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Mothers' Job Mobility after Childbirth and Earnings*

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Abstract

We show that mothers exhibit high job mobility after childbirth, with important implications for their future earnings. Using a bounding approach relying on intuitive and weak monotonicity assumptions, and administrative data for Austria, we find that changing jobs after childbirth increases re-employment earnings, but only for mothers at the upper part of the earnings distribution. For these mothers, the initial job mobility after childbirth has persistent effects, increasing earnings measured up to 15 years after the return-to-work decision. The positive earnings effects are caused by mothers moving to faster growing firms offering better career opportunities to women, even if such a move requires longer commuting. We show that high costs associated with job mobility, such as limited childcare support by the partner, are an important factor which precludes more mothers to move to better employment opportunities.

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Key words: motherhood penalty, return-to-work, job mobility, earnings, earnings gaps

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1 Introduction

Women still earn substantially less than men in most countries (e.g. Goldin, 2014; Blau and Kahn, 2017; Olivetti and Petrongolo, 2016).[1] Recent research has linked the gender inequality in earnings to the unequal impact of parenthood and the associated "motherhood penalty" (Angelov et al., 2016; Lundborg et al., 2017; Bütikofer et al., 2018; Kuziemko et al., 2018; Kleven, Landais and Sogaard, 2019).[2] Mothers experience a large and persistent decline in earnings after childbirth. This pattern is remarkably similar across countries and over time (Kleven, Landais, Posch, Steinhauer and Zweimüller, 2019). Understanding why and how children affect mothers' labor market careers is therefore important for a better understanding of gender inequality in the labor market. Knowing through which factors childbirth can affect mothers' earnings is also central for the design of effective policy responses.

In our work, we shed more light on the sources of the motherhood penalty by having a closer look at women's labor market behavior after childbirth, using high qualitative administrative data for Austria. We first show that mothers exhibit significantly higher job mobility after childbirth than comparable non-mothers. Such heightened job mobility of mothers is not unique to Austria, but can also be found in other countries, for example, the U.S. and Germany (Laughlin, 2011; Rupp, 2013).[3] This finding suggests that changing employer after childbirth plays an important role in shaping mothers' future labor market success. It is also related to Adda et al. (2017) and Hotz et al. (2018) who show that sorting into certain type of family friendly firms prior to birth is important for mothers' careers. We show that many mothers also change employer after giving birth and provide evidence that the motivation for such a move is to combine family responsibilities with a labor market career.

Having established that mothers have a high job mobility after childbirth, we investigate how such job-to-job transitions affect mothers' earnings. To the best of our knowledge, little consideration has been given to such a search and job mobility channel in the literature so far.[4] Our rich data allows us to evaluate the impact of job mobility

[1] For example, the gender pay gap is on average 20 percent in the United States (Bureau of Labor Statistics, 2019) and around 15 percent in Europe (Eurostat, 2020).

[2] Other explanations for the persistence of the gender gap which have been brought forward in the literature are the lower career aspirations of women, women's lower tolerance for pressure, and occupational sorting (e.g. Cortes and Pan, 2018; Cai et al., 2019; Azmat et al., 2020). These explanations and the motherhood penalty are not necessarily mutually exclusive in explaining the gender gap; see, for example, the findings in Adda et al. (2017).

[3] Both Laughlin (2011) and Rupp (2013) provide descriptive evidence that a large share of mothers move to a new employer after childbirth at the time of their return-to-work decision. They do not compare the observed transition rates of mothers to those of comparable non-mothers, however.

[4] A few works have looked at general gender differences in job search (Kunze and Troske, 2012; Cortes et al., 2020; Flinn et al., 2020; Le Barbanchon et al., 2021). As we will discuss later, mothers' motivations for job search is likely unique and the impact on their labor market careers are not clear a priori.

on both mothers' re-employment earnings at the time of the return-to-work decision and long-term earnings, measured up to 15 years later.

In general, one would think of job-to-job transitions as means to move up the "wage ladder".[5] The impact of changing employer on mothers' labor market careers are less clear, however. For example, to balance work and family responsibilities mothers might transit to flexible but lower paying jobs (e.g Goldin, 2014). Some mothers may also face higher costs of searching for and moving to better employment, for example, due to information frictions or insufficient support with childcare. To better understand the mechanisms underlying the impact of job mobility on the motherhood penalty, we pay particular attention to the role of employers and factors affecting search costs and mobility in our analysis.

To identify the impact of job mobility on earnings, we impose intuitive assumptions inherent in many search models with endogenous search effort (Christensen et al., 2005; Faberman et al., 2019; Wright et al., 2021). Specifically, we assume that marginal returns to job search are decreasing in both mother's pre-birth earnings and her *potential* re-employment earnings at her pre-birth employer conditional on her background characteristics and previous labor market experience. Mothers with higher earnings and earnings potential are already in highly productive firm-worker relationships. They therefore have a lower likelihood of finding better paying matches elsewhere. Taking into account that searching for new employment is costly, specifically after giving birth, this implies that these mothers have a lower likelihood of leaving their pre-birth employer after childbirth. We show that our assumptions on mothers' search behavior give rise to intuitive bounds on the impact of job mobility on earnings, building on the ideas in d'Haultfoeuille (2010). Besides our two weak monotonicity assumptions, we do not impose any other restrictions on mothers' abilities, preferences or require any structure on the underlying selection mechanism to identify bounds on the causal effect.

