 |
| | | (0.047) | (0.044) | | (0.026) | (0.023) |
| $y_{t+6}$ | 26.72 | 0.046 | 0.043 | 85.67 | 0.046 | 0.029 |
| | | (0.046) | (0.043) | | (0.026) | (0.023) |
| $y_{t+7}$ | 28.93 | 0.039 | 0.046 | 86.14 | 0.039 | 0.029 |
| | | (0.044) | (0.041) | | (0.026) | (0.023) |
| $y_{t+8}$ | 31.90 | −0.020 | −0.019 | 89.20 | 0.021 | 0.008 |
| | | (0.042) | (0.040) | | (0.025) | (0.022) |
| $y_{t+9}$ | 38.78 | −0.013 | −0.014 | 97.38 | 0.033 | 0.024 |
| | | (0.040) | (0.038) | | (0.026) | (0.022) |

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; [2] Controls: Pre-birth wage, age at birth, education, experience (ft & pt), rel. duration of unemployment, size of establishment, working time before birth, change of establishment, citizenship, no. of children, region, tenure and change of employer after birth. The number of observations vary for West Germany between 6,447 ($y_{t+1}$) and 18,565 ($y_{t-1}$) for low-income mothers and 7,700 ($y_{t+1}$) and 27,343 ($y_{t-2}$) for high-income mothers, and East Germany between 1,418 ($y_{t+1}$) and 5,809 ($y_{t-1}$) for low-income mothers and 1,268 ($y_{t+1}$) and 5,895 ($y_{t-2}$) for high-income mothers. Significance levels: * p< 0.05, ** p<0.01, *** p< 0.001. Robust standard errors in parentheses.

Finally, in Table 9 we present the results of estimations of the earnings effects of mothers with medium pre-birth earnings, i.e. with daily earnings above 42.3 euro (25th percentile) and below 91.7 euro (75th percentile).[9] We have left out these mothers in the main specification, since the change in financial incentives induced by the parental leave reform are not so unambiguous as for the high- and low-income mothers. However, since they form the largest group of mothers, it is relevant to analyze in what way the parental leave reform affected their post-birth earnings. As Table 9 shows, we find strong positive effects on earnings in the first and second year after giving birth that are smaller but still significant in the two subsequent years and fade out after

[9]The reform effects on the duration of the parental leave for medium-income mothers are shown in Figure 7 in the Appendix. The selection mechanism are similar to those of high-income mothers, i.e. mothers, who work in the first year after childbirth, although they were eligible for the benefit, represent a highly labor market attached group of women.

four years. So, the pattern that we find for this group is similar to the effects for high-income mothers, however, less pronounced. Moreover, the very large positive effect in the first year after giving birth (earnings are higher by 15 percent in this period for mothers in the control groups), is probably due to selection effects (see Table 15 in the Appendix).

Table 9: 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) | |
| Log earnings | | | |
| $y_{t-2}$ | 60.66 | −0.010 (0.008) | −0.014* (0.006) |
| $y_{t-1}$ | 64.68 | 0.000 (0.006) | −0.002 (0.005) |
| $y_{t+1}$ | 24.27 | 0.208*** (0.039) | 0.148*** (0.032) |
| $y_{t+2}$ | 24.15 | 0.121*** (0.021) | 0.108*** (0.016) |
| $y_{t+3}$ | 30.84 | 0.063** (0.020) | 0.052*** (0.014) |
| $y_{t+4}$ | 32.32 | 0.050** (0.017) | 0.036** (0.013) |
| $y_{t+5}$ | 32.69 | 0.023 (0.017) | 0.015 (0.012) |
| $y_{t+6}$ | 33.24 | 0.033* (0.016) | 0.018 (0.012) |
| $y_{t+7}$ | 33.66 | 0.001 (0.015) | 0.001 (0.011) |
| $y_{t+8}$ | 34.63 | −0.003 (0.014) | 0.003 (0.011) |
| $y_{t+9}$ | 38.82 | −0.001 (0.014) | 0.002 (0.011) |

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 15,392 ($y_{t+1}$) and 56,969 ($y_{t-2}$). Significance levels: * p< 0.05, ** p<0.01, *** p< 0.001. Robust standard errors in parentheses.

# 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, however, show that these longer employment interruptions did not have a negative effect on mothers' long-term earnings perspectives. In contrast, we 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 been shown to have increased fathers' parental leave taking, in particular among fathers with highly educated and high earnings spouses. Thus, 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 lead 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). If family policy wants to target low-income families, the parental leave benefit scheme should be reformed, for example by increasing the earnings replacement rate and, thereby, the financial benefit for parents with below-median earnings. This could directly increase the household income of these families in the first year after giving birth and incentivize fathers in this group to stronger engage in parental leave taking. This, in turn, could facilitate the re-entry into the labor market also for mothers with low prior-to-birth earnings and potentially increase their labor market outcomes in the years after the employment interruption.

From a Gender Pay Gap perspective, the parental leave reform increases the lifetime earnings of mothers with high and medium prior-to-birth earnings, and might, therefore, also decrease the Gender Lifetime Earnings Gap as well as the Gender Pension Gap. Since the reform did not decrease the duration of employment interruption of low-income mothers nor increase their earnings, we expect that the reform had no effect on their lifetime earnings. Hence, these imbalanced reform effects on earnings between mothers with high and medium prior-to-birth earnings on the one hand, and low-income mothers on the other, seem to have increased the earnings gap between these groups.

# References

Baker, Michael and Kevin Milligan (2008). "How Does Job Protected Maternity Leave Affect Mothers' Employment?" In: *Journal of Labor Economics* 26.4, pp. 655–691.

Baum, Charles L. and Christopher Ruhm (2016). "The Effects of Paid Family Leave in California on Labor Market Outcomes". In: *Journal of Policy Analysis and Management* 35.2, pp. 333–356.

Bergemann, Annette and Regina T Riphahn (2011). "Female labour supply and parental leave benefits–the causal effect of paying higher transfers for a shorter period of time". In: *Applied Economic Letters* 18.1, pp. 17–20.

Bergemann, Annette and Regina T. Riphahn (2015). *Maternal Employment Effects of Paid Parental Leave.* Discussion Paper 9073. IZA.

Bobak, Martin and Arjan Gjonca (2001). "The seasonality of live birth is strongly influenced by socio-demographic factors". In: *Human Reproduction* 16.7, pp. 1512–1517.

Broadway, Barbara, Guyonne R.J. Kalb, Duncan McVicar, and Bill Martin (Forthcoming). "The Impact of Paid Parental Leave on Labour Supply and Employment Outcomes". In: *Feminist Economics.*

Buckles, Kasey S. and Daniel M. Hungerman (2013). "Season of Birth and Later Outcomes: Old Questions, New Answers". In: *The Review of Economics and Statistics* 95.3, pp. 711–724.

Buenning, Mareike (2015). "What Happens after the Daddy Months'? Fathers' Involvement in Paid Work, Childcare, and Housework after Taking Parental Leave in Germany". In: *European Sociological Review* 31.6, pp. 738–748.

Clarke, Damian, Sonia Oreffice, and Climent Quintana-Domeque (2019). "The demand for season of birth". In: *Journal of Applied Econometrics* 34.5, pp. 707–723.

Cygan-Rehm, Kamila (2016). "Parental leave benefit and differential fertility responses: evidence from a German reform". In: *Journal of Population Economics* 29, pp. 73–103.

Cygan-Rehm, Kamila, Daniel Kuehnle, and Regina T Riphahn (2018). "Paid parental leave and families' living arrangements". In: *Journal of Population Economics* 29.1, pp. 73–103.

Dickert-Conlin, Stacy and Amitabh Chandra (1999). "Taxes and the Timing of Births". In: *Journal of Political Economy* 107.1, pp. 161–177.

Frodermann, Corinna, Dana Müller, and Martin Abraham (2013). "Determinanten des Wiedereinstiegs von Müttern in den Arbeitsmarkt in Vollzeit oder Teilzeit". In: *KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie* 65.4, pp. 645–668.

