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Return-to-Job During and After Maternity Leave

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and Anthony Strittmatter

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Non-technical summary

This study sheds light on the return-to-job of female employees after first birth based on exceptional longitudinal data from personnel records of a large German company. Our empirical analysis investigates a number of pertinent hypotheses regarding the return-to-job from a management perspective. We investigate to what extent data available to the management allow to predict the return-to-job of female employees in maternity leave (ML) after first birth. Specifically, we investigate whether good matches result in a higher and quicker return-to-job because management should be most interested in the return of these employees. Another hypothesis to be investigated suggests that a return to a part-time job during ML is associated with a higher incidence of a return-to-job after the end of ML and more stable employment afterwards. Furthermore, we investigate the career development before birth in comparison to female employees not having a child.

Our empirical analysis estimates the determinants of the cumulative incidence of exits to different states. The results show that predicting the return-to-job of female employees after first birth is a major challenge for management in a situation with long ML coverage. A large fraction of mothers never returns or has a second child during ML or shortly after return-to-job. Also, female employees have their first child, when their careers have been particularly successful in comparison. On average, these are the female employees management would like to have to return soon to their job. Having to replace these employees during the long ML phase implies high costs for the company and reducing the uncertainty regarding the return-to-job, is of great importance for management. Furthermore, after a long ML duration, a company may not be interested any more in the return-to-job. Our results suggest that a sizeable fraction of mothers with a successful career before first birth does not continue to advance their career and many do not even return to their job.

In addition, our findings show that the relative wage position, higher tenure, and an above average frequency of previous promotions show a positive association with the return-to-job and the stability of employment after return. These indicators can be used by management to predict the return-to-job. Furthermore, our results suggest that part-time work during ML is an useful way to reduce potential family-work-conflicts resulting in a higher return-to-job and higher employment stability after return.

Das Wichtigste in Kürze

Diese Studie untersucht die Rückkehr von Müttern an den vorherigen Arbeitsplatz nach der Geburt ihres ersten Kindes. Dazu werden Erwerbsbiographien mit Personaldaten eines großen deutschen Unternehmens ausgewertet. In der empirischen Analyse werden verschiedene Hypothesen getestet, die aus der arbeitsmarktökonomischen Literatur und der Management Literatur abgeleitet sind. Eine Haupthypothese unterstellt, dass ein erfolgreiches Arbeitgeber-Arbeitnehmer-Verhältnis vor der Geburt des ersten Kindes zu höheren Rückkehrwahrscheinlichkeiten und schnellerer Rückkehr führt. Eine weitere Hypothese stellt legt nahe, dass Frauen, die Teilzeit in Elternzeit arbeiten, höhere Rückkehrwahrscheinlichkeiten und höhere Stabilität nach der Rückkehr aufweisen. Weiterhin werden Karriereverläufe von Müttern vor der Geburt des ersten Kindes mit Karriereverläufen von Nicht-Müttern verglichen.

In der empirischen Analyse werden die Determinanten der kumulativen Inzidenzen der verschiedenen Übergänge geschätzt. Die Ergebnisse zeigen, dass es eine große Herausforderung für das Management ist, das Rückkehrverhalten von Frauen nach der Geburt vorauszusehen. Ein großer Anteil der Frauen kehrt gar nicht an den Arbeitsplatz zurück oder bekommt während bzw. kurz nach der ersten Elternzeit ein zweites Kind. Weiterhin bekommen viele Frauen ein Kind, wenn ihre Karriere - verglichen mit Nicht-Müttern - gerade vergleichsweise erfolgreich ist. Insbesondere bei diesen Frauen ist das Management an einer schnellen Rückkehr interessiert, da sowohl ihr Ersatz während der Elternzeit als auch eine Nichtrückkehr an den vorherigen Arbeitsplatz mit hohen Kosten verbunden ist. Hinzu kommt, dass nach langer Auszeit kein Interesse des Unternehmens an einer Rückkehr bestehen könnte. Zusammenfassend lässt sich sagen, dass ein großer Anteil der Frauen nach der Geburt eines Kindes nicht in gleichem Maße an ihre erfolgreiche Karriere anschließt und sogar mit hoher Wahrscheinlichkeit nicht wieder an ihren vorherigen Arbeitsplatz zurückzukehrt.

Die Ergebnisse zeigen allerdings auch, dass eine hohe relative Lohnposition, lange Betriebszugehörigkeit sowie eine überdurchschnittliche Beförderungsrate vor der Geburt in positivem Zusammenhang mit der Rückkehr an den alten Arbeitsplatz und der Stabilität der Beschäftigung im ersten Jahr nach der Rückkehr stehen. Diese Indikatoren können dem Management dabei helfen, die Rückkehrwahrscheinlichkeit abzuschätzen. Weiterhin zeigen die Ergebnisse, dass Teilzeit in Elternzeit ein guter Weg der Reintegration nach der Geburt eines Kindes ist und damit mögliche Konflikte zwischen Arbeits- und Privatleben abgebaut werden können.

Return-to-Job During and After Maternity Leave

Bernd Fitzenberger*, Susanne Steffes**, Anthony Strittmatter***

Abstract: This paper studies the return-to-job of female employees after first birth based on exceptional longitudinal data from personnel records of a large German company. Given a very long maternity leave coverage, we investigate to what extent data available to management allow to predict the return-to-job during and after maternity leave. Our data show a large heterogeneity in transition patterns, which poses a challenge for management. Maternity leave durations often last for three years or longer. More than 50 percent of those in maternity leave do not return to their job afterwards, either because they leave the company or because they have a second child. At the same time, about 31 percent of female employees return to part-time work during maternity leave, which is often a stepping stone but no guarantee for a return-to-job afterwards. There is mixed evidence as to whether female employees in better job matches are more likely to return to their job in the company. Specifically, we find that the relative wage position, higher tenure, a combination of vocational training and university education, and an above average frequency of previous promotions show a positive association with the return-to-job and a higher employment stability afterwards. At the same time, female employees have their first child, when their careers have been particularly successful in comparison. Among these, a sizeable share does not continue to advance their career and many do not even return to their job.

Keywords: female employees, maternity leave, match quality, personnel data.

JEL-Classification: J13, J22, M50.

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1 Introduction

Maternity leave (ML) coverage after child birth by law lasts 36 months in Germany, which is much longer than in almost all industrialized countries (Schönberg and Ludsteck 2007). There exists strong empirical evidence that longer ML coverage results in longer employment interruptions after child birth (Ondrich et al. 1999, Dustmann and Schönberg 2008, Lalive and Zweimüller 2009). Managing the return-to-job of female employees giving birth to a child during and after maternity leave is a major challenge for human resource management in firms.[1] In Germany, this challenge has become stronger over time in light of increasing female employment rates[2] and the strong expansion of ML coverage (Dustmann and Schönberg 2008). A quick return-to-job avoids long disruptions at the workplace, secures the firm-specific human capital of the employee, and avoids the costly hiring and training of a new employee, who may only serve as a temporary replacement. Empirical evidence shows that sizeable employment interruptions occur after childbirth, especially in Germany (Beblo et al. 2009, Fitzenberger et al. 2010, Geyer and Steiner 2007, Dustmann and Schönberg 2008). It is often argued that the long ML coverage is an important reason for the low employment rates of German mothers with young children, counteracting the general trend of rising employment rates.

Our paper analyzes empirically the return-to-job of female employees taking ML after birth in one large company in the German financial sector. In addition to taking long ML periods, a nonnegligible fraction of female employees are never returning to their job after birth (or to the labor market at all) and most female employees have the right to work part-time during ML, while still being entitled to their former full-time job after maternity leave (in this sense, ML serves as job protection). Our company data show that 12 percent of all first-time mothers leave the company directly after maternity leave and 31 percent work part–time during ML. Schönberg and Ludsteck (2007) find that many women, who return to their pre-birth job at the end of the ML coverage, leave the firm one or two months later. Long ML coverage is also associated with a high share of second births during ML (Lalive and Zweimüller 2009). In our sample, more than 40 percent of all female employees have a second child before the end of the ML spell associated with the birth of a first child. Hence, when a female employee has two children, this may be associated with an employment interruption of more than six years with guaranteed job protection. Our analysis for a large German company with long ML coverage is of interest

[1] We focus on female employees because the vast majority of parental leave periods is taken by women (Spiess and Wrohlich 2008).

[2] With 64.3 percent (OECD 2008), the employment rate of females is still lower than in Anglosaxon or Scandinavian countries. Furthermore, 38.6 percent of all employed women in Germany are working part-time but only 8.2 percent of employed men are working part-time (OECD 2008).

for an international audience, because various countries have long ML coverage of more than a year (Lalive and Zweimüller 2009) and an expansion of ML coverage has been on the political agenda in some countries (see discussion in Dustmann and Schönberg 2008).

There exists a large empirical literature which focuses on the return-to-work after child birth based on data for individual employees (Leibowitz et al. 1992, Ondrich et al. 1999, Lalive and Zweimüller 2009, Beblo et al. 2009). The return-to-work may involve a different job (Schönberg and Ludsteck 2007). Most of these studies focus on the effects of individual and workplace characteristics. The heterogeneity across firms makes it difficult to compare the behavior of female employees. Cross-national evidence suggests that ML coverage has a positive effect on employment rates of females (Ruhm 1998). Both family friendly policies (such as the availability of childcare and the flexibility of working times) and the firm culture regarding work-life balance may differ strongly across firms, possibly resulting in self-selection of female employees before and after birth in order to avoid work-family conflicts (Schönberg and Ludsteck 2007, Ngo et al. 2009). Our company offers a wide range of direct and indirect work-life-balance measures. Allowing for 3.5 or 4 years of ML reflects a firm culture that accounts for possible conflicts.

Recent studies in the management literature suggest that the firm culture is more important than the existence of formal family friendly policies (Major et al. 2008, Taylor et al. 2009). Depending on the firm and the type of job, there is also a lot of scope for synergies between family and work roles (Rothbard 2001, Greenhaus and Powell 2006, Van Steenbergen and Ellemers 2009).[3] Thus, it is crucial to control for differences across firms, when analyzing the return-to-job after child birth. Using detailed data for one large company, we can avoid biases due to heterogeneity across firms, while still being able to draw on a large sample. Our analysis is a case study in insider econometrics holding the firm characteristics and the management strategy constant (Bartel et al. 2004).