Within our bounding approach, we can therefore allow for a wide-range of situations affecting mother's job mobility. For example, we can allow for situations as in Kuziemko et al. (2018) where the birth of a child acts as a negative information shock for highly educated mothers. We can also allow for situations where mothers not only factor earnings but also the work environment into account, for example, as proxied by the share of female employees when considering moving to a new job; see also the discussion in Hotz et al. (2018) on family friendly firms. In all these situations we can recover the causal impact of job mobility on earnings as long as our monotonicity assumptions hold conditional on mothers' background characteristics and labor market experiences. We provide empirical evidence that this is the case in our setting.

[5]See Rogerson et al. (2005) and Wright et al. (2021) for a recent summary of the literature on search.

Our estimates reveal strong heterogeneous effects of job mobility on mothers' re-employment earnings, depending on her position in the earnings distribution. We find that mothers at the upper part of the earnings distribution *benefit* from leaving the pre-birth employer at the time of the return-to-work decision. Using the estimates for our lower bound, we calculate that moving to a new employer after childbirth increases mother's re-employment earnings by between 4 to 14 percent. Under our bounding approach, these gains reflect the causal impact of mothers' job mobility on earnings and are not explained by unobserved factors, such as productivity or motivation.

We also find that the initial decision to leave the pre-birth employer has a persistent effect on mothers' labor market success. Using average earnings between 11 to 15 years after the return-to-work decision, we find that a job transition increases long-term earnings by at least 10 percent. Our results imply that job mobility after childbirth puts mothers on a different career trajectory and helps them to climb the wage ladder faster.

In contrast, we do not find evidence that earnings of mothers at the lower and middle part of the earnings distribution are affected by the decision to move to a new employer after childbirth. Our bounds are wide and cover mostly zero when considering both earning at time of the return-to-work decision and in the long run. The wide bounds also imply that selection into job mobility on unobserved characteristics is the strongest for these mothers.

To obtain further insights into what drives the heterogenous effects, we investigate the role of employers and factors affecting job search costs and mobility. We find that employers play an important role in shaping mothers' future labor market success; see also Hotz et al. (2018) as well as Abowd et al. (2018) and Song et al. (2019) for a general analysis of the role of firms for labor market outcomes. Mothers with larger earnings increases from changing jobs after childbirth move to faster growing firms, both in terms of overall employment and the number of female employees. Faster growing firms tend to be more successful in the future and also offer higher life-time wages (Kaas and Kircher, 2015). Mothers with larger earnings increases also move to firms with smaller gender wage gaps among newly hired workers. We interpret this result as mothers searching for firms offering better career opportunities to their new female employees. The combination of moving to more successful firms offering better career opportunities ultimately leads to the strong long-term effects we find in our analysis.

Our results also show that mothers with larger earnings increases from changing employers search in wider geographic areas to find better employment possibilities. Those benefiting from job mobility are geographically more mobile and substantially increase their commuting time to work. This implies that mothers tend to value an increase in earnings relatively more than a reduction in commuting time and therefore exhibit preferences more similar to men; see Le Barbanchon et al. (2021) for an analysis of

gender differences in commuting time. The results also suggest that factors related to the costs of job search and moving, such as support with childcare, play an important role. For example, having no access to flexible childcare might deter mothers from looking for better employment opportunities which also require longer commutes.

We investigate such an explanation further and look at the importance of formal and informal childcare. Our results do not show that local provision of nurseries play any role in explaining mothers' labor market success. The estimates are close to zero and we can rule out meaningful effects. In that sense, we complement Kleven et al. (2020) who do not find that childcare expansion policies had any sizable effects on gender convergence.

We do find, however, that informal help with childcare, specifically by the husband, is an important factor. Using information about childcare arrangement in the Austrian Microcensus and comparing mothers in our sample to their "synthetic selves" in the census (see Kuziemko et al., 2018, for a similar approach), we find that mothers gaining the most from job mobility after childbirth also receive significantly more support with childcare from their husbands. Interestingly, our results also reveal that husbands of mothers with higher gains from changing employer also exhibit a higher job mobility after childbirth themselves. Changing employer and needing to adjust to a new work environment after childbirth may make these husbands more receptive for the difficulties of balancing childcare and working life. We do not find any evidence that husbands adjust their labor market outcomes on other margins. For example, we do not find that they are more likely to take time off from the labor market, reduce employment, or transit to less demanding jobs, as measured by changes in earnings.[6]

The results here complement Goldin (2014) and show that husbands play an important role in obtaining gender equality. They also imply that persistent norms, such as who is responsible for care-taking, affect the motherhood penalty (Kleven and Landais, 2017; Kuziemko et al., 2018; Kleven et al., 2020). Our work shows that these gender norms can create large costs which hold women back to search for better employment opportunities. Changes in the routine of partners' working life may help to overcome these costs. In our case, these behavioral adjustments of husbands occur without any policy interventions, showing that changes in the labor market have the potential to achieve gender convergence. Interpreted through the marriage and labor market model of Calvo et al. (2021), where couples with more equal productivity in household tasks are more likely to match and also have more equal labor market outcomes, our results also imply an important role for assortative matching in explaining the motherhood penalty.[7]

[6] We do not observe hours work in our data and therefore cannot investigate this margin of adjustment.
[7] In line with this explanation, we find that for mothers at the upper part of the earnings distribution the within-couple earnings gap decreases by around 5% due to job mobility. Our estimates are rather noisy, however.