Gans, Joshua S. and Andrew Leigh (2009). "Born on the first of July: An (un)natural experiment in birth timing". In: *Journal of Public Economics* 93, pp. 246–263.

Geisler, Esther and Michaela Kreyenfeld (2019). "Policy reform and fathers' use of parental leave in Germany: The role of education and workplace characteristics". In: *Journal of European Social Policy* 29.2, pp. 273–291.

Geyer, Johannes, Peter Haan, and Katharina Wrohlich (2015). "The effects of family policy on mothers' labor supply: Combining evidence from a structural model and a natural experiment". In: *Labour Economics* 36, pp. 84–98.

Huebener, Mathias, Daniel Kuehnle, and C Katharina Spiess (2019). "Paid Parental Leave and Child Development: Evidence from the 2007 German Parental Benefit Reform and Administrative Data". In: *Labour Economics* 61, p. 101754.

Kluve, Jochen and Sebastian Schmitz (2018). "Back to work: Parental benefits and mothers' labor market outcomes in the medium run". In: *ILR Review* 71.1, pp. 143–173.

Kluve, Jochen and Marcus Tamm (2013). "Parental leave regulations, mothers' labor force attachment and fathers' childcare involvement: Evidence from a natural experiment". In: *Journal of Population Economics* 26.3, pp. 983–1005.

Lalive, Rafael, Analia Schlosser, Andreas Steinhauer, and Josef Zweimüller (2014). "Parental Leave and Mothers' Careers: The Relative Importance of Job Protection and Cash Benefits". In: *The Review of Economic Studies* 81, pp. 219–265.

Ludsteck, Johannes (2014). "The impact of segregation and sorting on the gender wage gap - evidence from German linked longitudinal employer-employee data". In: *ILR Review* 67.2, pp. 362–394.

Müller, Dana and Katharina Strauch (2017). *Identifying mothers in administrative data*. FDZ-Methodenreport 13/2017. IAB.

Müller, Kai-Uwe and Katharina Wrohlich (2020). "Does subsidized care for toddlers increase maternal labor supply? Evidence from a large-scale expansion of early childcare". In: *Labour Economics* 62, p. 101776.

Neugart, Michael and Henry Ohlsson (2013). "Economic incentives and the timing of births: evidence from the German parental benefit reform of 2007". In: *Journal of Population Economics* 26.1, pp. 87–108.

Olivetti, Claudia and Barbara Petrongolo (2017). "The Economic Consequences of Family Policies: Lessons from a Century of Legislation in High-Income Countries". In: *Journal of Economic Perspectives* 31.1, pp. 205–230.

Raute, Anna (2019). "Can financial incentives reduce the baby gap? Evidence from a reform in maternity leave benefits". In: *Journal of Public Economics* 169, pp. 203–222.

Rossin-Slater, Maya (2018). "Maternity and Family Leave Policy". In: *Oxford Handbook of Women and the Economy*. Ed. by Susan L. Averett, Laura M. Argys, and Saul D. Hoffman. Oxford University Press.

Ruhm, Christopher J (1998). "The economic consequences of parental leave mandates: Lessons from Europe". In: *The Quarterly Journal of Economics* 113.1, pp. 285–317.

Samtleben, Claire, Clara Schaeper, and Katharina Wrohlich (2019). *Elterngeld und Elterngeld Plus: Nutzung durch V"ater gestiegen, Aufteilung zwischen M"uttern und V"atern aber noch sehr ungleich.* Wochenbericht 35/2019. DIW Berlin.

Schönberg, Uta and Johannes Ludsteck (2014). "Expansions in Maternity Leave Coverage and Mothers' Labor Markt Outcomes after Childbirth". In: *Journal of Labor Economics* 32.3, pp. 469–505.

Tamm, Marcus (2013). "The impact of a large parental leave benefit reform on the timing of birth around the day of implementation". In: *Oxford Bulletin of Economics and Statistics* 75.4, pp. 585–601.

— (2019). "Fathers' parental leave-taking, childcare involvement and labor market participation". In: *Labour Economics* 59, pp. 184–197.

Trappe, Heike (2013). "Väter mit Elterngeldbezug. Nichts als ökonomisches Kalkül?" In: *Zeitschrift für Soziologie* 42.1, pp. 28–51.

Welteke, Clara and Katharina Wrohlich (2019). "Peer Effects in Parental Leave Decisons". In: *Labour Economics* 56.2, pp. 146–163.

Wrohlich, Katharina, Eva Berger, Johannes Geyer, Peter Haan, Sengül Denise, C Katharina Spiess, and Andreas Thiemann (2012). *Elterngeldmonitor.* Politikberatung kompakt 61. DIW Berlin.

# Appendix

Table 10: Descriptive Statistics on Daily Earnings of Mothers

|  |  | Birth quarter | | | | |
|---|---|---|---|---|---|---|
| Daily earnings in |  | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | N |
|  |  | **High-income mothers** | | | | |
| t-2 | Mean Log(y) | 4.66 | 4.68 | 4.66 | 4.68 | 39,513 |
|  | SD | (0.38) | (0.36) | (0.38) | (0.36) |  |
|  | Mean y | 105.95 | 107.51 | 106.03 | 107.70 |  |
|  | N | 10,152 | 9390 | 10,159 | 9812 |  |
| t-1 | Mean Log(y) | 4.73 | 4.74 | 4.72 | 4.74 | 40,075 |
|  | SD | (0.29) | (0.29) | (0.29) | (0.28) |  |
|  | Mean y | 113.62 | 114.60 | 111.73 | 114.50 |  |
|  | N | 10,494 | 9676 | 10,447 | 10,133 |  |
| t+1 | Mean Log(y) | 4.18 | 4.01 | 4.06 | 4.02 | 9293 |
|  | SD | (1.10) | (1.04) | (1.05) | (1.04) |  |
|  | Mean y | 65.35 | 54.97 | 57.92 | 55.86 |  |
|  | N | 1438 | 2646 | 2629 | 2580 |  |
| t+2 | Mean Log(y) | 4.17 | 4.10 | 4.04 | 4.08 | 24,573 |
|  | SD | (0.82) | (0.88) | (0.89) | (0.87) |  |
|  | Mean y | 64.47 | 60.24 | 56.64 | 59.20 |  |
|  | N | 6414 | 5983 | 6258 | 5918 |  |
| t+3 | Mean Log(y) | 4.22 | 4.20 | 4.12 | 4.18 | 24,256 |
|  | SD | (0.77) | (0.79) | (0.84) | (0.80) |  |
|  | Mean y | 67.78 | 66.83 | 61.41 | 65.11 |  |
|  | N | 6461 | 5808 | 6154 | 5833 |  |
| t+4 | Mean Log(y) | 4.26 | 4.23 | 4.19 | 4.21 | 25,274 |
|  | SD | (0.73) | (0.74) | (0.76) | (0.76) |  |
|  | Mean y | 70.88 | 68.82 | 65.82 | 67.10 |  |
|  | N | 6618 | 6043 | 6329 | 6284 |  |
| t+5 | Mean Log(y) | 4.23 | 4.21 | 4.16 | 4.19 | 27,044 |
|  | SD | (0.74) | (0.75) | (0.80) | (0.78) |  |
|  | Mean y | 68.97 | 67.57 | 64.17 | 65.77 |  |
|  | N | 7082 | 6524 | 6810 | 6628 |  |
| t+6 | Mean Log(y) | 4.23 | 4.22 | 4.16 | 4.20 | 29,301 |
|  | SD | (0.71) | (0.75) | (0.76) | (0.73) |  |
|  | Mean y | 68.58 | 67.72 | 64.18 | 66.69 |  |
|  | N | 7602 | 7045 | 7489 | 7165 |  |
| t+7 | Mean Log(y) | 4.23 | 4.21 | 4.16 | 4.18 | 31,392 |
|  | SD | (0.70) | (0.73) | (0.75) | (0.73) |  |
|  | Mean y | 68.80 | 67.67 | 63.77 | 65.59 |  |
|  | N | 8065 | 7568 | 8061 | 7698 |  |
| t+8 | Mean Log(y) | 4.25 | 4.23 | 4.18 | 4.19 | 32,336 |