The decision about child birth and crucial steps in career advancements are taken at about the same age, especially among highly educated professionals (Brizendine 2008). The traditional view on the work-family conflict posits that female employees with a strong career orientation have less children and female employees with children invest less in their careers, even before the first birth (Polachek 1981, Kunze and Ejrnaes 2004). Rising employment rates of females with children and longer ML durations (Ruhm 1998) suggest that female employees have a growing interest in reconciling work and family

[3]Van Steenbergen and Ellemers (2009) find that work-family conflicts reduce individual productivity and lead to increasing health problems. Some firms offer explicit work-life-balance measures, others try to implement a firm culture of higher job commitment. Often, work-life-balance depends on the relationship between employee and direct supervisor. Major et al. (2008) find all these instruments to have a significantly negative impact on work-family conflicts. In contrast, Ngo et al. (2009) and Taylor et al. (2009) suggest that formal work-family policies have no significantly positive impact on work-life balance.

and, in response, firms invest more in the careers of female employees, especially when the quality of the job match is good (Jovanovic 1979). A long ML duration and failing to return to the previous job result in depreciation of human capital and sunk costs for both employee and employer. These costs are particularly large for good job matches (e.g. career oriented women who are successful in their job), for whom management is therefore very interested in a quick return-to-job. In Germany, part-time work of female employees with small children is a popular strategy to sustain human capital and to reduce work family conflicts (Ondrich et al. 1999, Geyer and Steiner 2007).

Our empirical analysis investigates a number of pertinent hypotheses regarding the return-to-job from a management perspective. We investigate to what extent data available to the management allow to predict the return-to-job of female employees in ML after first birth. Three distinctive features of these data are noteworthy. First, the data span the time period from entry into the firm until at least one year after the end of ML. Second, the data allow us to distinguish return-to-job on a part-time basis during ML from return-to-job after the end of ML. Third, the detailed data allow us to assess the quality of the job match before the birth of the first child relative to comparable female employees with the same previous history in the company who have not had a child. We are not aware of any study in the literature on return-to-work of female employees after first birth based on such high quality data.

2 Institutional Background

With ML coverage of 36 months by law in Germany, ML is more generous than in almost all industrialized countries (Schönberg and Ludsteck 2007). To allow for a sufficiently long observation period after child birth, our empirical analysis considers births during the time period 2000 to 2004. ML regulations have been changing a number of times over the last decades. Here, we describe the regulations in place between 2000 and 2004. Note that the strong expansion of ML coverage in Germany took place between the late 1970s and the early 1990s (Dustmann and Schönberg 2008).

ML regulations involve several aspects: First, the job protection during ML allows the mother to return to her previous job (or a comparable job in the firm) after 36 months after birth at the latest.[4] Second, means tested benefits are paid by the government as a compensation for loss of income. Third, the mother has the right to return to her job on a part-time basis during ML without giving up the employment protection of ML.

[4]Up to twelve months of ML coverage can be transferred into the future, up to when the child turns eight years old.

Fourth, the mother can ask for a regular part-time job after the end of ML, when the job protection through ML has expired.

Because of a company specific agreement between management and employees, our company allows for an extended ML coverage up to 3.5 years and in some cases even up to 4 years. This agreement has been in place since the 1990s and our data show that a large share of ML durations extends well beyond the legal limit of 3 years.

3 Hypotheses

The observed employment pattern of female employees after child birth is affected both by the employee and by the employer. The employee may choose not to return to her job for family related reasons or because of a perceived work-family conflict. Despite the job protection implied by ML, the firm has possibilities to terminate employment after child birth, if the firm does not want the employee to return to her job. First, management can negotiate with the employee and offer incentives with the goal to convince her to quit. Second, measures for work-life-balance may be refused (e.g. flexible working hours). Third, the employee may be laid off after the end of ML.

Economic theory posits that employees are utility maximizers considering their consumption possibilities (through income or home production), preferences for staying at home with the child, and other individual characteristics. A traditional view suggests that after child birth individual preferences shift towards home production (e.g. childcare) and the utility from employment decreases (Leibowitz et al. 1992). This shift reverses the older the child but the employment rate of mothers, empirically, never completely catches up with childless females. Some mothers return to work quickly after child birth, some take long ML breaks, while others never return-to-job (or return-to-work).

One focus of this study is the quality of the job match, which can be approximated by the wage level, tenure, and indicators of career progression. The quality of the job match is reflected in the attachment to the employer, i.e. the organizational commitment, which is found to improve both the productivity and the well-being of the employee (Meyer and Herscovitch 2001). Organizational commitment may take different forms, such as affective and continuance commitment.[5] High organizational commitment is likely to imply low turnover rates and good job performance (Mayer and Schoorman 1992). Among similar employees in the same workplace, attachment could differ because of differences in cognitive or non-cognitive skills, preferences, or other characteristics. These differences

[5]Grover and Crooker (1995) define affective commitment as an attitude of loyalty and pride. Continuance commitment is based on self-interests where the costs of terminating the relationship are relatively high for the employee.

result in differences in career progression. Higher attachment and better job matches are reflected in quicker career progression. We analyze career progression before birth of the first child.

A working mother deals with two roles, the role as mother and the role as employee. The literature on work-life balance discusses whether these two roles are enriching or depleting each other. Rothbard (2001) finds that women, who feel positively about their engagement in the family-role, are also highly engaged in employment, but a reverse effect cannot be found. According to Greenhaus and Powell (2006), high performance and positive affects in one role could enrich the performance and the positive affects in the other role. A woman, who is successful and satisfied in her job, has a high probability to be also successful and satisfied in her family life, and vice versa. This does not hold for less successful and less satisfied women. Accordingly, good job matches before birth with high success and high job satisfaction should be associated with a quicker return-to-job.

Another explanation relates to the impact of relative income and comparisons with colleagues on happiness and employment (Clark et al. 2008). Accordingly, there exists a positive relationship between relative income or status and utility from employment and happiness. Put differently, the utility from work before child birth is higher for employees who perform better in the job. Assuming that child birth shifts utility of all women to a similar extent, the after-birth utility from work is still higher for women who performed better before birth. Furthermore, the firm is especially interested in the return-to-job of these employees.

The matching theory assumes that the quality of a match is unknown, when the contract is concluded, and agents learn about this quality over time, especially soon after the job has started (Jovanovic 1979). Those matches, which emerge to be unproductive for whatever reason, are terminated, thus resulting in higher turnover rates at the beginning of a match. Turnover is decreasing over time and after some time only the good matches have survived. As a consequence, longer tenure reflects higher attachment to the employer, suggesting a quicker return-to-job compared to shorter tenure. Longer tenure may also reflect higher accumulation of firm-specific human capital over time (Becker 1960). Long ML may result in a strong depreciation of human capital. Put differently, a higher level of human capital increases the incentives for a quick return-to-job, both for the employee and the firm.

Hypothesis 1 *A higher pre-birth match quality, measured by job performance before birth, is associated with a higher probability of a return-to-job after child birth, a shorter time until the return, and higher employment stability after return. Similarly, longer tenure before birth fosters the return-to-job and the employment stability after the return.*

The longer a mother takes ML and does not return to her job, the stronger the depreciation of her human capital and the more likely it is that the demands in her former job will have changed.

Hypothesis 2 *A longer ML duration without return-to-job reduces the stability of employment after return-to-job.*

Taking care of the first child requires strong adjustments in family life, which are partly unpredictable before birth. Taking ML and using the possibility to work part-time during ML allows the women to gain experience in combining child rearing and work without losing the job protection until the end of ML coverage. Part-time work during ML allows the women to gain experience with how to deal with the work-family conflict.

Hypothesis 3 *There is a lot of uncertainty in as to whether and when female employees return to their job after child birth. Part-time work during ML provides experience in combining child rearing and work and increases the employment stability after the return-to-job. Because of the inherent uncertainty, part-time work during ML does by no means guarantee a return-to-job after ML.*

Many parents prefer to have more than one child. Generous ML coverage provides a strong incentive to have a second child during or shortly after the end of ML (Lalive and Zweimüller 2009), thus being able to take a second ML period without losing the job.

Hypothesis 4 *A large share of female employees in ML after birth of the first child will have a second child before the end of ML - or soon after the return-to-job.*

During the first two years of ML, female employees receive a small, means tested monthly benefit payment by the government, even if they work part-time. The means test becomes much stricter after six months of ML. Therefore, the monetary incentive for a return-to-job is higher for better paid female employees early during the ML, whereas it grows more strongly for less paid female employees over time. Furthermore, employees can transfer up to one year of ML coverage into the future, up to when the child turns eight years old.

Hypothesis 5 *The return-to-job during ML should increase continuously over time and particularly strong increases may occur at the end of six months and at the end of two years of ML. These increases should be the stronger the lower the pre-birth wage level.*

Finally, we consider the link between the career position before birth in comparison to other female employees and the decision to have a child. We can think of three different patterns to expect, and because of this ambiguity, no specific testable hypothesis is implied. First, female employees with a particular low career position may decide to have a child because this yields a higher utility compared to continuing work without children. This suggests that mothers are less successful before birth compared to childless employees. Second, mothers may anticipate the birth of the child for a while and may invest less in their careers shortly before birth. This would suggest a dip in the career position before birth (Kunze and Ejrnaes 2004). Third, female employees decide to invest strongly into their career before having a child. They will have a child, only after having achieved their individual career goals.

4 Data and Descriptive Statistics

4.1 Basic Information

We have access to panel data based on personnel records of a large German company in the financial sector.[6] The observation period is January 2000 to March 2008. Our data contain the information of the 100 percent sample of 6,744 female employees taking ML during the observation period and a random sample of 7,000 female employees not giving birth during the observation period while being employed in the company.

The data is organized in separate company registers (files), with general information about the current employment status (master data), wage information, information about education, about working time, and days of birth of children.[7] The master data set contains records on the timing and the nature of changes in the employment arrangement or position, as reported by the personnel department. These reports can be used to reconstruct individual employment histories within the company. For technical reasons, these detailed employment histories of each employee have been available since January 2000. For all employees entering the company before that date, we know the date of entry into the company as well as information about wages and birth of children since entry, i.e. we observe the complete employment history. The end of employment is determined by the date, when an exit from the company is reported. After merging the different company

[6]The company offers a wide range of direct and indirect work-life-balance measures, like a newsletter for parents in ML or support for the search of daycare. Because of high wages and other popular HR practices, the company is perceived as an attractive employer and quit rates are fairly low (the female annual turnover rate is around 5.5 percent.)

[7]Please find more detailed information about the data files in the Appendix.

registers and eliminating some inconsistencies, we have 13,689 female employees, based on a total of 241,322 records.