Lastly, we provide indirect evidence that information frictions play an important role in explaining why we do not find any earnings effects of job mobility for mothers at the lower part of the earnings distribution; see also Cortes et al. (2020) and Frimmel et al. (2022) for related findings. Having a strong co-worker network is an important source for information about job opportunities. Co-workers also provide prospective employers with information they otherwise would not have (Dustmann et al., 2016). We show that mothers at the lower part of the earnings distribution and without clear earnings increase after changing employer have weaker labor market networks than those at the upper part. They therefore have less likely access to accurate information about their labor market prospects.

Taken together, our results show, one the one side, that changes in the labor market have the potential of reducing gender inequality; see also the discussion in Goldin (2014). The positive earnings effects of job mobility we find is not caused by any government interventions. Given the rather pessimistic findings so far that family leave policies at most play a limited role in supporting gender convergence (Tô, 2018; Thomas, 2019; Kleven et al., 2020), we see our results as encouraging. They provide support that the goal of gender equality is achievable. Initial job-to-job transitions after childbirth can have long-lasting effects on mothers' earnings and the potential to reduce the motherhood penalty.

On the other side, woman and mothers in particular still face many obstacles in the labor market and changes may only occur slowly. While encouraging job search and provide mothers with accurate information about labor market opportunities is one way of achieving higher job mobility and reduce the motherhood penalty, our results highlight the importance of search and mobility costs. Husbands play a key role in supporting mothers' transitions to better employment, for example by taking over care responsibilities. Our results also imply that preferences and norms have a substantial impact on gender convergence; see also, for example, the discussion in Bertrand (2011) and Kleven et al. (2020).

With our work we make several contributions to different strands in the literature. First and foremost, we contribute to the literature on gender inequality in the labor market (e.g. Olivetti and Petrongolo, 2017, for a review) and in particular to the growing literature on parenthood and its unequal impact on men and women. Existing works show that parenthood is associated with a persistent decline in women's earnings (Angelov et al., 2016; Lundborg et al., 2017; Bütikofer et al., 2018; Kleven, Landais and Sogaard, 2019). Gender norms and biased beliefs about the career cost of children have been proposed as one explanations for the persistence of the motherhood penalty (Kuziemko et al., 2018). Discouragingly, recent evidence suggests that public policies have at most a modest impact on gender convergence (Kleven et al., 2020). In our work we have a

closer look at the labor market behavior of mothers and show that they tend to exhibit high job mobility after childbirth. To the best of our knowledge, such a job search and mobility channel has been given little consideration in the literature so far. We investigate how heightened job mobility contributes to the motherhood penalty. Our results reveal that moving employer increases earnings, but only for some mothers. These earnings increases are caused by mothers sorting into better firms. We also find that high search and mobility costs, such as limited information about job opportunities and support by husbands, preclude mothers from moving to better job opportunities.

We also contribute to the literature on the (unintended) consequences of maternity leave policies on mothers' post-birth labor market outcomes (Lalive et al., 2014; Tô, 2018; Thomas, 2019).[8] This literature finds in general important implication of leave policies on mothers' labor market outcomes through signaling, promotion gaps, and offered job protection and cash benefits.[9] In our paper, we consider the short- and long-term earnings impact of job-to-job transitions after childbirth, an outcome which can be closely linked to job search during maternity leave. Our results highlight that there is substantial heterogeneity in the returns to changing employer along the income distribution, but that for some mothers job search during maternity leave is an important channel to improve labor market outcomes.

Lastly, our work speaks to the recent literature on the causes of rising inequality in the labor market caused by firms, mobility and matching (Abowd et al., 2018; Song et al., 2019; Calvo et al., 2021) and specifically mothers' sorting into jobs and firms (Felfe, 2012; Adda et al., 2017; Hotz et al., 2018).[10] Firms' characteristics play an important role in explaining our results. Mothers with earnings gains from job mobility move to faster growing firms and firms offering better career opportunities to women. Our results also provide evidence that mothers search for better employment opportunities within a larger geographic area, leading to a trade-off between earnings and commuting time. Ultimately, this leads to strong long-term earnings growth. At the same time, our results highlight the importance of the costs underlying this process. Some mothers face higher search and mobility costs which preclude them to find and move to better employment opportunities.

Our paper proceeds by first describing the institutional setting and the data. In Section 3 we show that mothers in Austria have a higher job-to-job transition rate than

[8] Other papers evaluating the changes in maternity leave policies on mothers' post-birth labor market outcomes include, for example, Berger and Waldfogel (2004), Baker and Milligan (2008), and Schönberg and Ludsteck (2014). These works find in general impacts of the policies on the short-term labor supply of mothers, but no or only small effects on their long-run labor market outcomes.

[9] Lalive et al. (2014) also provide reduced form estimates on how extending maternity leave affects the return probability to the pre-birth employer and re-employment wages. They do not explicitly evaluate the impact of job mobility after childbirth on earnings and long-term earnings growth further, however.

[10] Related, there is also the literature on general sorting into low- and high paying jobs by gender (e.g. Loprest, 1992; Del Bono and Vuri, 2011; Card et al., 2016; Barth et al., 2017; Sorkin, 2017).

comparable non-mothers. We describe our bounding approach in Section 4. Our main estimates, the effect of job mobility on both short- and long-term earnings are presented in Section 5. In Section 6, we explore the role of firms and search costs in explaining our results. Section 7 concludes.