|  |  | Birth quarter | | | | N |
| --- | --- | --- | --- | --- | --- | --- |
| Daily earnings in |  | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | N |
|  | SD | (0.69) | (0.70) | (0.72) | (0.73) |  |
|  | Mean y | 70.29 | 68.76 | 65.04 | 65.84 |  |
|  | N | 8306 | 7754 | 8306 | 7970 |  |
| t+9 | Mean Log(y) | 4.35 | 4.32 | 4.20 | 4.21 | 32,616 |
|  | SD | (0.68) | (0.71) | (0.71) | (0.73) |  |
|  | Mean y | 77.59 | 74.91 | 66.85 | 67.30 |  |
|  | N | 8252 | 7684 | 8508 | 8172 |  |
|  | **Low-income mothers** | | | | | |
| t-2 | Mean Log(y) | 3.09 | 3.12 | 3.14 | 3.14 | 26,013 |
|  | SD | (0.73) | (0.71) | (0.71) | (0.73) |  |
|  | Mean y | 22.03 | 22.73 | 23.05 | 23.14 |  |
|  | N | 6717 | 6828 | 6213 | 6255 |  |
| t-1 | Mean Log(y) | 3.10 | 3.11 | 3.11 | 3.13 | 31,328 |
|  | SD | (0.65) | (0.64) | (0.64) | (0.64) |  |
|  | Mean y | 22.18 | 22.53 | 22.41 | 22.86 |  |
|  | N | 8078 | 8177 | 7489 | 7584 |  |
| t+1 | Mean Log(y) | 2.73 | 2.66 | 2.72 | 2.68 | 7895 |
|  | SD | (0.89) | (0.84) | (0.83) | (0.81) |  |
|  | Mean y | 15.29 | 14.34 | 15.11 | 14.62 |  |
|  | N | 1741 | 2203 | 1944 | 2007 |  |
| t+2 | Mean Log(y) | 2.91 | 2.83 | 2.82 | 2.80 | 16,014 |
|  | SD | (0.84) | (0.85) | (0.85) | (0.88) |  |
|  | Mean y | 18.42 | 16.92 | 16.83 | 16.48 |  |
|  | N | 4611 | 4018 | 3729 | 3656 |  |
| t+3 | Mean Log(y) | 3.00 | 2.99 | 2.97 | 3.00 | 18,642 |
|  | SD | (0.85) | (0.87) | (0.86) | (0.87) |  |
|  | Mean y | 20.17 | 19.96 | 19.44 | 20.07 |  |
|  | N | 5219 | 4651 | 4507 | 4265 |  |
| t+4 | Mean Log(y) | 3.11 | 3.07 | 3.07 | 3.05 | 21,520 |
|  | SD | (0.82) | (0.85) | (0.84) | (0.85) |  |
|  | Mean y | 22.43 | 21.55 | 21.50 | 21.21 |  |
|  | N | 5817 | 5559 | 5067 | 5077 |  |
| t+5 | Mean Log(y) | 3.16 | 3.15 | 3.12 | 3.09 | 22,297 |
|  | SD | (0.82) | (0.84) | (0.84) | (0.87) |  |
|  | Mean y | 23.57 | 23.33 | 22.60 | 22.06 |  |
|  | N | 6031 | 5795 | 5260 | 5211 |  |
| t+6 | Mean Log(y) | 3.20 | 3.19 | 3.17 | 3.16 | 23,074 |
|  | SD | (0.83) | (0.83) | (0.85) | (0.87) |  |
|  | Mean y | 24.56 | 24.38 | 23.78 | 23.64 |  |
|  | N | 6140 | 5962 | 5520 | 5452 |  |
| t+7 | Mean Log(y) | 3.25 | 3.24 | 3.19 | 3.21 | 23,589 |
|  | SD | (0.82) | (0.83) | (0.85) | (0.85) |  |
|  | Mean y | 25.83 | 25.52 | 24.32 | 24.85 |  |

| Daily earnings in | | Birth quarter | | | | N |
|---|---|---|---|---|---|---|
| | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | |
| | N | 6225 | 6105 | 5623 | 5636 | |
| t+8 | Mean Log(y) | 3.29 | 3.28 | 3.25 | 3.25 | 23,904 |
| | SD | (0.83) | (0.83) | (0.84) | (0.85) | |
| | Mean y | 26.76 | 26.61 | 25.86 | 25.88 | |
| | N | 6287 | 6150 | 5720 | 5747 | |
| t+9 | Mean Log(y) | 3.45 | 3.44 | 3.31 | 3.31 | 24,041 |
| | SD | (0.81) | (0.81) | (0.84) | (0.84) | |
| | Mean y | 31.50 | 31.13 | 27.27 | 27.50 | |
| | N | 6268 | 6149 | 5811 | 5813 | |

Source: IEB 1976-2016; own calculations.

Table 11: Descriptive Statistics on Control Variables, Nine years after giving birth

| Variables | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
|---|---|---|---|---|---|
| | | Birth quarter |
| | | **High-income mothers** |
| Log(Daily Earnings 10 months prior-to-birth) | Mean | 4.78 | 4.77 | 4.78 | 4.78 |
| | SD | (0.21) | (0.20) | (0.20) | (0.20) |
| Non-German | Mean | 0.09 | 0.08 | 0.08 | 0.08 |
| | SD | (0.28) | (0.27) | (0.27) | (0.27) |
| Full-time work experience (months) | Mean | 90.45 | 89.67 | 90.07 | 88.53 |
| | SD | (57.77) | (57.17) | (56.60) | (55.42) |
| Part-time work experience (months) | Mean | 35.60 | 33.69 | 35.74 | 33.57 |
| | SD | (46.70) | (45.11) | (46.57) | (45.27) |
| Unemployment work experience (Share of total work life) | Mean | 0.01 | 0.01 | 0.01 | 0.01 |
| | SD | (0.03) | (0.04) | (0.04) | (0.04) |
| Age at birth | Mean | 31.97 | 31.89 | 31.81 | 31.81 |
| | SD | (3.49) | (3.54) | (3.58) | (3.52) |
| Change of employer after birth | Mean | 0.28 | 0.28 | 0.27 | 0.29 |
| | SD | (0.45) | (0.45) | (0.44) | (0.45) |
| Employment ten months prior-to-birth | | | | | |
| Full-time | Mean | 0.77 | 0.76 | 0.76 | 0.77 |
| | SD | (0.42) | (0.42) | (0.43) | (0.42) |
| Part-time | Mean | 0.23 | 0.24 | 0.24 | 0.23 |
| | SD | (0.42) | (0.42) | (0.43) | (0.42) |
| Marginal Employment | Mean | 0.00 | 0.00 | 0.00 | 0.00 |
| | SD | (0.01) | (0.01) | (0.00) | (0.01) |
| Location of the establishment (before birth) | | | | | |
| West Germany | Mean | 0.89 | 0.90 | 0.89 | 0.89 |
| | SD | (0.32) | (0.31) | (0.31) | (0.31) |
| East Germany | Mean | 0.11 | 0.10 | 0.11 | 0.11 |
| | SD | (0.32) | (0.31) | (0.31) | (0.31) |
| Educational level | | | | | |
| No A-Levels/ No VT | Mean | 0.03 | 0.02 | 0.02 | 0.02 |
| | SD | (0.14) | (0.12) | (0.13) | (0.12) |
| No A-Levels/ VT | Mean | 0.38 | 0.38 | 0.42 | 0.40 |
| | SD | (0.49) | (0.49) | (0.49) | (0.49) |
| A-Levels/ No VT | Mean | 0.01 | 0.01 | 0.01 | 0.01 |
| | SD | (0.12) | (0.12) | (0.11) | (0.11) |
| A-Levels/ VT | Mean | 0.27 | 0.27 | 0.26 | 0.27 |
| | SD | (0.44) | (0.44) | (0.44) | (0.44) |
| University of Applied Science | Mean | 0.08 | 0.08 | 0.08 | 0.09 |
| | SD | (0.28) | (0.28) | (0.27) | (0.28) |
| University Degree | Mean | 0.22 | 0.24 | 0.22 | 0.22 |
| | SD | (0.42) | (0.42) | (0.41) | (0.42) |