4.2 ML Spells

The exact day of birth of a child is provided in a separate data file, showing the birth of 9,854 children by 6,017 mothers.[8] To allow for a sufficiently long observation period after child birth, we restrict ourselves to ML spells starting before April 2004.[9] Furthermore, we only analyze first births during employment in the company, which leaves us with 1,835 ML spells starting after January 2000. We keep only those cases with regular employment before ML, thus dropping apprentices, interns, and employees with temporary contracts and leaving us with 1,509 cases.[10] An ML spell related to the birth of a first child ends, when the employment status ML in the master data ends or when a second child is born.[11] After the end of full ML coverage, women either return to their job or leave the company.[12]

Figure 1 shows the distribution of full-time-equivalents (FTE) of actual employment before, during, and after ML. Before the first birth, more than 90 percent of all women are working full-time. After ML, only 20 percent are working full-time. Thus, we note that a return to a full-time job immediately after ML is quite a rare event, illustrating the challenges for female employees and for management regarding the return-to-job after child birth. About 30 percent of all women work part-time during ML, thus keeping in touch with their job. Therefore, we allow part-time during ML as one of the various exit states after starting an ML spell.

Figure 1 here

4.3 Further Key Variables

The company data allow us to construct proxies for the quality of the job match before first birth, based on information such as turnover, wages, or career progression. A first proxy for the quality of the job match is elapsed tenure at first birth. We define three dummy variables for short, medium, and long tenure: 1) at most 6 years of tenure, 2) between 7 and 12 years of tenure, 3) more than 12 years of tenure. Table 1 shows that 31

[8] Accordingly 727 mothers are missing, compared to the 6,744 mothers taking ML in the master data.
[9] If a ML spell is not finished before April 2008, it is right censored at the elapsed duration.
[10] Additionally, we drop twins and ML spells which seem obviously wrong to us, i.e. ML spells longer than 4 years. Moreover, we drop observations with missing wage information.
[11] Having a baby while taking ML interrupts the first ML spell, but a part of the remaining ML coverage can be transferred to the end of the second ML spell.
[12] We do not know whether the exits are quits or layoffs.

percent of the mothers have been employed for at most 6 years, 45 percent for between 7 and 12 years, and 24 percent for more than 12 years (sample shares in parentheses, see table 1). Hence, most mothers have been employed in the company for more than 6 years, suggesting a high job attachment.

The second proxy accounts for the speed of career progression between the time of entry into the company until the child birth, counting the number of promotions to higher wage groups. We define three dummy variables: Being promoted on average 1) less often than every 5 years (36 percent), 2) between every second and every fifth year (48 percent), 3) more often than every second year (16 percent) (table 1).

Figure 2 here

The third proxy accounts for the performance of a woman compared to women with the same characteristics, e.g. the same qualification, tenure, and age (and thus date of entry). We estimate the conditional relative wage position as the conditional probability that a woman earns a lower wage than her current one, i.e. a discrete version of the cumulative probability of the current wage among women with the same characteristics.[13] Differences in the estimated conditional probabilities reflect the wage differences within the group of employees with the same characteristics. This variable could be interpreted as the attachment to the employer. Distinguishing the relative wage position by quartiles, we obtain: 1) $<25\%\equiv$very low (27 percent), 2) 25-50%≡below average (40 percent), 3) 50-75%≡above average (22 percent), 4) $\geq 75\%\equiv$very high (11 percent) (table 1).

The fourth proxy is a dummy variable for whether a woman has a supervisory role in her job before her first birth. We assume that a supervisory role reflects a higher attachment to the job than other female employees with the same characteristics. 28 percent of all women have a supervisory role in their job before birth (table 1).

In addition, we observe other important employment characteristics. The data provide the highest educational degree.[14] Table 1 shows that 5 percent of the first-time mothers hold no professional degree, 54 percent just a vocational training degree, 30 percent both vocational training degree and university degree, and 11 percent just a university degree.

Table 1 here

[13]This probability is predicted based on an ordered probit regression of the wage groups on important regressors. Cumulating the fitted probabilities for all wage groups below the actual one and one half of the probability to be in the actual wage group. This procedure is described in figure 2. Estimation results are available upon request.

[14]To correct for missings, we use a complete imputation approach, which estimates the probabilities for each degree and uses these as weights (see Appendix for details).

As information on wages, we observe the wage group, ranging from group 8 to group 16.[15] Each wage group reflects a different base wage and these base wages change over time. We define three dummy variables: 1) [groups 8 to 12] low (47 percent), 2) [groups 12 to 14] medium (23 percent) or 3) [groups 14 to 16] high (31 percent).

Age at birth is a key variable to consider when assessing the career progression in the company. Defining three age groups, the first column in table 1 shows the following distribution: 1) at most 30 years (35 percent), 2) between 31 and 35 years (46 percent) and 3) more than 35 years (19 percent).

5 Empirical Results

Our empirical analysis examines the duration of ML, the transitions during and after ML to various exit states, and the stability of employment after ML. We account for a transition during ML to part-time work (T_{mp}) and for three transitions after the end of ML involving the return-to-job (T_{me}), having a second child (T_{mc}), and leaving the company (T_{ml}). After starting part-time work, one of the following three transitions may occur, return-to-job (T_{pe}), having a second child (T_{pc}), and leaving the company (T_{pl}). Finally, after return-to-job, the employee may leave the company (T_{al}) or have a second child (T_{ac}). Conditional on being in state $a \in m, p, e$ (m = ML after child birth, p = part-time work during ML, e = return-to-job after end of ML), T_{ab} denotes the duration until exit to state $b = p, e, c, l$.

Figure 3 here

Figure 3 summarizes the transitions analyzed and provides the actual number of transitions observed. Among the 1,509 female employees taking ML after birth of the first child, 446 (30 percent) return to their job after the end of ML, 436 (29 percent) have a second child before the end of ML, 159 (11 percent) leave the company without ever returning to their job, and 468 (31 percent) return to their job working part-time during ML. Among those 468 working part-time during ML, only 267 (57 percent) continue working in their job after the end of ML. Among those 689 (=713-24) having returned to their job after the end of ML and not being censored during the first year, 557 (81 percent) continue to work in their job one year after return.

In the Appendix, we formalize these transitions as the outcome of a two step competing risks model with multiple exit states. We do not think that we have sufficient identifying information to estimate the complex competing risks model, i.e. the hazard rates for the

[15] Wage groups 15 and 16 are individual and not collectively agreed.

different exit states. We resort to analyzing the timing of the cumulative incidence (CI) for the transitions of interest. The CI for exit i at time t simply denotes the share of observations in the initial state who have made an exit to i up to time t (see Appendix for details). For instance, the CI of the exit to part-time of those taking ML at $t = 1$ *year* is the share of those who have started part-time work during ML during the first year after child birth. In the following, we analyze the timing of the CIs both for the entire sample and various subsamples by means of graphical analysis and conditional on observed covariates by means of regression analysis.

5.1 Transitions after and Employment before Birth

We start with graphical evidence on the unconditional CIs for the group of all first-time mothers taking ML. These graphs are augmented with employment rates before birth. Figure 4 shows the CIs for exits from ML and employment rates for all 1,509 first-time mothers. Time 0 on the horizontal axis denotes the time of birth. To the left of 0 (time before birth), we depict the evolution of employment rates before birth. To the right of 0, we depict the evolution of the CI's by different exit states. The employment rates before birth are calculated separately for the subsamples of mothers with different exit states, to provide evidence on the association between employment before birth and the exit behavior. Figure 4 provides evidence both on exits after ML (ignoring the possibility of part–time work during ML) in figure 4(a) and on exits during and after ML and exits after part-time work during ML in Figures 4(b) and 4(c), respectively.

Figure 4(a) distinguishes the exit states *return-to-job*, *second child*, and *leave the company*. Only about 47 percent of all mothers return to their job, 41 percent give birth to a second child and 12 percent leave the company after ML (these numbers are based on the CI's four years after birth). In accordance with hypothesis 1, those leaving the company have shorter tenure before birth. Regarding the timing of transitions, we find a continuous increase of the return-to-job during ML in accordance with the first aspect of hypothesis 5, but more than half of those returning to their job (about 25 percent of all mothers) stay on ML 3 years or longer, which is reflected in particular in the steep rises in the CI at 3 years and 3.5 years. There is no particularly strong increase at 6 months and only a very small increase at 2 years, providing little support to the second aspect of hypothesis 5. Among those women, who eventually leave the company after ML, also about 50 percent have not exited ML before three years after. The time pattern of the CI for women having a second child is much smoother, growing continuously from the second year after birth onwards. This finding is in accordance with hypothesis 4 and the uncertainty hypothesis 3. In contrast to Lalive and Zweimüller (2009), we do not find a

discontinuous rise in the rate of having a second child shortly before the end of ML.

Figure 4 here

Figure 4(b) considers exits to part-time work during ML, which allows the women to keep ML coverage. About 30 percent of all women work part-time at some time during ML. Now, the fraction of mothers who return to their job or who have a second child, both without working part-time during ML, amounts to about 30 percent in both cases. Figure 4(c) depicts the conditional CI's for transitions after ML from part–time work during ML, aligned to the time since birth. Almost all mothers, who work part-time during ML, return to their job (57 percent) or have a second child (38 percent). Only 21 mothers (5 percent) leave the company. Thus, working part-time during ML (PT-ML) is associated with a higher return-to-job and a much lower rate to leave the company, in accordance with hypothesis 3. Nevertheless, a sizeable share of women working part-time have a second child, i.e. considerable uncertainty remains for management with respect to whether and when a women working part-time during ML returns to her job after ML, in accordance with hypotheses 3 and 4.

Figures 5 and 6 provide evidence on the association between proxies of the match quality before birth and the return-to-job after ML. The figures to the left include all women, who return to their job after ML, while the figures to the right involve women who return to their job after PT-ML, analogous to the difference between figure 4(a) and figure 4(b). Figure 5 shows that the return-to-job probability is slightly higher for women in the middle tenure category between 6 and 12 years. Mothers with very long tenure have overall also a high probability to return after ML, however, they tend to take longer ML breaks and no such difference exists for the overall return-to-job after PT-ML. Regarding the relative wage position, we find surprisingly small differences in the return-to-job and the result depends somewhat upon whether part–time work during ML is included.

As expected, a very high relative wage position is associated with the highest rate of return-to-job after ML without PT-ML. However, a large share of these (about one third of those returning) takes ML for 3.5 years. The next highest return rates are observed for those with the lowest relative wage position and the lowest return rates are observed for the lowest relative wage position. This U-shaped pattern is only partly consistent with hypothesis 1. Women with the lowest relative wage position show a comparatively high return rate and seem to work more often part-time during ML before returning. This suggests that this group is in stronger need of the labor income.

Figures 5 and 6 here

Figure 6 shows the differences by promotion frequency and by supervisory role. The overall return rate is highest when the frequency of promotion is low, but those very frequently promoted return more quickly. The return probability does not vary that much for return after PT-ML, but mothers who are very frequently promoted before birth return faster again. Finally, a supervisory role is associated with a higher return rate and somewhat quicker returns, especially for direct returns after ML (hypothesis 1).