2 Institutional Setting and Data

2.1 Institutional Setting

We briefly describe the institutional setting in place in Austria between 1990 and 1995, the time period of our sample. It should be noted that the two most important components of family leave policies in our work, maternity protection and job-protected maternity leave, have remained largely unchanged over the past years and are still in place today.

Maternity Protection: Maternity protection in Austria has remained largely unchanged over the past decades. The duration of maternity protection is 16 weeks in general. It starts 8 weeks before the estimated birth date and lasts until 8 weeks after the birth of the child. Under certain circumstances, such as a premature birth, multiple births or cesarean-section birth, maternity protection is extended to at least 20 weeks. Mothers are not allowed to work during maternity protection by law. Over the duration of the protection period, mothers receive government transfers replacing 100 percent of the net pre-birth labor earnings. The replacement is calculated as the average labor earnings over the last 3 months prior to the start of maternity protection.

Maternity leave: After the end of maternity protection, mothers have the right to take maternity leave. The maximum duration of job protected maternity leave is 24 months. During this time, mothers enjoy extended job protection. Extended job protection means that mothers have the right to return to their pre-birth employer in the same position as prior to leave taking. If this is not possible, an employer has to offer a similar position in line with the specification set out in the existing employment contract. Mothers are also protected from dismissal for six weeks after returning from maternity leave. After these six weeks, the regular notice period and dismissal rules apply.[11]

Unlike employers, mothers can terminate the work relationship with her pre-birth employer at any time during the maternity leave, as long as they comply with the appropriate notice period.[12] At the same time, they also keep the option of returning to their pre-birth employer after the end of maternity leave. This allows mothers to engage in job search within the two years of the leave period.

[11] The exact notice period depends on tenure within the firm. In general, the notice period is at least 6 weeks and employees can only be dismissed by the end of each quarter.

[12] The exact period for notifying the employer is often set by collective bargaining agreements and is normally one month.

It should be emphasized that job protected maternity leave is not unique to Austria but is offered in many countries. For example, in the U.S., women employed in firms with 50 or more employees are in general entitled to 12 weeks of unpaid job protected maternity leave under the Family and Medical Leave Act.[13] Women in the UK can take a minimum of 52 weeks of job-protected leave, with an extension if the employer participates in a special maternity scheme. In Germany mothers are eligible for up to 3 years of job protected leave after the birth of a child.

Benefit Payments: During the time period between July 1990 and the end of 1995 we consider in our analysis, mothers received government transfers during the entire maternity leave.[14] The duration of job protected leave and the time over which government transfers are paid are therefore equal in our setting. The benefit amount did not depend on mothers' household income and amounted to roughly 30 to 40 percent of female net median earnings (Lalive et al., 2014). Benefit payments were conditional on the mother staying at home, however. If she returned to work before the leave period was exhausted, benefit payments were terminated.

To qualify for benefit payments, mothers had to fulfill certain work requirements. For a first birth, they had to be employed for at least 52 weeks within the two years prior to giving birth. For the second- and higher order births or if the mother was younger than 25 years old at the time of birth, the work requirement was reduced to 25 weeks.[15]

2.2 Data and Sample

Our analysis is based on the Austrian Social Security Data Base (ASSD), a high-quality administrative data set to verify pension claims which is structured as a matched employer-employee data set. It covers all private sector employees and provides detailed information about daily labor market states. As time spent on child bearing and rearing is an important determinant for the calculation of old-age security benefits, the ASSD also contains high quality information on the number of births and the duration of maternity leave taken by mother with previous social security contributions. Zweimüller et al. (2009) provide an extensive description of the ASSD.

[13] In some states, the job protected leave is even longer, conditional on certain requirements. For example, the District of Columbia offers up to 16 workweeks of medical leave and 16 weeks of family leave during a 24 months period (see Gault et al., 2014, for an overview).

[14] The current legislation allows parents to choose from a set of benefit duration, ranging from 12 (higher monthly benefit payments) to 36 months (smaller monthly benefit payments). Regardless of the chosen duration, job protected leave is fixed to 24 months after childbirth.

[15] Parents also had the possibility to share the second year of maternity leave during our observation period. It was also possible to transform the maternity leave into part-time leave by reducing working hours by 50% and receiving only 50% of the benefits. There was no substantial take-up of either maternity leave by fathers or part-time leave, however (Lalive et al., 2014).

We observe all mothers with a child born between July 1990 and the end of 1995 in the data. For all mothers in our sample, we obtain the duration of the maternity protection and maternity leave, the tenure prior to entering maternity protection at the pre-birth employer, and mothers' daily earnings. We also obtain information on daily earnings in the first job after re-entering the labor market and information on the employing firm. In addition, to investigate the long-term impact of job search we collect information on daily earnings up to 15 years after the initial return-to-work decision.

In our analysis, we concentrate on a sample of mothers who are attached to the labor market. Therefore, we disregard all mothers who had less than one year of tenure in their last firm prior to childbirth. This tenure requirement is slightly stronger than the eligibility criteria for job-protected maternity leave discussed in the previous section and also slightly stronger than the restrictions applied in Lalive et al. (2014). While our results are not sensitive to the imposed tenure requirements, concentrating on a sample of established workers allows us to fully trace out the potential effects of job mobility after childbirth.