Continued on next page

|  |  | Birth quarter | | | |
| --- | --- | --- | --- | --- | --- |
| Variables |  | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
| Tenure (months, 10 months prior-to-birth) | Mean | 73.95 | 70.05 | 73.83 | 69.89 |
|  | SD | (50.28) | (49.68) | (50.99) | (50.27) |
| Number of children |  |  |  |  |  |
| 1 | Mean | 0.55 | 0.57 | 0.56 | 0.58 |
|  | SD | (0.50) | (0.50) | (0.50) | (0.49) |
| 2 | Mean | 0.40 | 0.38 | 0.39 | 0.38 |
|  | SD | (0.49) | (0.49) | (0.49) | (0.49) |
| 3 | Mean | 0.05 | 0.05 | 0.04 | 0.04 |
|  | SD | (0.21) | (0.21) | (0.20) | (0.20) |
| 4 | Mean | 0.00 | 0.00 | 0.00 | 0.00 |
|  | SD | (0.07) | (0.05) | (0.06) | (0.06) |
| 5 | Mean | 0.00 | 0.00 | 0.00 | 0.00 |
|  | SD | (0.01) | (0.02) | (0.02) | (0.00) |
| Observations |  | 8,252 | 7,684 | 8,508 | 8,172 |
|  |  | **Low-income mothers** | | | |
| Log(Daily Earnings 10 months prior-to-birth) | Mean | 3.30 | 3.11 | 3.30 | 3.08 |
|  | SD | (0.60) | (0.60) | (0.64) | (0.60) |
| Non-German | Mean | 0.18 | 0.18 | 0.18 | 0.17 |
|  | SD | (0.38) | (0.38) | (0.38) | (0.38) |
| Full-time work experience (months) | Mean | 19.15 | 19.67 | 19.82 | 18.78 |
|  | SD | (27.63) | (29.67) | (29.79) | (28.69) |
| Part-time work experience (months) | Mean | 27.31 | 26.14 | 28.30 | 27.21 |
|  | SD | (33.89) | (32.69) | (33.67) | (33.47) |
| Unemployment work experience (Share of total work life) | Mean | 0.04 | 0.04 | 0.04 | 0.04 |
|  | SD | (0.09) | (0.09) | (0.09) | (0.09) |
| Age at birth | Mean | 26.17 | 26.14 | 26.22 | 25.85 |
|  | SD | (5.16) | (5.20) | (5.30) | (5.28) |
| Change of employer after birth | Mean | 0.55 | 0.56 | 0.55 | 0.54 |
|  | SD | (0.50) | (0.50) | (0.50) | (0.50) |
| Employment ten months prior-to-birth |  |  |  |  |  |
| Full-time | Mean | 0.16 | 0.15 | 0.17 | 0.16 |
|  | SD | (0.37) | (0.36) | (0.37) | (0.37) |
| Part-time | Mean | 0.56 | 0.56 | 0.54 | 0.53 |
|  | SD | (0.50) | (0.50) | (0.50) | (0.50) |
| Marginal Employment | Mean | 0.28 | 0.29 | 0.29 | 0.31 |
|  | SD | (0.45) | (0.46) | (0.45) | (0.46) |
| Location of the establishment (before birth) |  |  |  |  |  |
| West Germany | Mean | 0.68 | 0.69 | 0.68 | 0.67 |
|  | SD | (0.47) | (0.46) | (0.47) | (0.47) |
| East Germany | Mean | 0.32 | 0.31 | 0.32 | 0.33 |
|  | SD | (0.47) | (0.46) | (0.47) | (0.47) |
| Educational level |  |  |  |  |  |
| No A-Levels/ No VT | Mean | 0.09 | 0.10 | 0.10 | 0.10 |
|  | SD | (0.29) | (0.31) | (0.30) | (0.30) |
| No A-Levels/ VT | Mean | 0.30 | 0.31 | 0.29 | 0.29 |
|  | SD | (0.46) | (0.46) | (0.45) | (0.45) |
| A-Levels/ No VT | Mean | 0.02 | 0.01 | 0.01 | 0.01 |
|  | SD | (0.13) | (0.12) | (0.12) | (0.13) |
| A-Levels/ VT | Mean | 0.15 | 0.15 | 0.15 | 0.15 |

|  |  | Birth quarter | | | |
| --- | --- | --- | --- | --- | --- |
| Variables |  | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
|  | SD | (0.36) | (0.36) | (0.35) | (0.34) |
| University of Applied Science | Mean | 0.01 | 0.01 | 0.01 | 0.01 |
|  | SD | (0.10) | (0.11) | (0.10) | (0.11) |
| University Degree | Mean | 0.02 | 0.02 | 0.02 | 0.02 |
|  | SD | (0.14) | (0.14) | (0.14) | (0.15) |
| No Information | Mean | 0.41 | 0.39 | 0.41 | 0.41 |
|  | SD | (0.49) | (0.49) | (0.49) | (0.49) |
| Tenure (months, 10 months prior-to-birth) | Mean | 33.58 | 31.57 | 34.16 | 34.16 |
|  | SD | (30.33) | (30.25) | (30.24) | (30.63) |
| Number of children |  |  |  |  |  |
| 1 | Mean | 0.66 | 0.67 | 0.66 | 0.66 |
|  | SD | (0.47) | (0.47) | (0.47) | (0.48) |
| 2 | Mean | 0.29 | 0.29 | 0.29 | 0.29 |
|  | SD | (0.45) | (0.46) | (0.45) | (0.45) |
| 3 | Mean | 0.04 | 0.04 | 0.05 | 0.05 |
|  | SD | (0.20) | (0.19) | (0.21) | (0.21) |
| 4 | Mean | 0.00 | 0.00 | 0.00 | 0.00 |
|  | SD | (0.05) | (0.05) | (0.06) | (0.07) |
| 5 | Mean | 0.00 | 0.00 | 0.00 | 0.00 |
|  | SD | (0.00) | (0.01) | (0.02) | (0.02) |
| Observations |  | 6,228 | 6,149 | 5,811 | 5,813 |

Source: IEB 1976-2016; own calculations.

Table 12: Descriptive Statistics on Mothers' Working Hours (conditional on working)

| Working hours in | | Birth quarter | | | | N |
|---|---|---|---|---|---|---|
| | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | |
| **High-income mothers** | | | | | | |
| 2008 | Mean | 29.61 | 29.40 | 28.56 | 29.79 | 743 |
| | SD | (12.96) | (12.17) | (11.76) | (12.17) | |
| | N | 181 | 202 | 185 | 175 | |
| 2009 | Mean | 30.33 | 30.20 | 28.54 | 28.15 | 753 |
| | SD | (11.41) | (11.80) | (11.46) | (12.30) | |
| | N | 179 | 205 | 192 | 177 | |
| 2010 | Mean | 28.99 | 29.18 | 27.88 | 29.56 | 845 |
| | SD | (11.78) | (11.06) | (11.36) | (12.07) | |
| | N | 203 | 231 | 206 | 205 | |
| 2011 | Mean | 28.22 | 29.28 | 27.52 | 29.01 | 1008 |
| | SD | (11.92) | (11.29) | (11.88) | (11.84) | |
| | N | 269 | 246 | 254 | 239 | |
| 2012 | Mean | 27.72 | 28.64 | 28.11 | 28.38 | 947 |
| | SD | (11.22) | (12.05) | (12.91) | (12.17) | |
| | N | 249 | 234 | 224 | 240 | |
| 2013 | Mean | 28.44 | 28.16 | 27.46 | 27.96 | 980 |
| | SD | (11.59) | (11.15) | (12.32) | (11.25) | |
| | N | 261 | 245 | 241 | 233 | |
| 2014 | Mean | 28.30 | 27.94 | 28.11 | 28.29 | 1246 |
| | SD | (11.53) | (11.21) | (12.00) | (11.06) | |
| | N | 330 | 302 | 320 | 294 | |
| 2015 | Mean | 27.42 | 27.45 | 28.85 | 26.57 | 1306 |
| | SD | (11.68) | (10.75) | (12.05) | (11.10) | |
| | N | 350 | 331 | 304 | 321 | |
| 2016 | Mean | 28.98 | 28.56 | 28.63 | 28.35 | 1634 |
| | SD | (12.27) | (11.73) | (11.59) | (11.29) | |
| | N | 396 | 408 | 400 | 430 | |
| **Low-income mothers** | | | | | | |
| 2008 | Mean | 31.11 | 28.68 | 28.67 | 24.78 | 162 |
| | SD | (11.94) | (12.75) | (12.99) | (12.82) | |
| | N | 38 | 41 | 39 | 44 | |
| 2009 | Mean | 24.43 | 23.32 | 24.30 | 24.78 | 191 |
| | SD | (12.73) | (12.93) | (12.56) | (11.81) | |
| | N | 47 | 47 | 46 | 51 | |
| 2010 | Mean | 23.88 | 23.29 | 22.76 | 24.10 | 219 |
| | SD | (13.82) | (13.36) | (12.46) | (13.29) | |
| | N | 57 | 48 | 55 | 59 | |
| 2011 | Mean | 27.35 | 26.28 | 24.21 | 24.77 | 214 |
| | SD | (13.24) | (13.47) | (14.64) | (12.90) | |