Next, we run multivariate regressions to explain the CI based on information about exits having occurred over six-months-intervals and accounting for the time since birth. Specifically, we regress dummy variables for the state of employment in months 6, 12, 18, up to 48 after birth, i.e. for each individual we use up to 8 observations.[16] We report results based on pooled linear probability models for panel data.[17] The first set of regressions reported in table 2 estimates the association of the four proxies for match quality before birth with the CI for different exits. We consider both the four first exits during and after ML and the exits after having started part–time work during ML.[18]

Table 2 here

Tenure shows a positive association with the return-to-job and a negative association wiht both leaving the company and having a second child (hypothesis 1). The effect falls slightly with increasing tenure. Tenure shows neither a significant association with exits to part-time work during ML nor with the transitions after part-time work during ML. Qualitatively the associations of the relative wage position and the supervisory role go into a similar direction. For the relative wage position, as an exception, there is in addition a significantly positive association with exits to part-time work during ML and the effect on return-to-job is positive but not significant. The results for the frequency of promotion are mixed and not quite in accordance with hypothesis 1. Promotions below the average are positively associated with the return-to-job, whereas the positive coefficient for above average promotions neither differs significantly from average promotions and from below average promotions. Because the coefficients for above and below average are closer than the minimum of the two, which reflects the difference in the return-to-job to average promotion, we take this as - albeit weak - evidence for a U-shaped pattern, similar to the above univariate results for the wage position. In contrast, below average promotions exhibit a negative association with the transitions to part–time during ML, and with 5

[16] In order to account for possible differences in the time paths of exits by covariates, we have also estimated the regressions with interactions between time since birth and other covariates. The main results do not change. These additional estimation results are available upon request.

[17] These results are similar to Probit estimates, which are available upon request.

[18] Because there are only 21 cases, we exclude the case of leaving the company after part part–time work during ML.

ppoints the effect is stronger than the positive coefficient of 3 ppoints for the return-to-job without part–time during ML. There are no significant associations with the other exits. A supervisory role increases the return-to-job probability. It shows no significant association with leaving the company directly and it reduces exits to part-time during ML. Presumably, it is difficult for a supervisor to work part-time.

Regression results including the other available characteristics are reported in table 3. It is remarkable how little the associations change for the proxies of match quality, thus supporting the findings discussed in the previous paragraph. However, there are some noteworthy additional results. Age does not show a significant association with leaving the company. At higher age, women return less often to their job after ML, irrespective of whether they work part-time during ML. Furthermore, they work more often part-time during ML (however, the age coefficients are not significant) and they are more likely to have a second child after part-time during ML. This suggests an increasing preference for family life at higher age, associated with the birth of a second child and with the desire not to cut ties with the company. The findings are in line with hypothesis 4 and with an increasing likelihood of being married or living in a stable relationship at a higher age. The education variables show mixed effects and there is no evidence for a positive association between education level and return-to-job. Just having a university degree is associated with a significantly lower return-to-job after part-time during ML. Women with a high wage level are more likely to work part-time during ML and less likely to return to their job after part-time work during ML, which is in accordance with hypothesis 3 pointing to the uncertainty of return behavior. Compared to women without a professional degree, vocational training is associated with a significantly lower probability to have a second child, both after ML and after part-time during ML. At the same time, all coefficients for this group are negative (but not always significant), therefore these women show both longer durations in ML and a lower return-to-job after part-time during ML. In contrast, having both vocational training and a university degree is associated with a significantly higher probability to have a second child and a significantly higher probability to return-to-job after part-time work. Because all coefficients are positive, this group shows shorter durations in ML. Thus, this group shows a strong attachment to their job at the company, while implementing the plan to have children. To put this into context, recall that the relative wage position works somewhat into the opposite direction, showing a significantly positive association with the return-to-job after ML. Women in the lowest wage group are more likely to return to their job after part–time during ML, suggesting that part-time work during ML allows to reduce a possible work-family conflict among this group. Note that this is one of the rare cases where a higher incidence of part–time work during ML

is associated with a higher return to job afterwards.

Table 3 here

5.2 Employment Stability After ML

When a female employee is back working in the company after ML, combining child rearing and work remains an issue. Women may find it difficult to work in the same job full-time, job requirements may have changed, somebody else may be working in the previous job, and management may not be interested in having the job being filled again by the returning mother after the employment protection through ML coverage has expired. Recall that one year after return-to-job after ML, 81 percent of all female employees still work in the company. 7 percent leave the company within the first year after ML and 12 percent have a second child, whereas the exit rate is on average only 5.5 percent for childless female employees in this company. This is again in accordance with hypotheses 3 and 4.

Figure 7 depicts the CIs for leaving the company and having a second child. A first noteworthy fact is that those who leave the company within the first year mostly do so during the first half of the year after return. In contrast, the CI for having a second child remains at zero for the first two months and grows almost linearly afterwards. Figure 8 shows the heterogeneity in the CIs for leaving the company. The CI increases considerably with shorter tenure, in line with hypothesis 1. While only 6 percent leave the company within a year, when tenure is above 12 years, 8 percent leave the company, when tenure is less than 6 years. Similarly, the CI to leave the company falls with the relative wage position changing from very low to high. There is a small reversal when changing from high to very high. The CI to leave the company is lower when the employee experienced more frequent promotions and when she is in a supervisory role. Especially frequent promotions increase the probability to stay in the company. Thus, we find quite consistent evidence in favor of the hypothesis 1, which stipulates a higher employment stability for better matches. For the duration of ML, we find a weak U-shaped pattern. Both ML durations shorter than 2 years and ML durations strictly longer than 3 years show an about twice as high CI to leave the company compared to the middle group with ML durations between 2 and 3 years. Thus, a short ML duration does not imply higher employment stability and hypothesis 2 holds only for durations above 2 years.

Figures 7 and 8 here

Showing the CIs of having a second child during the first year after return, figure 9 focuses only on two interesting results regarding the frequency of promotion and the

duration of maternity leave. First, the more frequent a mother is promoted the higher is the probability that she has a second child during the first year after return-to-job. This supports the hypothesis that females tend to have a child only after having achieved their individual career goals. Second, mothers with ML durations of more than 2 years are more likely to have a second child briefly after their return-to-job. A long first ML duration signals a stronger orientation towards family.

Figure 9 here

Table 4 provides multivariate regression results for the CI for leaving the company during the first year after the return-to-job after ML.[19] The CI to leave the company decreases significantly with age. Having just a vocational training degree or earning a high wage are associated with a significantly higher CI to leave the company. In contrast, the relative wage position shows a strong, significantly negative association. There are no significant associations for the other proxies for match quality (tenure, promotion frequency, supervisory role). Thus, there is only partial evidence for hypothesis 1 regarding employment stability.

Table 4 here

We also investigate the association with the duration of ML and with part-time work during ML. We define dummy variables for six month intervals of ML duration. It comes as a surprise that there is no significant effect of the ML duration for mothers not working part–time during ML. This is in contradiction to hypothesis 2. Working part–time during ML (PT) is interacted with the dummy variables for the duration of ML. The coefficients involving these interaction effects are all negative and jointly significant ($F(5, 977) = 10.71$; $Prob > F = 0.001$), i.e. part-time work during ML is associated with higher employment stability. The effect is U-shaped in duration of ML, with the strongest negative effect, i.e. the highest employment stability, for those mothers working part-time during ML and ending ML 31 to 36 months after birth. The evidence is in accordance with hypothesis 3. Incidently, short ML duration (less than 18 months) without part-time work during ML are associated with less employment stability than long ML duration with part–time work during ML. This suggests that gaining experience in combining child rearing and work is important for employment stability after return (hypothesis 3).

[19] We have explored the sensitivity of results across different specifications. Because the basic results do not change, we report only one specification here.

5.3 Career Progression Before Birth

To complete the picture, we examine the careers of mothers before birth in comparison to female employees, who do not give birth in the same year and who are similar to the mother in terms of age, education, and tenure. To investigate this issue, we use a flexible specification to regress the wage group on age, tenure, and education as well as on a dummy of giving birth in the future interacted with dummy variables for the time before birth at a half year frequency. This regression is estimated based on data for childless women and on data before birth for female employees giving birth to a child.

Figure 10 depicts the estimated wage differences before birth between four and zero years before childbirth. The dots are the point estimates and the bars are the 95% confidence intervals. 3.5 years before birth the wage difference is zero and it starts increasing until half a year before birth, when the highly significant wage difference lies above 1.5 wage groups. In the last half year before birth, it drops back to zero, which most likely is related to the upcoming birth. The increasing profile up to half a year before birth suggest that women invest strongly into their career before having a child. They will have a child, only after having achieved their individual career goals. We can not confirm results in the literature suggesting a wage dip before birth (Kunze and Ejrnaes 2004). Our results show that first–time mothers have experienced a successful career during the last 4 years before birth, i.e. there is no indication before birth that these female employees are planning to leave their job.

Figure 10 here

6 Discussion

6.1 Main Findings and Limitations

Using exceptional longitudinal company data, our study provides several new insights on the return-to-job during and after ML, when ML coverage is very long. First, we find a large heterogeneity and complexity in transitions during and after ML. Among female employees taking ML after birth of the first child, 30 percent return to their job after the end of ML, 29 percent have a second child before the end of ML, 11 percent leave the company without ever returning to their job, and 31 percent return to their job working part-time during ML. In total, 46 percent have a second child during or shortly after ML. Among those working part-time during ML, only 57 percent continue working in their job after the end of ML. Among those having returned to their job after the end of

ML, 81 percent continue to work in their job one year after return. These numbers and our detailed multivariate results show a huge uncertainty for management regarding the question as to whether, when, and for how long a female employee returns to her job after first birth.

Second, we investigate to what extent a good match quality before first birth, approximated by indicators of career development, results in a higher and quicker return-to-job, as suggested both by sorting theory (Jovanovic 1979) or human capital theory (Becker 1960). On the one hand, there is some evidence that female employees in better job matches are more likely to return to their job in the company, possibly through part–time work. The relative wage position, higher tenure, a combination of vocational training and university education, and an above average frequency of previous promotions show a positive association with the return-to-job. On the other hand, a high absolute wage, a high education, or an average frequency of promotions in comparison to a low frequency of promotions do not foster the return-to-job. Furthermore, female employees have their first child, when their careers have been particularly successful in comparison. These results suggest that a sizeable fraction of mothers with a successful career before first birth do not engage in a similar career advancement after first birth and have a probability of not returning to their job. This makes the challenge for management even stronger because a successful career before first birth is associated with the accumulation of firm–specific human capital, which is at great risk after first birth. Some of the evidence is consistent with the hypothesis that a sizeable share of female employees seek to achieve a certain career goal, before they can "afford" to have a child, but after first birth they do not seek further career advancements and show a strong "preference for a family life". We can strongly reject the hypothesis that the least successful female employees are most likely to have a first child.