Around 65 percent of all mothers who take up employment after childbirth return to work within the maternity leave period of two years. Some mothers take substantially longer, however. For example, some return to the labor market once the child attends primary school around age six or even later. Firms may perceive the extended leave taking as a signal of lower attachment to work (Tô, 2018). These mothers also arguably do not engage in job search but their return decision and job selectivity is likely driven by the age of the child and other considerations. To avoid that our results are affected by this group, we exclude all mothers who did not return to the labor market by the end of the job protected maternity leave period.[16] In Appendix B, we provide further support for the importance of the job protected maternity leave period for mothers' return-to-work decisions.

Table 1 summarizes our estimation sample. Overall, our sample consists of around 59,000 women with at least one child. All earnings in the table and in our analysis are expressed in 1990 euro. Before entering maternity protection, mothers earn on average 25 euros per day which is lower compared to average female daily earnings of 36 euros during the period under consideration.[17] The large majority of mothers in our sample are employed in white collar jobs prior to childbirth and have, on average, almost four years of tenure in the pre-birth firm.

[16] On the one side, longer time out of work may also lead to a stronger depreciation of human capital and can therefore lower re-employment wages (e.g. Albrecht et al., 1999). On the other side, women returning faster to the labor market after childbirth might be negatively (Ejrnæs and Kunze, 2013) or positively (Tô, 2018) selected. In Appendix D, we present results when allowing for a longer return period. The estimates are qualitatively similar to those presented here.

[17] Expressed in current terms, these mean daily earnings correspond to 45 euro and 65 euro respectively.

[Table 1]

We also provide summary statistics separately for mothers who decided to leave their pre-birth employer (leavers, $L = 1$) and those who returned (stayers, $L = 0$) after childbirth. As one can see, mothers who left the pre-birth employer tend to be younger and had lower earnings in the pre-birth firm compared to stayers. Leavers also have lower tenure than stayers. With respect to firm characteristics, leavers were more likely employed in significantly smaller firms and also faced higher pay inequality within the firm prior to giving birth.

Overall, the summary statistics presented in Table 1 suggest substantial differences in observable characteristics between stayers and leavers. These stark differences are likely affected by unobserved heterogeneity, for example, in preferences for family friendly firms and amenities (e.g. Felfe, 2012; Hotz et al., 2018), in career concerns (e.g. Bertrand et al., 2010), or in the intensity of job search (e.g. Faberman and Kudlyak, 2019). We describe how we estimate the earnings effects of job mobility if such unobserved heterogeneity affects mothers' decisions in Section 4.

3 Motherhood and Job Mobility

Motherhood has likely strong effects on mothers' career consideration. Having a child can be considered as an important life circumstance. It may also serve as an information shock about own labor market expectations and ambitions. There is strong evidence that in many countries, such as the U.S. and Germany, motherhood leads women to reconsider their career and increases the propensity of changing their employer when returning to the labor market after childbirth (Laughlin, 2011; Rupp, 2013).[18] In this section, we show that recent mothers tend to have a significantly higher job mobility after childbirth than comparable non-mothers in our data.

To investigate the importance of job mobility after childbirth for mothers in comparison to non-mothers, we first construct a control group of non-mothers with similar age and education as the mothers observed in our sample. For each quarter in which we observe a birth in our sample (reference quarter), we select all women who were employed at that time and who did not gave birth in a window of 4 years around this reference quarter.[19] From this potential comparison group, we only keep non-mothers with a similar age and education at the reference quarter as mothers in our baseline sample.

[18] That motherhood leads to substantial changes in life and to career re-considerations is also often discussed in the popular press, for example, https://www.nytimes.com/interactive/2020/05/05/parenting/how-motherhood-changed-us.html.

[19] Notice that women in our control group are allowed to have children, as long as the birth date of the child is sufficiently far away from the reference quarter. For simplicity we refer to these women as non-mothers.

Then, we obtain the tenure in the current firm, the earnings up to the reference quarter as well as the labor market outcomes up to two years after the reference quarter. These two years correspond to the duration of the maternity leave of mothers; see Section 2. Applying similar criteria as when defining our baseline sample of mothers, we disregard all non-mothers with tenure measured up to the reference quarter of one year or less. We also exclude all non-mothers who were not employed at least one day in the two years following the reference quarter. The applied two years window corresponds to the length of the job protected maternity leave.

Using this final sample of non-mothers, we then create an indicator if the person had a job-to-job transition within two years after the assigned reference quarter. An individual experienced a job-to-job transitions if she moved to a new employer after the reference quarter and the transition took place within the same quarter as the end of her previous employment spell.[20]

Lastly, we combine the sample of non-mothers with our baseline sample of mothers, to estimate simple differences in means in the job-to-job transition rates between mothers and non-mothers. To account for possible differences in moving intentions, we also estimate logit regressions where we account for a wide range of personal and labor market characteristics such as tenure in the previous job, earnings in the previous job, education, and age. These variables should capture any differences in the propensity to move employer caused, for example, by career and earnings considerations or differences in firm-specific human capital. The average marginal effects derived from our regression are reported in Table 2. Notice that we do not interpret our estimates as causal but rather important suggestive evidence.

[Table 2]

The results presented in the table show the importance of motherhood for job mobility. Our estimates are large and highly significantly. Mothers have a more than 7 percentage points higher likelihood of moving to a new employer within two years after giving birth in comparison to non-mothers. Including our control variables leaves our results virtually unchanged.