| Working hours in | | Birth quarter | | | | N |
|---|---|---|---|---|---|---|
| | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | |
| | N | 51 | 50 | 61 | 52 | |
| 2012 | Mean | 23.40 | 23.66 | 21.78 | 23.54 | 226 |
| | SD | (12.84) | (12.92) | (12.04) | (14.02) | |
| | N | 57 | 59 | 64 | 46 | |
| 2013 | Mean | 20.65 | 22.29 | 21.92 | 19.59 | 234 |
| | SD | (12.25) | (13.10) | (12.79) | 11.25) | |
| | N | 43 | 72 | 60 | 59 | |
| 2014 | Mean | 21.35 | 20.22 | 20.74 | 21.05 | 254 |
| | SD | (12.33) | (11.89) | (11.37) | (11.89) | |
| | N | 54 | 78 | 62 | 60 | |
| 2015 | Mean | 23.27 | 18.88 | 21.60 | 20.10 | 257 |
| | SD | (15.38) | (11.81) | (10.88) | (11.05) | |
| | N | 52 | 72 | 63 | 70 | |
| 2016 | Mean | 21.88 | 24.53 | 21.44 | 20.95 | 286 |
| | SD | (12.11) | (23.46) | (13.00) | (13.62) | |
| | N | 59 | 75 | 66 | 86 | |

Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus 2008-2016, own calculations.

Table 13: Descriptive Statistics on Control Variables for selective years (Microcensus)

| Variables | | | Birth half-year | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
| | | | High-income mothers | | | |
| 2008 | Age | Mean | 33.23 | 34.25 | 34.55 | 34.94 |
| | | SD | (3.44) | (4.07) | (4.34) | (4.02) |
| | Married | Mean | 0.76 | 0.80 | 0.79 | 0.78 |
| | | SD | (0.43) | (0.40) | (0.41) | (0.41) |
| | Single Mother | Mean | 0.05 | 0.07 | 0.08 | 0.07 |
| | | SD | (0.22) | (0.25) | (0.27) | (0.25) |
| | German | Mean | 0.93 | 0.93 | 0.94 | 0.93 |
| | | SD | (0.25) | (0.26) | (0.25) | (0.25) |
| | Foreigner, European | Mean | 0.02 | 0.04 | 0.03 | 0.04 |
| | | SD | (0.15) | (0.21) | (0.16) | (0.20) |
| | Foreigner, Non-European | Mean | 0.04 | 0.03 | 0.04 | 0.03 |
| | | SD | (0.21) | (0.17) | (0.19) | (0.17) |
| | Partner's age | Mean | 36.09 | 37.00 | 36.85 | 37.96 |
| | | SD | (4.53) | (5.32) | (5.35) | (6.09) |
| | Net income | Mean | 1355.64 | 1208.16 | 1419.46 | 1439.35 |
| | | SD | (1037.32) | (925.26) | (991.49) | (1348.31) |
| | Net household income | Mean | 3936.94 | 3667.98 | 3952.53 | 4046.96 |
| | | SD | (2384.09) | (2081.73) | (2017.38) | (2502.27) |
| | Fulltime | Mean | 0.49 | 0.46 | 0.42 | 0.38 |
| | | SD | (0.50) | (0.50) | (0.49) | (0.49) |
| | Observations | | 181 | 202 | 185 | 175 |
| 2009 | Age | Mean | 33.85 | 35.11 | 34.55 | 35.60 |
| | | SD | (3.59) | (4.16) | (4.04) | (4.17) |
| | Married | Mean | 0.75 | 0.80 | 0.84 | 0.81 |
| | | SD | (0.43) | (0.40) | (0.37) | (0.39) |
| | Single Mother | Mean | 0.04 | 0.10 | 0.06 | 0.08 |
| | | SD | (0.21) | (0.30) | (0.23) | (0.28) |
| | German | Mean | 0.93 | 0.91 | 0.92 | 0.92 |
| | | SD | (0.26) | (0.29) | (0.28) | (0.27) |
| | Foreigner, European | Mean | 0.02 | 0.06 | 0.04 | 0.06 |
| | | SD | (0.13) | (0.24) | (0.20) | (0.23) |
| | Foreigner, Non-European | Mean | 0.06 | 0.03 | 0.04 | 0.02 |
| | | SD | (0.23) | (0.18) | (0.20) | (0.15) |
| | Partner's age | Mean | 36.67 | 38.24 | 38.06 | 38.60 |
| | | SD | (4.46) | (5.98) | (5.48) | (4.88) |
| | Net income | Mean | 1636.57 | 1437.24 | 1504.10 | 1584.43 |
| | | SD | (1137.79) | (1056.65) | (1110.33) | (1603.86) |
| | Net household income | Mean | 4138.89 | 3777.27 | 4183.53 | 4351.90 |
| | | SD | (2072.82) | (2129.47) | (2312.92) | (2683.81) |