Third, we find consistent evidence that better matches before birth and working part–time during ML are associated with a higher employment stability. However, there is no significant effect of the ML duration for mothers not working part–time during ML. In accordance with theoretical reasoning, the results on employment stability imply that various indicators suggesting a high attachment to the job are indeed associated with a higher employment stability after return-to-job, the exception being the duration of ML for those not working part–time during ML. At the same time, a sizeable share of those returning to their job after ML have a second child soon afterwards, emphasizing the importance of the "preference for a family life" and the incentive induced by ML coverage to have a second birth soon after first birth (Lalive and Zweimüller 2009).

Even though our data allow to describe the complex transition patterns during and

after ML, as a limitation, our analysis remains descriptive in nature.[20] Yet, we think it is informative from a management perspective. Another limitation relates to the fact that we have no information on the availability and the take-up of family friendly policies on an individual level. Using data for one company, we can at least be sure that our results are not driven by company differences. Insider econometrics (Bartel et al. 2004) allows to control differences in management strategies across companies. Last, we think that our results are representative for the financial sector in Germany, but this needs to be confirmed in future research using data for other companies.

6.2 Implications for Research

We note four important research implications of our study. First, on average, female employees have their first child when their careers have been particularly successful. This is in contrast to studies finding a wage dip before birth (Kunze and Ejrnaes 2004). Good matches are associated with a higher and quicker return-to-job, but it is the case that there exists a huge uncertainty from the perspective of management as to whether and when a female employee returns to her job after first birth. It remains a major challenge for future research to explain the long maternity leave durations and the low rate of return-to-job even among successful female employees.

Second, our study suggests that part–time work during ML plays an important role for our understanding of return patterns. Analyses based on survey data or administrative data, which do not allow to distinguish between part-time work during ML and return-to-job after ML, are missing this issue (Dustmann and Schönberg 2008, Kunze and Ejrnaes 2004, Ondrich et al. 1999, Schönberg and Ludsteck 2007).

Third, our results do not confirm evidence for Austria (Lalive and Zweimüller 2009) that the rate at which women have a second child increases disproportionately when they reach the end of ML coverage. Although it is very likely that the availability of long ML coverage has a positive effect on having a second child during or soon after ML, we can not provide evidence in favor of a hypothesis that women maximize the total ML duration when having two children. Future research should analyze the return-to-job of mothers after having two children.

Fourth, future research should analyze both the effectiveness of family friendly policies implemented at the company level and the importance of the firm culture towards return-

[20] Based on the available data, we do not have enough information to credibly estimate the hazard functions for each exit separately, accounting for the selection in various states. We think that more information on the personal background of female employees, including information on preferences for family life and career development, the availability of child care, and information on the involvement of fathers in child care would be necessary for doing this.

to-job of mothers in a setting with a very long ML coverage. Previous studies have been restricted to situations with short ML coverage (Major et al. 2008, Taylor et al. 2009).

6.3 Implications for Practice

Our results show that predicting the return-to-job of female employees after first birth is a major challenge for management in a situation with long ML coverage. We find a lot of uncertainty regarding the return-to-job because many women take very long ML durations. A large fraction never returns or has a second child during ML or shortly after return-to-job. Also, female employees have their first child, when their careers have been particularly successful in comparison. And the latter are the female employees management would want to return quickly to their job because having to replace them during the long ML phase implies high costs for the company. Reducing the uncertainty regarding the return-to-job is of great importance for management. Furthermore, after a long ML duration, a company may not be interested any more in the return-to-job. Our results suggest that a sizeable fraction of mothers with a successful career before first birth do not engage in a similar career advancement after first birth and are at a high risk of not returning to their job.

On the positive side, our findings imply that the relative wage position, higher tenure, a combination of vocational training and university education, and an above average frequency of previous promotions show a positive association with the return-to-job and the stability of employment after return. These indicators can be used by management to assess the return-to-job. Furthermore, our results suggest that part-time work during ML is an useful way to reduce potential family-work-conflicts resulting in a higher return-to-job and higher employment stability after return. However, a sizeable fraction of female employees leave the company or have a second child even after having worked part-time during ML.

Family friendly policies, a firm culture fostering the employment of mothers, and incentives for a return-to-job even in a part-time job need to be designed in a way to account for a long ML coverage and to address the strong heterogeneity in transition patterns after first birth.

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Tables

Table 1: Summary statistics for different characteristics

Exit States	Total		Return		Leave		Second Child	
Total	1,509	(100.0)	713	(47.2)	180	(11.9)	616	(40.8)
Age								
Age $\leq$ 30	524	(34.7)	250	(35.1)	60	(33.3)	214	(34.7)
30 $<$ Age $\leq$ 35	702	(46.5)	315	(44.2)	78	(43.3)	309	(50.2)
Age $>$ 35	283	(18.8)	148	(20.8)	42	(23.3)	93	(15.1)
Tenure								
Tenure $\leq$ 6	460	(30.5)	185	(25.9)	61	(33.9)	214	(34.7)
6$<$Tenure $\leq$ 12	681	(45.1)	346	(48.5)	71	(39.4)	264	(42.9)
Tenure $>$ 12	368	(24.4)	182	(25.5)	48	(26.7)	138	(22.4)
Education (numbers are weighted)								
Without professional training	82	(5.4)	42	(5.9)	6	(3.3)	34	(5.5)
Vocational Train.	814	(54.0)	411	(57.6)	105	(58.3)	298	(48.4)
Univ. & Voc. Train.	453	(30.0)	197	(27.6)	51	(28.3)	205	(33.3)
Academic Degree	160	(10.6)	63	(8.8)	18	(10.0)	79	(12.8)
Wage Group								
Low Wage	706	(46.8)	350	(49.1)	105	(58.3)	251	(40.7)
Medium Wage	340	(22.5)	134	(18.8)	38	(21.1)	168	(27.3)
High Wage	463	(30.7)	229	(32.1)	37	(20.6)	197	(32.0)
Average Promotion								
Seldom Promotion	548	(36.3)	261	(36.6)	89	(49.4)	198	(32.1)
Medium Promotion	717	(47.5)	344	(48.2)	68	(37.8)	305	(49.5)
Freq. Promotion	244	(16.2)	108	(15.1)	23	(12.8)	113	(18.3)
Supervisory Role								
No Supervisory Role	1091	(72.3)	488	(68.4)	130	(72.2)	473	(76.8)
Supervisory Role	418	(27.7)	225	(31.6)	50	(27.8)	143	(23.2)
Relative Wage Position								
Very Low	405	(26.8)	186	(26.1)	62	(34.4)	157	(25.5)
Under Average	608	(40.3)	266	(37.3)	80	(44.4)	262	(42.5)
Above Average	335	(22.2)	174	(24.4)	30	(16.7)	131	(21.3)
Very High	161	(10.7)	87	(12.2)	8	(4.4)	66	(10.7)

Source: Company data, sample of 1,509 first-time mothers.
Note: Own calculations; Frequencies of mothers who leave ML into the respective exit state; percentages are shown in parentheses.

Table 2: Regression of CI for exits during and after ML on proxies for match quality before birth and time dummies

Variable	Return-to-job[a]		Leaving Company[a]		Part-time during ML		Second birth[a]		Return after part-time		Next birth after part-time	
Tenure	.008**	(.003)	−.009***	(.002)	−.003	(.006)	−.008**	(.003)	.005	(.007)	−.008	(.007)
Tenure squared	−.000**	(.000)	.000***	(.000)	.000	(.000)	.000**	(.000)	.000	(.000)	.000	(.000)
Rel. wage position	.029	(.027)	−.057***	(.011)	.104	(.040)	−.077***	(.023)	−.073	(.048)	−.018	(.045)
Promotion below average	.031**	(.013)	.004	(.006)	−.052**	(.018)	−.012	(.011)	−.006	(.022)	.017	(.022)
Promotion above average	.020	(.019)	.007	(.007)	.000	(.027)	.009	(.015)	.004	(.030)	.014	(.028)
Supervisory role	.044***	(.014)	.003	(.005)	−.073**	(.018)	−.016	(.011)	.054	(.025)	−.031	(.022)
Time dummies	yes		yes		yes		yes		yes		yes	
$\sum$ of weighted observations	9,369		9,369		9,369		9,369		4,212		4,212	
F-test	123.54		924.90		51.20		115.63		48.67		50.69	
R-squared	0.0896		0.0718		0.0659		0.0886		0.2183		0.1363	

Source: Company data, sample of first-time mothers.

Note: Own calculations; OLS-estimations (balanced panel with information in half-year steps between birth and 4 years after birth); robust standard errors are in parentheses; *= significant at 10%-level, **= significant at 5%-level, ***= significant at 1%-level

a: without part-time during ML

Table 3: Regression of CI for exits during and after ML on all covariates

Variable	Return-to-job[a]		Leaving Company[a]		Part-time during ML		Second birth[a]		Return after part-time		Next birth after part-time	
Age	−.037*	(.019)	−.010	(.007)	.020	(.025)	.001	(.015)	−.056*	(.032)	.046*	(.026)
Age squared	.001*	(.000)	.000	(.000)	−.000	(.000)	−.000	(.000)	.001*	(.000)	−.001**	(.000)
Tenure	.010**	(.004)	−.008***	(.002)	−.001	(.006)	−.007**	(.004)	.004	(.007)	−.008	(.007)
Tenure squared	−.000**	(.000)	.000***	(.000)	−.000	(.000)	.000**	(.000)	−.000	(.000)	.000	(.000)
University degree	−.002	(.032)	−.003	(.009)	−.023	(.045)	−.039	(.029)	−.128**	(.057)	−.027	(.054)
Vocational training	−.035	(.025)	−.006	(.006)	−.041	(.037)	−.102***	(.022)	−.172***	(.046)	−.119***	(.043)
Uni and voc. train.	.011	(.033)	.002	(.011)	.033	(.048)	.054*	(.030)	.121**	(.059)	.067	(.055)
Lowest wage groups	.016	(.015)	.011	(.007)	−.028	(.022)	−.018	(.013)	.051*	(.028)	−.019	(.025)
Highest wage groups	−.023	(.016)	.008***	(.006)	.102***	(.026)	−.002	(.014)	−.054**	(.025)	.038	(.024)
Rel. wage position	.049*	(.028)	−.056***	(.012)	.052	(.042)	−.073***	(.025)	−.025	(.051)	−.019	(.047)
Promotion below average	.028**	(.014)	.001	(.006)	−.040**	(.019)	−.002	(.012)	−.028	(.023)	.027	(.022)
Promotion above average	.018	(.019)	.008	(.008)	−.014	(.027)	−.005	(.016)	.012	(.030)	−.003	(.028)
Supervisory role	.032**	(.014)	.002	(.005)	−.044**	(.019)	−.016	(.011)	.018	(.027)	−.016	(.024)
Time dummies	yes		yes		yes		yes		yes		yes	
$\sum$ of weighted observations	9,369		9,369		9,369		9,369		4,212		4,212	
F-test	82.54		588.09		37.60		77.82		37.30		33.08	
R-squared	0.0939		0.0729		0.0807		0.0983		0.2436		0.1528	

Source: Company data, sample of first-time mothers.