To show that our results do not depend solely on career concerns and information shocks of becoming a mother, we present estimation results separately by education groups. Educational attainment is likely a good, while imperfect, measure to proxy possible career concerns (see also Del Bono et al., 2012). At the same time, motherhood tend

[20] Using the daily information on labor market spells, we could also allow for a more exact and shorter period of non-employment between spells. Our results are virtually identical to the ones reported here when using such a finer criterion instead.

to be a larger shocks to their labor market beliefs for higher educated women (Kuziemko et al., 2018).

We observe a similar pattern for our different education groups as in our baseline sample. Highly educated mothers have a more than 5 percentage points higher likelihood to move to a new employer compared to non-mothers. For lower educated mothers, we even find stronger effects of motherhood on the transition probabilities. All our estimates are not only substantial in magnitude but also highly significant. Overall, our results show that mothers have significantly higher job mobility after childbirth than comparable non-mothers.

In terms of our other variables, we see that in general individuals with higher tenure and higher wages are less likely to leave their employer. The estimated average marginal effects for these variables are also quite large. For example, a one euro increase in daily earnings decreases the leave probability by 0.14 percentage points. The effects of wages on the propensity to leave the employer are similar across our education groups. In that sense, these results also lend support to our assumptions that higher earnings mothers and those with longer tenure are in better firm worker matches, which is necessary for identification in our bounding approach. We discuss the bounding approach and associated assumptions extensively in the next section.

4 Empirical Bounds Approach

4.1 Bounding the Earnings Effects of Job-to-Job Transitions

There are many important factors which determine a mother's decision to change jobs, such as motivation, taste for workplaces, beliefs, and job search intensity. Most of these factors are endogenously determined. To obtain causal estimates for the impact of job mobility on mothers' future earnings, we employ a bounding approach imposing minimal yet very intuitive assumptions.

Our approach allows us to bound the effect of job mobility on the distribution of earnings, even when mothers' decisions to change employers is endogenously determined. All we impose are marginal decreasing returns to job search in mother's pre-birth earnings and their re-employment earnings potential at their pre-birth employer. Such assumptions are inherent in many theoretical job-search models (Christensen et al., 2005; Wright et al., 2021) and also supported by empirical evidence (Faberman et al., 2019). Mothers with higher earnings and earnings potential have formed already highly productive matches with their current employer. They also have a lower likelihood of finding better paying employment elsewhere. As looking for new employment requires effort and is costly, this implies that these mothers have a lower likelihood of leaving their pre-birth employer

after childbirth. As we will discuss further below, these monotonicity assumptions give rise to intuitive bounds on the effects of job mobility on earnings.

Denote by L the indicator whether a mother changed jobs after childbirth, with $L = 1$ if she leaves her pre-birth employer (leavers) and $L = 0$ if the mother returns to her pre-birth employer (stayers). Likewise, denote by $Y(1)$ the potential earnings a mother would receive if she left her pre-birth employer and by $Y(0)$ the potential earning if the mother returned to her pre-birth employer (see, for example, Imbens and Wooldridge, 2009, for the potential outcome notation). Define the function $h_y(Y(L)) = \mathbb{1}(Y(L) > y)$, where $\mathbb{1}(A)$ is an indicator function if the argument A is true. Then the distributional effects of job mobility on mothers' earnings can be defined as

$$\Delta^D(y) = E[h_y(Y(1)) - h_y(Y(0))|L = 1] \tag{1}$$

For a given y, the estimate $\Delta^D(y)$ from Equation (1) reflects the effect of job mobility after childbirth on the probability of obtaining re-employment earnings of greater than y for mothers who decided to leave their employer. This effect can therefore be interpreted as how job mobility after childbirth affects mothers' post-birth earnings potentials.

Notice that $E[h_y(Y(1))|L = 1]$ in Equation (1) can be directly identified from the observed data. To bound the counterfactual outcome $E[h_y(Y(0))|L = 1]$, we link mother's observed job-to-job transition to two weak and intuitive monotonicity assumptions on mothers' job mobility propensity, using the idea of d'Haultfoeuille (2010).

Denote by Z mother's pre-birth earnings prior to entering maternity protection and by X a vector of mother's background characteristics which may affect her job transition decision, such as education, age, and pre-birth firm characteristics. Remember that $Y(0)$ are *potential* earnings offered by the pre-birth employer after the return-to-work decision. Our first monotnoicity assumption requires that a mother's likelihood of leaving her pre-birth employer is decreasing in her pre-birth earnings Z, for given potential earnings $Y(0)$ and characteristics X. More formally,it can be expressed as

Assumption M1.

$$P(L = 0|Y(0), Z = z, X = x) \text{ is increasing in } z \text{ almost surely, for all x.} \tag{M1}$$

Changing employers requires effort and is likely costly. Therefore, the expected earnings gain from moving to a new employer is smaller for higher values of Z (see also, for example, the model of Christensen et al., 2005).[21] Facing smaller marginal benefits from changing employers, mothers' with higher values of Z are therefore less likely to search for a new job and more likely to return to their pre-birth employer. In support

[21] In our setting, mothers always can choose to return to their pre-birth employers and receive earnings Z; see the discussion in Section 2.

of our Assumption M1, Faberman et al. (2019) find that individuals' job search effort is decreasing in own earnings.

Assumption M1 would be violated if, for example, mothers with higher pre-birth earnings are negatively surprised by the "costs" of motherhood and therefore value family friendly but lower paying careers more after childbirth than those with lower values of Z. To account for such possibilities, we include a wide range on mothers' background characteristics in our estimation. For example, we can allow for situations as in Kuziemko et al. (2018) where higher educated mothers underestimate the impact of motherhood on their future labor market career, as long as within education groups our conditional monotonicity assumption holds. The discussion in Section 3 provides evidence that higher earnings are associated with a lower likelihood of changing employers, even within different education groups.