|  |  |  | Birth half-year | | | |
|---|---|---|---|---|---|---|
| Variables | | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
|  | Fulltime | Mean | 0.40 | 0.49 | 0.40 | 0.39 |
|  |  | SD | (0.49) | (0.50) | (0.49) | (0.49) |
|  | Observations | | 179 | 205 | 192 | 177 |
| 2016 | Age | Mean | 40.11 | 40.57 | 40.80 | 41.78 |
|  |  | SD | (4.66) | (4.76) | (4.97) | (4.97) |
|  | Married | Mean | 0.76 | 0.79 | 0.74 | 0.82 |
|  |  | SD | (0.43) | (0.41) | (0.55) | (0.39) |
|  | Single Mother | Mean | 0.18 | 0.18 | 0.22 | 0.13 |
|  |  | SD | (0.39) | (0.18) | (0.41) | (0.34) |
|  | German | Mean | 0.94 | 0.91 | 0.90 | 0.92 |
|  |  | SD | (0.24) | (0.28) | (0.30) | (0.28) |
|  | Foreigner, European | Mean | 0.03 | 0.05 | 0.05 | 0.06 |
|  |  | SD | (0.16) | (0.22) | (0.22) | (0.23) |
|  | Foreigner, Non-European | Mean | 0.04 | 0.03 | 0.05 | 0.03 |
|  |  | SD | (0.18) | (0.18) | (0.22) | (0.16) |
|  | Partner's age | Mean | 43.18 | 43.35 | 43.98 | 44.53 |
|  |  | SD | (6.30) | (5.76) | (5.93) | (4.88) |
|  | Net income | Mean | 2026.98 | 2002.37 | 2138.54 | 1854.03 |
|  |  | SD | (1559.57) | (1555.72) | (2037.86) | (1195.73) |
|  | Net household income | Mean | 4773.78 | 4922.81 | 4804.37 | 5003.35 |
|  |  | SD | (2868.12) | (2982.95) | (3018.83) | (2871.30) |
|  | Full-time | Mean | 0.35 | 0.36 | 0.34 | 0.31 |
|  |  | SD | (0.48) | (0.48) | (0.47) | (0.46) |
|  | Observations | | 396 | 408 | 400 | 430 |
|  | **Low-income mothers** | | | | | |
| 2008 | Age | Mean | 25.34 | 28.51 | 27.36 | 27.45 |
|  |  | SD | (5.38) | (7.31) | (6.03) | (6.03) |
|  | Married | Mean | 0.55 | 0.63 | 0.56 | 0.57 |
|  |  | SD | (0.50) | (0.49) | (0.50) | (0.50) |
|  | Single Mother | Mean | 0.18 | 0.29 | 0.21 | 0.30 |
|  |  | SD | (0.39) | (0.46) | (0.41) | (0.46) |
|  | German | Mean | 0.87 | 0.80 | 0.74 | 0.84 |
|  |  | SD | (0.34) | (0.40) | (0.44) | (0.37) |
|  | Foreigner, European | Mean | 0.03 | 0.00 | 0.08 | 0.05 |
|  |  | SD | (0.16) | (0.00) | (0.27) | (0.21) |
|  | Foreigner, Non-European | Mean | 0.11 | 0.20 | 0.18 | 0.11 |
|  |  | SD | (0.31) | (0.40) | (0.39) | (0.32) |
|  | Partner's age | Mean | 30.87 | 34.34 | 30.77 | 32.58 |
|  |  | SD | (6.83) | (8.60) | (6.55) | (6.34) |
|  | Net income | Mean | 645.95 | 677.78 | 690.54 | 792.68 |
|  |  | SD | (559.87) | (314.69) | (451.71) | (342.11) |
|  | Net household income | Mean | 1795.94 | 1982.81 | 1763.89 | 1964.47 |
|  |  | SD | (1061.30) | (820.17) | (574.66) | (1224.84) |
|  | Full-time | Mean | 0.61 | 0.41 | 0.54 | 0.50 |

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|  |  |  | Birth half-year | | | |
|---|---|---|---|---|---|---|
| Variables |  |  | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
|  |  | SD | (0.50) | (0.50) | (0.50) | (0.51) |
|  | Observations |  | 38 | 41 | 39 | 44 |
| 2009 | Age | Mean | 26.70 | 28.25 | 29.93 | 28.67 |
|  |  | SD | (5.63) | (6.40) | (5.99) | (5.86) |
|  | Married | Mean | 0.53 | 0.72 | 0.53 | 0.61 |
|  |  | SD | (0.50) | (0.45) | (0.50) | (0.49) |
|  | Single Mother | Mean | 0.26 | 0.26 | 0.17 | 0.35 |
|  |  | SD | (0.44) | (0.44) | (0.38) | (0.48) |
|  | German | Mean | 0.81 | 0.81 | 0.74 | 0.75 |
|  |  | SD | (0.40) | (0.40) | (0.44) | (0.44) |
|  | Foreigner, European | Mean | 0.06 | 0.02 | 0.11 | 0.04 |
|  |  | SD | (0.25) | (0.15) | (0.31) | (0.20) |
|  | Foreigner, Non-European | Mean | 0.13 | 0.17 | 0.15 | 0.22 |
|  |  | SD | (0.34) | (0.38) | (0.36) | (0.42) |
|  | Partner's age | Mean | 31.49 | 34.49 | 34.00 | 33.06 |
|  |  | SD | (8.51) | (7.06) | (7.32) | (4.80) |
|  | Net income | Mean | 645.56 | 663.33 | 679.38 | 864.67 |
|  |  | SD | (416.60) | (379.73) | (361.35) | (506.94) |
|  | Net household income | Mean | 1980.00 | 1982.14 | 1861.11 | 1894.05 |
|  |  | SD | (2074.04) | (873.93) | (704.99) | (975.07) |

Continued on next page

| Variables | | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 |
|---|---|---|---|---|---|---|
| | | | Birth half-year | | | |
| | Full-time | Mean | 0.34 | 0.30 | 0.37 | 0.33 |
| | | SD | (0.48) | (0.46) | (0.49) | (0.48) |
| | Observations | | 47 | 47 | 46 | 51 |
| 2016 | Age | Mean | 35.59 | 34.43 | 36.33 | 36.16 |
| | | SD | (6.53) | (5.99) | (6.70) | (6.19) |
| | Married | Mean | 0.61 | 0.71 | 0.71 | 0.65 |
| | | SD | (0.49) | (0.46) | (0.46) | (0.48) |
| | Single Mother | Mean | 0.31 | 0.28 | 0.27 | 0.31 |
| | | SD | (0.46) | (0.45) | (0.45) | (0.46) |
| | German | Mean | 0.73 | 0.69 | 0.73 | 0.73 |
| | | SD | (0.45) | (0.46) | (0.45) | (0.45) |
| | Foreigner, European | Mean | 0.10 | 0.19 | 0.09 | 0.15 |
| | | SD | (0.30) | (0.39) | (0.29) | (0.36) |
| | Foreigner, Non-European | Mean | 0.17 | 0.12 | 0.18 | 0.12 |
| | | SD | (0.38) | (0.33) | (0.39) | (0.32) |
| | Partner's age | Mean | 40.00 | 39.84 | 41.02 | 39.84 |
| | | SD | (11.39) | (7.56) | (6.11) | (7.56) |
| | Net income | Mean | 962.07 | 1032.00 | 1014.23 | 877.65 |
| | | SD | (546.04) | (532.61) | (604.35) | (546.04) |
| | Net household income | Mean | 2353.51 | 2606.08 | 2665.39 | 2536.47 |
| | | SD | (991.12) | (1429.32) | (1118.24) | (1045.47) |
| | Full-time | Mean | 0.22 | 0.28 | 0.27 | 0.26 |
| | | SD | (0.42) | (0.45) | (0.49) | (0.44) |
| | Observations | | 59 | 75 | 66 | 86 |

Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus 2008-2016, own calculations.