Note: Own calculations; OLS-estimations (balanced panel with information in half-year steps between birth and 4 years after birth); robust standard errors are in parentheses; *= significant at 10%-level, **= significant at 5%-level, ***= significant at 1%-level

a: without part-time during ML

Table 4: OLS regression on CI to leave company 12 months after return from ML

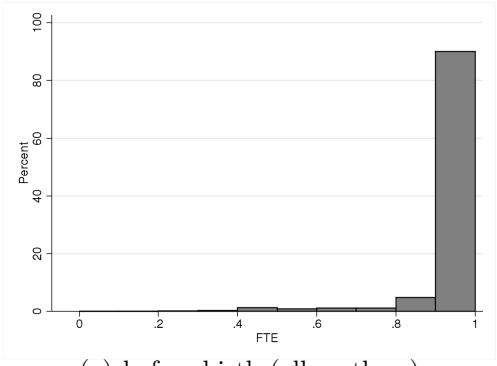
Variable		
Age	−.047*	(.027)
Age squared	.001*	(.000)
Tenure	.001	(.005)
Tenure squared	.000	(.000)
University degree	.008	(.026)
Vocational training	.028*	(.016)
Uni and voc. train.	−.016	(.030)
Lowest wage groups	.002	(.017)
Highest wage groups	.052***	(.019)
Rel. wage position	−.150***	(.037)
Promotion below ave.	.031	(.020)
Promotion above ave.	−.010	(.018)
Leading position	−.012	(.017)
Duration ML 19-24 m.	−.025	(.039)
Duration ML 25-30 m.	.005	(.043)
Duration ML 31-36 m.	.016	(.030)
Duration ML 37-42 m.	−.009	(.026)
Duration ML 43-48 m.	.042	(.040)
PT*ML 19-24 m.	−.057	(.036)
PT*ML 25-30 m.	−.063	(.052)
PT*ML 31-36 m.	−.096***	(.026)
PT*ML 37-42 m.	−.038	(.027)
PT*ML 43-48 m.	−.055	(.058)
Constant	−0.129***	(.018)
$\sum$ of weigthed obs	689	
R-squared	0.0516	

Source: Company data, sample of mothers who return to the company.

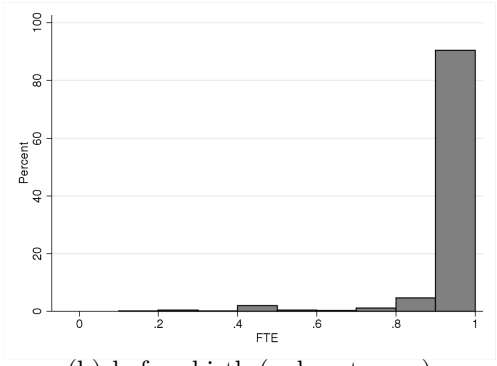
Note: Own calculations; OLS-estimations (one observation per person); standard errors are in parentheses; *= significant at 10%-level, **= significant at 5%-level, ***= significant at 1%-level

Figures

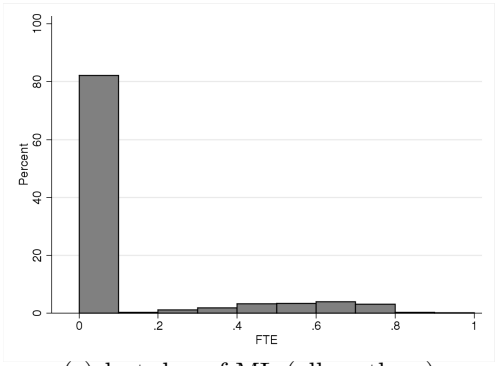
Figure 1: FTE's before, during, and after ML



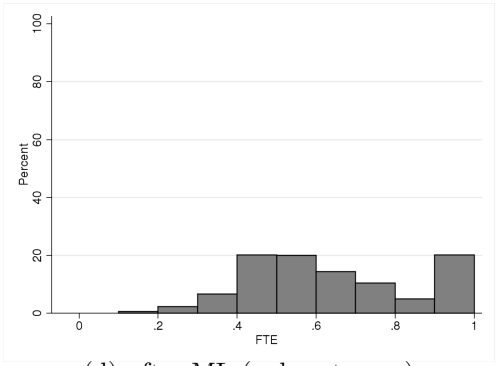
(a) before birth (all mothers)



(b) before birth (only returner)



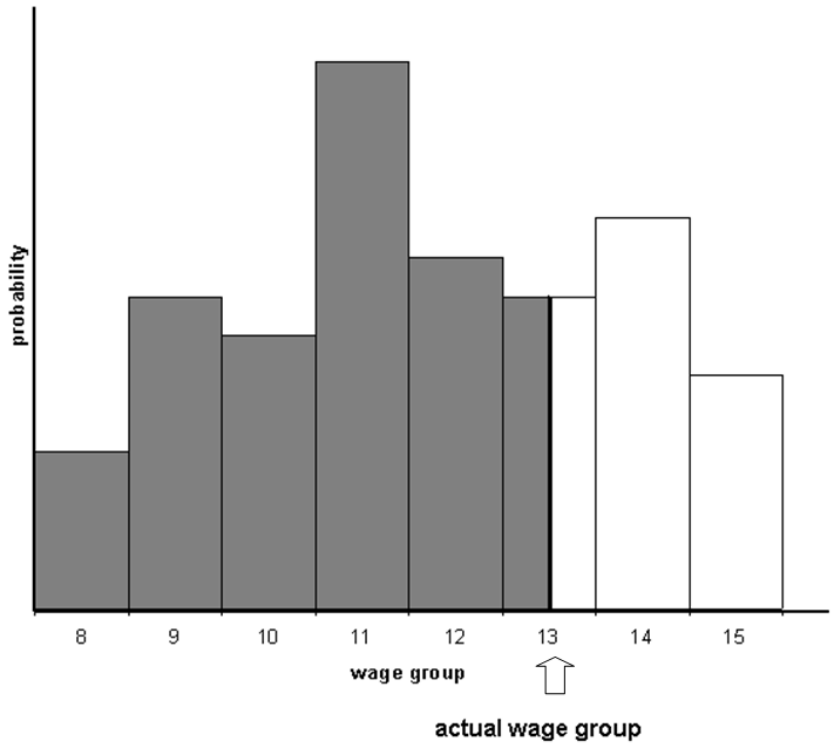
(c) last day of ML (all mothers)



(d) after ML (only returner)

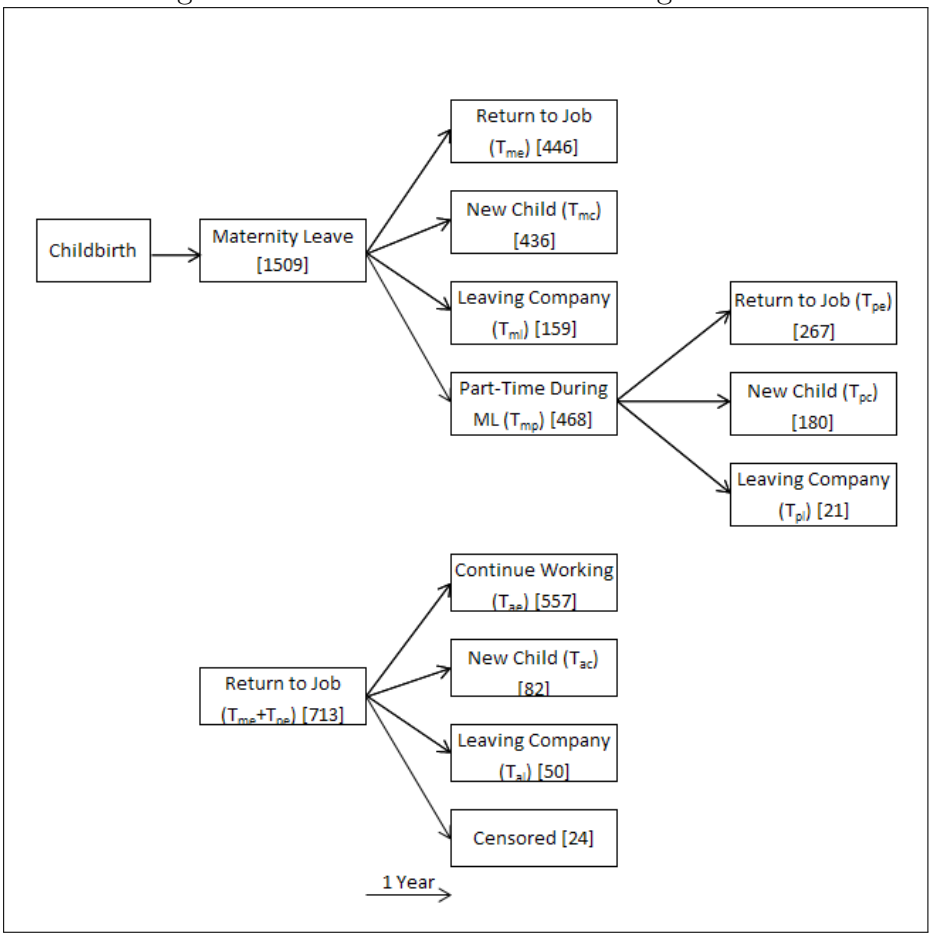
Source: Company data, sample of 1,509 first-time mothers.
Note: FTE is the ratio of agreed upon working hours to full-time hours. Own calculations.

Figure 2: Calculation of the conditional relative wage position



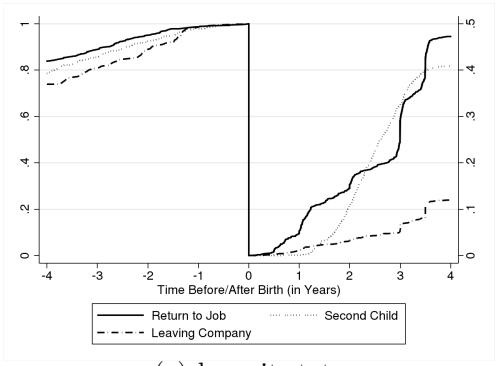
We estimate the probability to be in a specific wage group conditional on the individual characteristics $Pr(w_i = W|X)$ with $W = 8, ..., 15$. Then we calculate the conditional probability that individual i is in a lower wage group $Pr(w_i < W|X)$ than w_i: $Pr(w_i < W|X) = \sum Pr(w_i = W|X)$ if $w_i < W$. A large relative wage position indicates a good career performance because women with similar characteristics have lower wages.