In addition, for mothers with higher pre-birth earnings it may also be a better and a less costly strategy to renegotiating the terms of employment with the pre-birth employer instead of searching for a new job. Mothers with higher Z, and thus likely with higher productivity, are more costly to replace for the employer, implying a higher bargaining power for the mother.[22] Given these higher replacement costs, the pre-birth employer may therefore be more willing to offer family friendly working conditions, at least for a pre-specified period of time. Assumption M1 is perfectly in line with this type of renegotiation. We provide further empirical evidence in favor of Assumption M1 in the next section.

To obtain our bounds, we also need to assume that mother's likelihood of leaving the pre-birth employer is decreasing in *potential* earnings offered after childbirth by the pre-birth employer $Y(0)$, conditional on pre-birth earnings Z and mother's background characteristics. Our second monotonicity assumption can formally be expressed as

Assumption M2.

$$P(L = 0|Y(0) = y, Z, X = x) \text{ is increasing in } y \text{ almost surely, for all x.} \qquad \text{(M2)}$$

Assumption M2 implies that mothers with higher $Y(0)$ at their pre-birth employer will gain less from searching more intensively for a new job compared to mothers with lower $Y(0)$ and possible more productive matches elsewhere. Given that searching is costly and facing smaller earnings gains, mothers further up the earnings distribution will therefore less likely leave their pre-birth employer; see also the discussion and models

[22] For example, Ginja et al. (2020) show that the costs family leave programs impose on firms can depend on the availability of substitutes.

in Wright et al. (2021).[23] Notice, that Assumption M2 does not rule out that we observe mothers with higher $Y(0)$ to move to higher paying jobs at a different firm.

Assumption M2 would be violated if mothers with higher $Y(0)$ valued non-monetary amenities, such as work flexibility or part-time employment, offered by other firms more than at their pre-birth firm. While non-monetary amenities play an important role in the labor supply decisions of mothers in general (e.g. Felfe, 2012), there is no evidence that mothers' valuation of non-monetary amenities depends on their earnings potential. For example, the results in Taber and Vejlin (2016) suggest that women with higher education and therefore likely higher potential earnings value non-monetary job amenities equally as women with lower education and therefore likely lower potential earnings.

It is worth noting that our two monotonicity assumptions are different and arguably weaker than the assumptions usually imposed in the empirical literature using bounds; see Manski (2003) and Ho and Rosen (2017) for an overview over different bounding approaches. For example, the commonly used monotone treatment response (MTR) assumption requires that leaving the pre-birth employer has either a monotone positive or monotone negative effect on re-employment earnings (Manski, 1997). Similar requirements are imposed by the montone instrument variable (MIV) assumption which necessitates to have access to a variable having a monotone impact on earnings (Manski and Pepper, 2000). Likewise, the monotone treatment selection (MTS) assumption restricts the direction of the selection bias due to endogenous job-to-job transition on earnings (Manski and Pepper, 2000).

As we do not have any prior on how leaving the pre-birth employer can affect future earnings and the direction of the selection bias, neither of these restrictions are appealing in our setting. In contrast, by using our two monotonicity assumptions we only require that the probability of returning to the pre-birth employer is increasing in Z and potential future earnings $Y(0)$, without restricting the impact on the outcome or imposing any other structure on the selection mechanism. We provide empirical evidence that our assumptions are met in the next section.

Besides our two montotonicity assumptions, we also need a strong correlation between Z and $h(Y(0))$ in the subgroup of stayers. Loosely speaking, one can think of this requirement as a type of relevance condition, similar to the relevance condition in linear instrumental variable models.[24]

[23] In the model considered in Wright et al. (2021) where higher paying jobs attract more applicants and search is costly, an individual even stops searching once she receives a sufficiently high wage at her current firm.

[24] The function $h(\cdot)$ has also to be increasing in its argument. By definition this is the case in our setting.

Under Assumption M1 and M2, and a sufficiently strong relationship between Z and $h(Y(0))$, we obtain the following upper and lower bound on our counterfactual outcome $E[h_y(Y(0))|L=1, X=x]$ (see also d'Haultfoeuille, 2010):

$$E[h_y(Y(0))|L=1, X=x] \leq E\left[E[h_y(Y)|L=0, Z, X=x]|L=1, X=x\right] \tag{UB}$$

$$\frac{\pi_x}{1-\pi_x} E\left[\frac{1-P_x(Y)}{P_x(Y)} h_y(Y)|L=0, X=x\right] \leq E[h_y(Y(0))|L=1, X=x] \tag{LB}$$

where $\pi_x = P(L=0|X=x)$. The term $P_x(Y)$ is the solution to the following conditional moment condition

$$E\left[\frac{1-L}{P_x(Y)} - 1|Z, X=x\right] = 0. \tag{2}$$

and can be thought of as the probability of returning to the pre-birth employer.[25]