Table 14: Effects of the parental leave reform on working hours

| Working hours | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|
| | b/se | b/se | b/se | b/se | b/se | b/se | b/se | b/se | b/se |
| University (vs. no VT) | 1.12 | 4.35* | 5.24** | 3.71 | 4.39* | 6.80*** | 7.76*** | 5.58*** | −7.80*** |
| | (2.12) | (1.96) | (1.97) | (2.06) | (2.15) | (1.62) | (1.57) | (1.41) | (1.55) |
| Birth 1st half (vs. 2nd half) | −0.18 | 0.44 | −1.96 | −1.92 | −2.68 | 1.23 | −0.85 | −0.54 | 0.66 |
| | (2.69) | (2.35) | (2.29) | (2.54) | (2.40) | (2.12) | (1.98) | (1.82) | (2.14) |
| University * Birth 1st half (vs. 2nd half) | −0.95 | 0.16 | 0.59 | 0.46 | 2.47 | −1.68 | 0.24 | 2.48 | −0.43 |
| | (2.95) | (2.65) | (2.56) | (2.75) | (2.63) | (2.33) | (2.16) | (2.01) | (2.27) |
| Birth 06/07 (vs. 05/06) | −3.46 | −2.06 | −2.61 | 0.11 | −1.65 | 0.70 | −0.51 | −1.84 | 3.39 |
| | (2.51) | (2.22) | (2.41) | (2.46) | (2.46) | (2.03) | (1.84) | (1.80) | (2.02) |
| University* Birth 06/07 (vs. 05/06) | −0.95 | 0.16 | 0.59 | 0.46 | 2.47 | −1.68 | 0.24 | 2.48 | −0.43 |
| | (2.95) | (2.65) | (2.56) | (2.75) | (2.63) | (2.33) | (2.16) | (2.01) | (2.27) |
| Treatment | 5.53 | 0.18 | 3.18 | 2.79 | 2.95 | −2.63 | 2.66 | 4.32 | −3.63 |
| | (3.76) | (3.33) | (3.36) | (3.60) | (3.24) | (3.11) | (2.85) | (3.03) | (2.99) |
| University * Treatment | −4.12 | −0.77 | −1.81 | −2.07 | −4.22 | −3.00 | −2.13 | −6.21* | 3.50 |
| | (4.16) | (3.72) | (3.72) | (3.91) | (3.56) | (3.41) | (3.10) | (3.25) | (3.19) |
| Age | 0.17 | −1.95* | −1.03 | 0.44 | 0.82 | 0.41 | −0.37 | −0.82 | −0.95 |
| | (0.82) | (0.79) | (0.83) | (0.74) | (0.74) | (0.63) | (0.59) | (0.68) | (0.65) |
| Age squared | −0.00 | 0.03* | 0.01 | −0.01 | −0.01 | −0.01 | 0.00 | 0.01 | 0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| Number of Children (ref: 1 child) | | | | | | | | | |
| 2 | 0.91 | −0.27 | −1.11 | −2.73*** | −5.36*** | −4.17*** | −3.62*** | −2.66*** | −3.83*** |
| | (1.27) | (0.93) | (0.76) | (0.73) | (0.73) | (0.71) | (0.62) | (0.64) | (0.62) |
| 3 | 0.12 | −1.69 | 0.03 | −2.23 | −5.46*** | −6.69** | −7.01*** | −5.95*** | −6.33*** |
| | (8.18) | (4.44) | (3.25) | (1.88) | (2.04) | (1.40) | (1.15) | (1.04) | (0.89) |
| 4 | | | | | | | −6.67 | −1.53 | −9.73*** |
| | | | | | | | (7.42) | (3.15) | (2.04) |
| East Germany | 4.06*** | 5.32*** | 5.63*** | 5.49*** | 6.69*** | 8.48*** | 7.49*** | 6.11*** | 6.56*** |
| | (0.94) | (0.89) | (0.88) | (0.76) | (0.78) | (0.76) | (0.65) | (0.70) | (0.64) |
| Nationality (ref: German) | | | | | | | | | |
| Non German, EU-Citizen | −1.68 | −6.19** | 2.34 | −2.40 | 2.27 | 0.92 | 2.87* | −0.65 | 0.11 |
| | (2.34) | (2.06) | (1.99) | (1.56) | (1.96) | (1.86) | (1.49) | (1.50) | (1.31) |
| Non German, Non-EU-Citizen | −3.71* | −1.53 | −3.83* | −3.43* | −3.23* | −1.70 | 1.39 | −1.74 | 0.40 |
| | (2.04) | (1.65) | (1.65) | (1.68) | (1.39) | (1.43) | (1.31) | (1.35) | (1.48) |
| Marital status (ref: single) | | | | | | | | | |
| married | −2.44* | −1.38 | −1.42 | −1.40 | −2.24* | −1.56 | −2.51*** | −2.28** | −0.25 |
| | (1.03) | (1.00) | (0.92) | (0.87) | (0.87) | (0.86) | (0.71) | (0.77) | (0.70) |
| divorced | −12.62*** | 1.31 | 2.36 | 1.37 | −1.87 | −1.56 | −2.39 | 1.10 | 2.73* |
| | (3.80) | (2.39) | (2.49) | (1.92) | (1.44) | (1.46) | (1.32) | (1.44) | (1.11) |
| Public sector | 0.66 | 0.81 | 1.12 | 0.39 | −0.10 | −0.22 | 1.00 | 1.27* | 0.10 |
| | (0.90) | (0.84) | (0.78) | (0.72) | (0.73) | (0.67) | (0.58) | (0.58) | (0.53) |
| Region (ref: City) | | | | | | | | | |
| Urban Region | −0.73 | −2.26* | −0.54 | −1.82* | −2.47** | 0.03 | −0.45 | −0.15 | −0.53 |
| | (0.94) | (0.88) | (0.80) | (0.76) | (0.78) | (0.79) | (0.67) | (0.67) | (0.62) |
| Rural region | 1.05 | −0.65 | 0.47 | −0.42 | −1.62 | −1.36 | −1.07 | 0.37 | −0.55 |
| | (1.35) | (1.24) | (1.19) | (1.14) | (0.97) | (0.83) | (0.70) | (0.73) | (0.69) |
| Constant | 27.85* | 57.72*** | 43.09** | 21.52 | 15.28 | 15.73 | 31.03** | 38.45** | 43.19*** |
| | (12.67) | (12.77) | (13.96) | (12.95) | (13.11) | (11.49) | (10.64) | (12.83) | (12.61) |
| R-squared | 0.06 | 0.11 | 0.10 | 0.10 | 0.17 | 0.18 | 0.19 | 0.16 | 0.14 |
| N | 905 | 944 | 1064 | 1222 | 1173 | 1214 | 1500 | 1563 | 1920 |

Source: RDC of the Federal Statistical Office and Statistical Offices of the Länder, Microcensus 2008-2016; own calculations. Treatment dummy equals 1 if the first child is born in the first half of 2007. VT: Vocational Training. Significance levels: * p< 0.05, ** p<0.01, *** p< 0.001. Robust standard errors in parentheses.

Figure 5: Effects of the parental leave reform on the duration of employment interruptions in West Germany
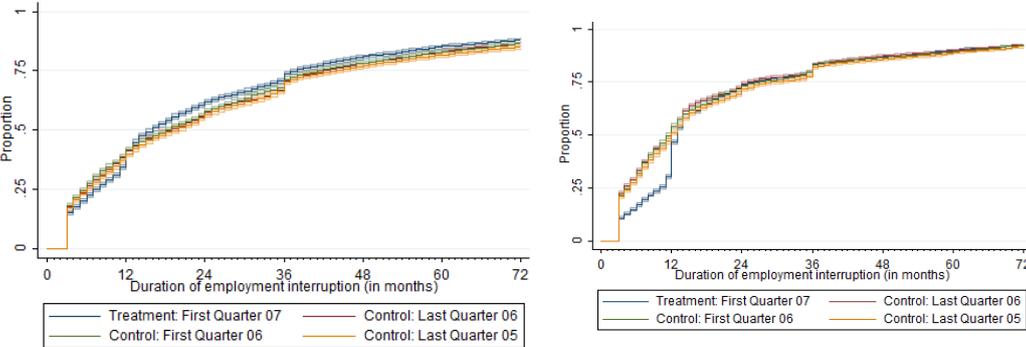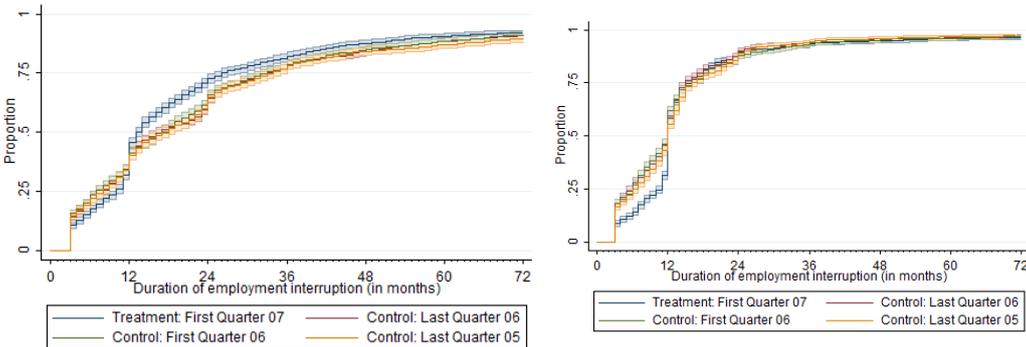


(a) Low-income mothers
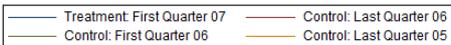
(b) High-income mothers
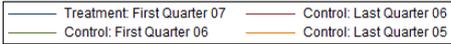
Source: IEB 1976-2016; own calculations.

Figure 6: Effects of the parental leave reform on the duration of employment interruptions in East Germany



(a) Low-income mothers

(b) High-income mothers

Source: IEB 1976-2016; own calculations.