Figure 3: Observed Transitions during and after ML

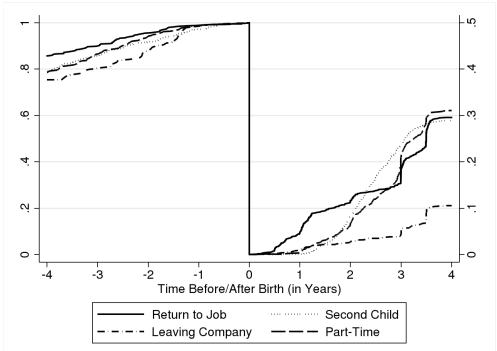


Source: Company data, sample of 1,509 first-time mothers.
Note: Number in parentheses are absolute number of female employees in respective state/making a certain transition. T_{ab} denotes transition from state a to state b. Own calculations.

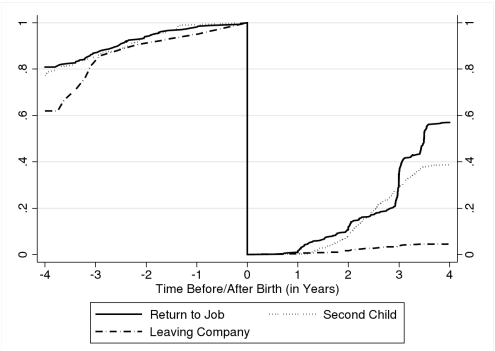
Figure 4: Maternity leave durations and employment rates before birth



(a) by exit state



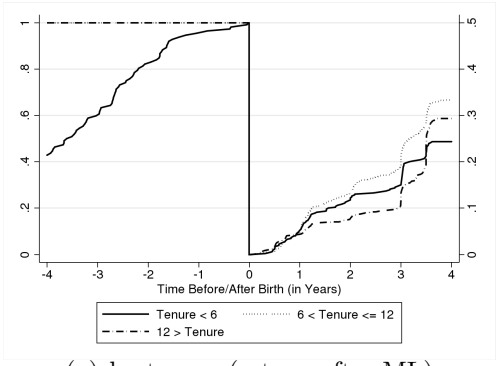
(b) by exit state including part-time during ML (PT-ML)



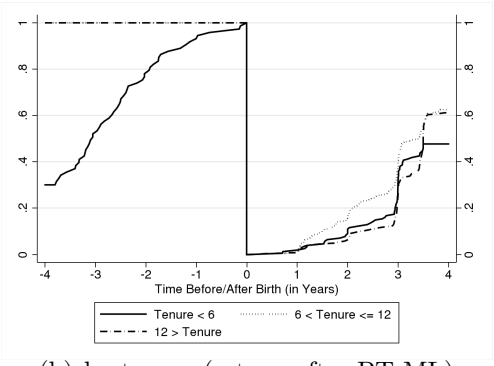
(c) by exit state, only part-time during ML (PT-ML)

Source: Company data, sample of 713 first-time mothers who return to their job after ML.
Note: Own calculations; Cumulative incidence functions.

Figure 5: Proxies of Match Quality before Birth and Return-to-Job

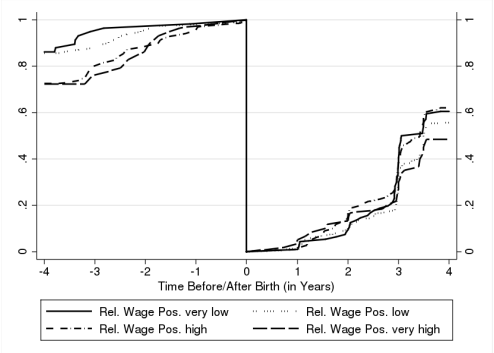


(a) by tenure (return after ML)



(b) by tenure (return after PT-ML)

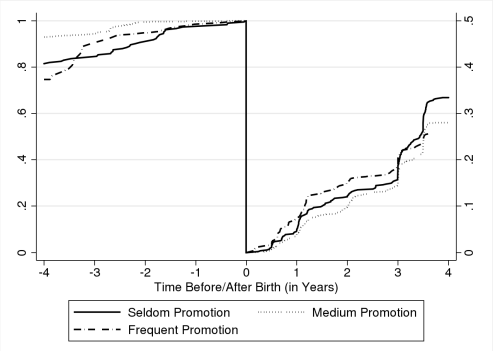
(c) by relative wage position (return after ML)



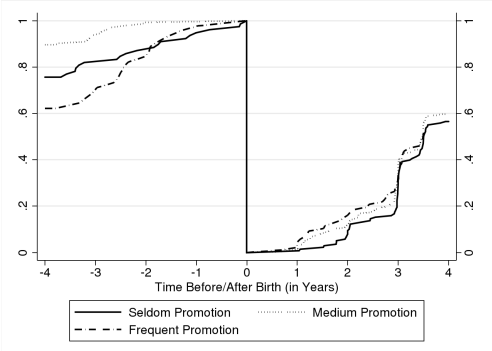
(d) by relative wage position (return after PT-ML)

Source: Company data, sample of 1,509 first-time mothers.
Note: Own calculations, CI incidence functions to the right for women who return to their job after ML, including or excluding those working part-time during ML (PT-ML).

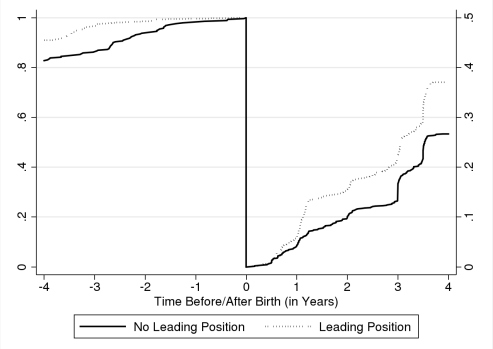
Figure 6: Proxies of Match Quality before Birth and Return-to-Job <continued>



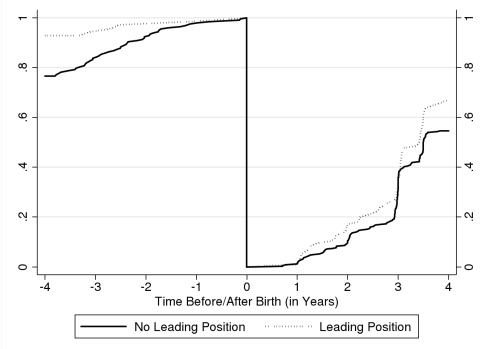
(a) by promotion frequency (return after ML)



(b) by promotion frequency (return after PT-ML)



(c) by supervisory role (return after ML)



(d) by supervisory role (return after PT-ML)

Source: Company data, sample of 1,509 first-time mothers.
Note: Own calculations, CI incidence functions to the right for women who return to their job after ML, including or excluding those working part-time during ML (PT-ML).

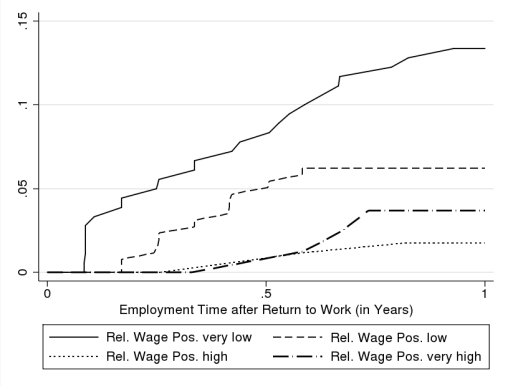
Figure 7: Unconditional CIs for exits from employment after ML

(a) CIs for exits from employment

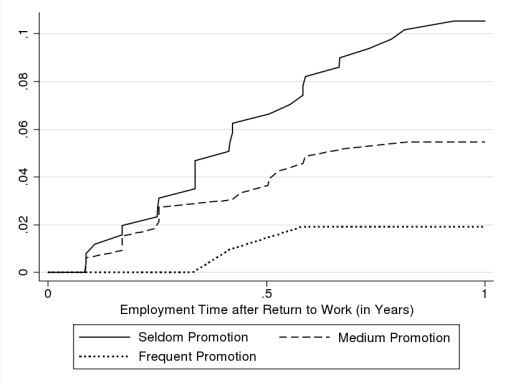
Source: Company data, sample of 713 first-time mothers who return to their job after ML.
Note: Own calculations; cumulative incidence function.

Figure 8: CIs for leaving the company from employment after ML

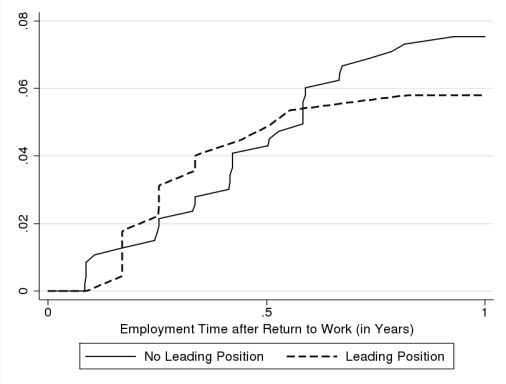
(a) by tenure



(b) by relative wage position



(c) by average promotion

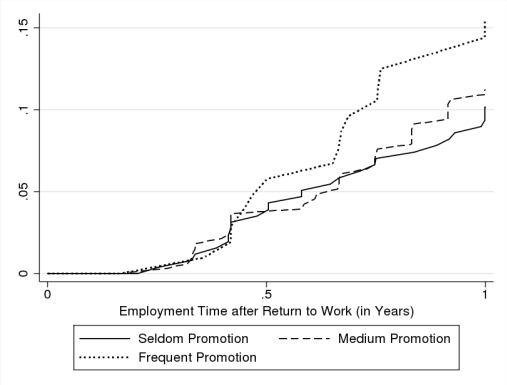


(d) by leading position

(e) by ML duration

Source: Company data, sample of 713 first-time mothers who return to their job after ML.
Note: Own calculations; cumulative incidence function.