Table 15: Descriptive Statistics on Daily Earnings of Mothers, Medium-income mothers

| | | Birth quarter | | | | |
|---|---|---|---|---|---|---|
| Daily earnings in | | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | N |
| | | **Medium-income mothers** | | | | |
| t-2 | Mean Log(y) | 4.04 | 4.05 | 4.05 | 4.06 | 76,363 |
| | SD | (0.50) | (0.50) | (0.49) | (0.49) | |
| | Mean y | 56.83 | 57.40 | 57.40 | 57.97 | |
| | N | 18,625 | 19,679 | 18,500 | 19,559 | |
| t-1 | Mean Log(y) | 4.11 | 4.12 | 4.12 | 4.13 | 79,345 |
| | SD | (0.40) | (0.41) | (0.40) | (0.39) | |
| | Mean y | 60.95 | 61.56 | 61.56 | 62.18 | |
| | N | 19,341 | 20,423 | 19,253 | 20,328 | |
| t+1 | Mean Log(y) | 3.94 | 3.21 | 3.19 | 3.20 | 15,413 |
| | SD | (1.14) | (0.99) | (1.03) | (1.03) | |
| | Mean y | 51.42 | 24.78 | 24.29 | 24.53 | |
| | N | 2240 | 4579 | 4181 | 4413 | |
| t+2 | Mean Log(y) | 3.41 | 3.26 | 3.27 | 3.30 | 41,458 |
| | SD | (0.89) | (0.92) | (0.94) | (0.95) | |
| | Mean y | 30.27 | 26.05 | 26.31 | 27.11 | |
| | N | 10,720 | 10,674 | 9838 | 10,226 | |
| t+3 | Mean Log(y) | 3.52 | 3.55 | 3.43 | 3.52 | 45,165 |
| | SD | (0.85) | (0.87) | (0.89) | (0.88) | |
| | Mean y | 33.78 | 34.81 | 30.88 | 33.78 | |
| | N | 11,692 | 11,311 | 11,144 | 11,018 | |
| t+4 | Mean Log(y) | 3.60 | 3.57 | 3.55 | 3.57 | 50,707 |
| | SD | (0.80) | (0.81) | (0.83) | (0.83) | |
| | Mean y | 36.60 | 35.52 | 34.81 | 35.52 | |
| | N | 12,505 | 13,150 | 12,076 | 12,976 | |
| t+5 | Mean Log(y) | 3.59 | 3.58 | 3.55 | 3.56 | 52,471 |
| | SD | (0.80) | (0.81) | (0.84) | (0.84) | |
| | Mean y | 36.23 | 35.87 | 34.81 | 35.16 | |
| | N | 13,015 | 13,558 | 12,596 | 13,302 | |
| t+6 | Mean Log(y) | 3.60 | 3.59 | 3.56 | 3.59 | 55,528 |
| | SD | (0.79) | (0.80) | (0.82) | (0.81) | |
| | Mean y | 36.60 | 36.23 | 35.16 | 36.23 | |
| | N | 13,673 | 14,358 | 13,475 | 14,022 | |
| t+7 | Mean Log(y) | 3.62 | 3.60 | 3.57 | 3.57 | 59,201 |
| | SD | (0.77) | (0.78) | (0.80) | (0.80) | |
| | Mean y | 37.34 | 36.60 | 35.52 | 35.52 | |
| | N | 14,400 | 15,334 | 14,248 | 15,219 | |
| t+8 | Mean Log(y) | 3.64 | 3.63 | 3.60 | 3.40 | 60,593 |
| | SD | (0.77) | (0.77) | (0.79) | (0.80) | |
| | Mean y | 38.09 | 37.71 | 36.60 | 29.96 | |

Continued on next page

42

| | Birth quarter | | | | |
|---|---|---|---|---|---|
| Daily earnings in | 1st 2007 | 4th 2006 | 1st 2006 | 4th 2005 | N |
| N | 14,796 | 15,753 | 14,510 | 15,534 | |
| t+9    Mean Log(y) | 3.75 | 3.74 | 3.64 | 3.63 | 61,355 |
| SD | (0.75) | (0.76) | (0.77) | (0.78) | |
| Mean y | 42.52 | 42.10 | 38.09 | 37.71 | |
| N | 14,788 | 15,680 | 14,878 | 16,009 | |

Source: IEB 1976-2016; own calculations.

Figure 7: Effects of the parental leave reform on the duration of employment interruptions for Medium-income mothers
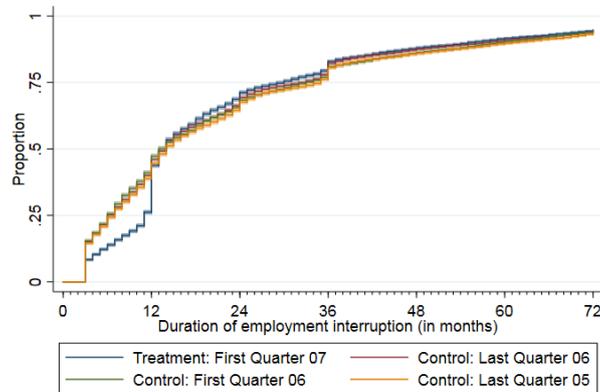
Table 16: Effects of the parental leave reform on daily earnings, nine years after birth

| Log(Daily Earnings) | $\beta$ | se | $\beta$ | se |
|---|---|---|---|---|
| FirstQuarter | −0.01 | (0.02) | −0.01 | (0.01) |
| Reform | 0.13*** | (0.01) | 0.11*** | (0.01) |
| FirstQuarter × Reform | 0.01 | (0.02) | 0.03* | (0.01) |
| Previous wage | 0.11*** | (0.02) | 0.93*** | (0.02) |
| Foreign | −0.09*** | (0.02) | 0.15*** | (0.01) |
| Full-time experience | 0.00*** | (0.00) | −0.00*** | (0.00) |
| Full-time experience squared | 0.00*** | (0.00) | 0.00*** | (0.00) |
| Part-time experience | 0.00 | (0.00) | 0.00 | (0.00) |
| Part-time experience squared | 0.00 | (0.00) | −0.00 | (0.00) |
| Unemployment work experience | −0.48*** | (0.06) | −0.11 | (0.10) |
| Age at birth | 0.00* | (0.00) | 0.02*** | (0.00) |
| Change of employer after birth | −0.10*** | (0.01) | −0.20*** | (0.01) |
| Employment pre-birth (ref: Full-time) | | | | |
| Part-time | 0.08*** | (0.03) | 0.18*** | (0.01) |
| Marginal Employment | −0.05 | (0.03) | 0.04 | (0.14) |
| East Germany | 0.37*** | (0.01) | 0.36*** | (0.01) |
| Educational level (ref: No A-Levels/ No VT) | | | | |
| No A-Levels/ VT | 0.04* | (0.02) | −0.07** | (0.03) |
| A-Levels/No VT | 0.15** | (0.04) | 0.00 | (0.04) |
| A-Levels/ VT | 0.10*** | (0.02) | −0.06* | (0.03) |
| University of Applied Science | 0.19*** | (0.05) | −0.03 | (0.03) |
| University Degree | 0.44*** | (0.04) | 0.02 | (0.03) |
| No Information | 0.21*** | (0.02) | 0.15 | (0.13) |
| Tenure | −0.00** | (0.00) | −0.00*** | (0.00) |
| Firm size (ref: < 50) | | | | |
| 50-100 | 0.31*** | (0.03) | 0.33*** | (0.01) |
| 101-200 | 0.32*** | (0.03) | 0.39*** | (0.01) |
| 201-500 | 0.38*** | (0.03) | 0.43*** | (0.01) |
| >500 | 0.50*** | (0.03) | 0.47*** | (0.01) |
| Missing | −0.03 | (0.02) | 0.05* | (0.03) |
| Constant | 2.63*** | (0.08) | −0.85*** | (0.09) |
| R-squared | 0.13 | | 0.33 | |
| N | 23,931 | | 32,5865 | |

Source: IEB 1976-2016; Besides firm size all variables refer to the employment spell 10 months prior to birth. Significance levels: * p< 0.05, ** p<0.01, *** p< 0.001. Robust standard errors in parentheses.