Figure 9: CIs for having a second child during employment after ML

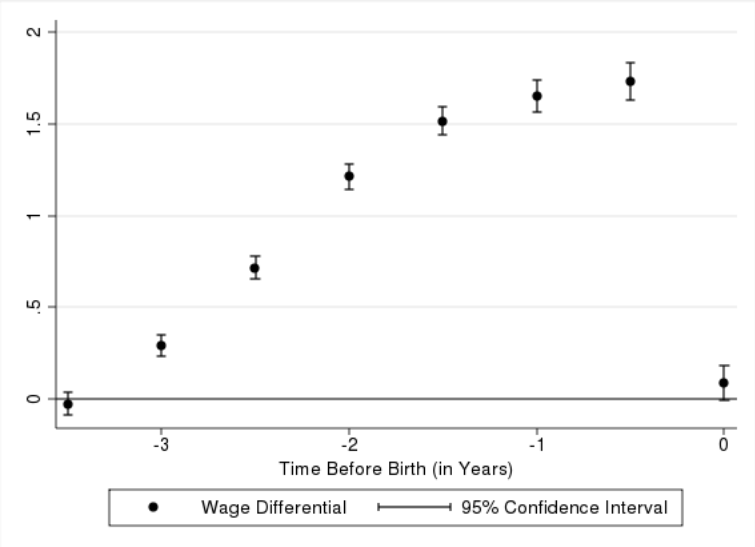


(a) by average promotion

(b) by ML duration

Source: Company data, sample of 713 first-time mothers who return to their job after ML.
Note: Own calculations; cumulative incidence function.

Figure 10: Wage differences before birth



Source: Company data, sample of all observed women before first birth.
Note: Own calculations.

Appendix

A.1 Detailed Data Description

Master Data

The master data contain the personal identification number of the observed employee, her birth date and further information, which can be separated into report-specific and employment-specific information. The event which causes the report can be summarized in the following five categories: *leave*, *enter*, *transfer*, *rehire* and *position or data change*. The employment-specific information are: an employment number, which counts the different relationships a person has during its time within the company, the number of the current cost center, the kind of contract or position an employee currently holds (called "job position" in the following) and the current occupation.[21] Generally, a person keeps its employment number until the end of the employment relationship, but if she moves internally from one job to another she changes the employment number. The job position contains the following categories: *employee*, *temporary contract*, *temporary personnel*, *trainees*, *vocational training*, *internship*, *retired* and *maternity leave*. With this information, we are able to identify ML spells and to select our sample with regard to the exclusion of temporary employment etc.. The information about the occupation can be entered freely in a description field, which leads to the fact that we observe more than 750 different items that contain information about the division, the specific occupation and the hierarchical position. Two reasons preclude us from using this variable extensively: First, there is no obvious systematic, which makes it possible to allocate all observations to a specific division or occupation. Second, the hierarchical levels and denotations differ such between the divisions that it is not possible to define global levels. However, it is possible to extract the information, whether an employee holds personnel responsibility and this information is used in the empirical work.

Wage information

Since most of the wages paid by the company are negotiated in collective agreements, we do not have information on individual wages, but we know the wage group an employee belongs to and the respective experience levels. Wages are determined by nine different collectively agreed wage groups and within these wage groups by the respective experience level which depend on tenure. Employees, who are not covered by collective agreements, negotiate their wages individually but their career position and wage levels

[21] Additionally, this data contains the corporate title and information about the wage group, both information are also available in an extra data set and thus, not used here.

can be abstracted from the corporate titles these employees hold. Similar to the master data, every change in the wage group or level is reported and the date from which the change is effective can be observed from the reports. We are able to observe wage profiles during the whole employment history, beginning with the entry into the company on.

Education information

The education information is the only data file, which is not provided in a panel setting. Since 2004, all employees are motivated to report on their own, when they reached a new education degree. Thus, the available information should be the highest degree, a person has ever reached. Unfortunately, the date of an update is not observed.

The education file contains three variables, which give information about school education, vocational training, academic studies and further training. The first variable is the qualification degree and contains items like *Abitur*[22] or *diploma*. The whole number of items is 48, which is mainly due to the fact that it also contains the subject of further training (mainly language courses). However, since schooling, vocational training and university degrees can be observed and generally, more than one observation per employee is available, this variable could help to identify the qualification degree of an individual. The second variable contains the profession of the employees or the subject of the respective qualification like for instance *industrial clerk* or *business studies*.[23] Although, this variable can be filled in, using a description field, we only observe 75 different items. The third variable contains information about the institution, from where the employee got the respective qualification like for instance *university of cooperative education* and has 199 items. Unfortunately, this variable is not consistent because some items clearly name the institution where a degree was gotten from (e.g. *Ruhr-University Bochum*) and others only give information about the kind of institution (e.g. *chamber of industry and commerce*. Additionally, some observations only contain a subject (e.g. *clerk*) or a qualification degree (e.g. *diploma*), instead of the institution. Since we are interested in the highest qualification an employee has, in a first step we separately allocate all the items of the three variables to seven categories, namely: *secondary school*, *Abitur*, *vocational training*, *degree of university of cooperative education, university of applied science, other colleges*, *university degree*, *further training* and *other*.

Next, we generate a new variable which contains the same seven categories and summarizes the information of the three origin variables. Around 40 percent of the variables qualification degree and institution coincide with regard to the schooling degree and

[22]German equivalent to A-levels.

[23]This information is only available for professional degrees.

around 80 percent of the three variables coincide with regard to the professional degree.[24] For the observations where no accordance of all variables exist, we apply a procedure, which allocates one of the seven categories to the observation, and run some plausibility checks. Finally, we observe one schooling or professional degree per observation and derive the highest degrees for each individual for whom we observe education information.

Unfortunately, information is missing for some employees, especially for those women, who left the company after ML.[25] Since the education information is important for our analysis, we impute the missing information for 410 mothers in our sample. We decided to use only the information about the professional degree, namely whether a woman has 1) *a vocational training degree*, 2) a *university degree*, 3) *both degrees*, or 4) *none professional degree*. In order to impute the information, we calculate the probability of an individual to be in one of the four states. For this, we run bivariate probit regressions, using information about the entry and the current wage and because we want to allow for as much flexibility as possible, we do this for every single year of employment before the first birth is observed (only mothers) or until a woman exits the company (non-mothers) or before the observation period expires (non-mothers).[26] Afterwards, we predict the conditional probabilities for the four degrees. For the empirical analysis, we quadruplicate the observations of the individuals with missing education information, insert every new observation of one of the four states and use the conditional probabilities as weights, respectively. Individuals with available education information are weighted with one.

Working time information

In the company we observe, the working time is not measured in hours, but in full-time equivalents (FTE's), which indicates the percentage, an employee works per month, compared to a full-time worker. For example, a mother who is working half-day is observed with a full-time equivalent of 0.5. Since the information about the working time directly affects the wage payments, the information is very reliable and every change is reported. We thus observe the FTE's for the whole employment history, at least since the beginning of the observation period in January 2000 (see table 1). Women who are in ML and are not working part-time during ML, are observed with a FTE of zero.

[24] We exclude further training from this procedure, because we do not use this information in the empirical analysis.

[25] The education information is available for 10,154 and missing for 3,590 individuals.

[26] Estimation results are available upon request.

A.2 Econometric Approach

Our empirical study analyzes the duration of ML and the transitions to various exit states. Furthermore, we analyze the stability of employment after return to the firm and we account for the case that mothers may work part-time during their ML spell. In the following, we formalize these transitions as the outcome of a two step competing risks model with multiple exit states. We do not think that we have sufficient identifying information to estimate the complex competing risks model, i.e. the hazard rates for the different exit states. Therefore, we resort to estimate the CI for the transitions of interest.

A.2.1 Competing Risks Model

Our empirical analysis is based on a sample of employees, who start a ML spell after the birth of their first child. We are interested in modelling the following duration variables:

T_m: duration of ML

T_{eam}: duration of employment after return to firm and end of ML

and we take account of different exit states. It is possible to work part-time at the firm during the ML. Thus, we also take account of transitions into this state.

The first transition out of spell of ML without part-time employment may occur to one of the following four exit states:

1. leave the company (T_{ml})
2. next child (T_{mc})
3. return to employment after ML (T_{me})
4. part-time employment during ML (T_{mp})

where $T_{\cdot}$ denotes the respective duration until the transition.

We treat both exits 1 and 2 as absorbing states, for which we do not follow mothers after the exit from their first maternity leave. Even though we could follow the mother after exit 2 (in contrast to exit 1), we exclude this case from our analysis. This is because of a small sample size and because the length of second ML spell may extend beyond the end of our sample period.

For exit state 3, we analyze the possibly right censored duration of employment after return until the exit to one of the exit states 'leave the company' and 'next child'.

Exit state 4 is a transient state during the ML spell, because it lasts at most until the maximum length of ML. Mothers can exit to the three states 'leave the company',

'next child', and 'employment after ML'. Analogous to exit state 3, we also analyze the possibly right censored duration of 'employment after ML' in this sequence. We do this both for this sequence and for the sample involving this sequence and exit state 3 above (i.e. the union of all sequences ending in a return to employment).

The observed duration of ML without part-time work (T_{m1}) is given by the duration until the first transition, i.e.:

$$T_{ml1} = min(T_{ml}, T_{mc}, T_{me}, T_{mp}) \ . \tag{1}$$

The observed total duration of ML (T_m) also involves the possible duration of part-time work during the ML spell. Thus, we have a stage competing risk model, where

$$T_{ml} = T_{ml1} + I(T_{mp} < min(T_{ml}, T_{mc}, T_{me}))min(T_{pe}, T_{pc}, T_{pl}) \ . \tag{2}$$

The observed duration of employment after the end of a ML spell – with or without part-time work during the maternity spell – is given by

$$T_{eam} = min(T_{ec}, T_{el}) \ . \tag{3}$$

Overall, our model involves in total three competing risks models with different exit states. Given the data available, it does not seem feasible to estimate the selection at the various stages, based on credible identifying assumptions. Therefore, we resort to estimate the CI for all exits of interest conditional on the selection of individuals observed in the data, to start a certain spell.

A.2.2 Cumulative Incidence

For each transition considered above, we have up to four exit states. Let J be the number of exit states, then the observed duration T in one state is given by $T = min(T_1, ..., T_J)$. The cumulative incidence (CI) for exit destination $j = 1, ..., J$ is defined as citep[see e.g.Arntz et al., 2007]:

$$Q_j(t) = P(T_j \leq t, T_j < min_{i \neq j} T_i) \ . \tag{4}$$

$Q_j(t)$ is the probability for an observation in the initial sample, i.e. the mothers, starting in the respective state that an exit to destination j is observed until time t. For t growing, $Q_j(t)$ converges to the total probability of an observed exit to destination j, and the limit is below one, when transitions to multiple exit states occur.

The CI function is identified in the data, because it just describes the distribution of transitions observed in the sample. No further identifying assumptions are required.

In our empirical analysis, we graphically illustrate the sample estimates of $Q_j(t)$, i.e. the shares of those who have exited to destination j by time t. We show these nonparametric estimates both for the entire sample and for different subgroups of interest. Furthermore, to account for the effects of the mothers's characteristics, we estimate linear probability models for the CI function, where $Q_j(t)$ is specified as a flexible function of observed covariates at the beginning of the spell and the time variable t. This takes account of the interaction between covariates and time since beginning of the spell.