Intuitively, to obtain the upper bound (UB) on our counterfactual outcome, we match mothers who leave their pre-birth employer to stayers with the same pre-birth earnings Z, conditional on background characteristics X. Since mothers with higher (potential) earnings at their pre-birth employer are more likely to return, it must be the case that there is no other employer offering better career opportunities and therefore a higher probability for the mother of receiving higher earnings (Assumption M2). If there was another employer offering better prospects, then stayers would be better off moving to this firm and leave their pre-birth employer. Therefore, any mother with similar pre-birth earnings (and characteristics) but who decided to leave the pre-birth employer could have had at most the same career prospects as stayers at her old firm. Thus, the observed re-employment earnings of stayers constitute the upper bound on our counterfactual outcome.[26]

The lower bound (LB) is based on a selection correction approach, where we weight the observed re-employment earnings of stayers with the estimated odds of returning to the pre-birth employer. When estimating the odds, we assume that mothers only base their decision whether to return to their pre-birth employer on the potentially offered re-employment earnings, given their own background characteristics.[27] This gives

[25] Strictly speaking, the interpretation that $P_x(Y)$ is the return probability is only correct under the independence assumption $L \perp\!\!\!\perp Z|(Y, X)$, which is stronger than the monotonicity assumptions we impose, see d'Haultfoeuille (2010).

[26] One could make this argument more formally. Under Assumption M2 and using Bayes' formula we have that $P(Y(0) \geq y|L=1, Z=z, X=x) \leq P(Y(0) \geq y|L=0, Z=z, X=x)$. To obtain the bound, this inequality needs to be integrated over Z conditional on L and X. Therefore, earnings potential of leavers at the pre-birth employer is bounded from above by the re-employment earnings of stayers.

[27] Weighting by the estimated selection probabilities bears similarity to the non-parametric selection correction approach of Das et al. (2003) using propensity score weights. The exclusion restriction here is, however, different. In our setting, selection is mainly driven by the outcome variable. If pre-birth earnings were independent of job mobility conditional on re-employment earnings, then we could point identify the earnings effects of job mobility.

rise to a (misspecificed) instrumental variable approach where we estimate Equation (2) using pre-birth earnings as instrument for re-employment earnings *conditional* on our outcome Y; see d'Haultfoeuille (2010) and Laffers and Schmidpeter (2021). Loosely speaking, as we ignore the strong dependence between pre- and post-birth earnings, and the positive effect on the return probability (Assumption M1), our misspecified selection correction approach underestimates the true selection into job mobility and the potential re-employment earnings at the pre-birth employer for movers. This suggests that we can use these estimates as lower bound on our counterfacutal outcome.

Using (UB) and (LB), we can bound the conditional returns to job mobility $\Delta_x^D(y)$

$$\begin{aligned} LB_x(y) \equiv E[h_y(Y)|L=1,X=x] - E\left[E\left[h_y(Y)|L=0,Z,X=x\right]|L=1,X=x\right] \\ \leq \Delta_x^D(y) \leq \\ UB_x(y) \equiv E[h_y(Y)|L=1,X=x] - \frac{\pi_x}{1-\pi_x} E\left[\frac{1-P_x\left(Y\right)}{P_x(Y)} h_y(Y)|L=0,X=x\right] \end{aligned} \tag{3}$$

Given that $LB_x(y)$ and $UB_x(y)$ are sharp bounds on $\Delta_x^D(y)$ (d'Haultfoeuille, 2010), we have that $LB(y)$ and $UB(y)$ defined as

$$\begin{aligned} LB(y) &\equiv \int_x LB_x(y) dF_{X|L=1}(x), \\ UB(y) &\equiv \int_x UB_x(y) dF_{X|L=1}(x), \end{aligned} \tag{4}$$

are also sharp bounds on $\Delta^D(y)$, where $F_{X|L=1}$ denotes the conditional distribution of X given $L=1$. Therefore, by integrating the lower and upper bound over the distribution of X given $L=1$ we obtain bounds on our effect of interest $\Delta^D(y)$. We discuss how we estimate these bounds from the data in Appendix A.

We want to highlight again that to obtain the lower and upper bounds in (4), we neither restrict individual productivity and taste for certain workplace characteristics nor job search effort and return decisions. All these components are allowed to be correlated with our potential outcomes and pre-birth earnings. For example, we can allow for situations as in Adda et al. (2017) and Hotz et al. (2018), where mothers sort into jobs and firms according to their future fertility plans, career aspirations and other unobserved traits. We can also allow for situations where some mothers signal their labor market attachment to a potential future employer by taking fewer days of maternity leave, as in Tô (2018). In all these cases, we still are able to bound the returns to job mobility, as long as our two monotonicity assumptions are satisfied.

4.2 Support for Identification Assumptions

Here, we provide empirical support for our three identification assumptions discussed in the previous section. First, under Assumption M1 the likelihood of returning to the pre-birth employer has to be increasing in Z. We estimate a simple logit model to provide empirical evidence for the monotone relationship between Z and the return probability. The predicted probability of returning to the pre-birth employer as a function of pre-birth earnings, $\widehat{P}(L=0|Z)$, are shown in Panel a of Figure 1. As one can see, there is a strong relation between Z and the return probability, supporting our first monotonicity assumption.

Second, Assumption M2 requires that the probability of returning to the pre-birth employer is positively related to potential earnings $Y(0)$. We provide evidence for this assumption graphically by plotting the (unconditional) estimates of the selection probability $\widehat{P}(Y)$ obtained from the moment condition (2) against the observed re-employment earnings for stayers, i.e. mothers with $L=0$. The results are shown in Panel b of Figure 1. It is apparent from the figure that there is a strong and positive relationship between potential earnings and mothers' decisions to return to their pre-birth employer, which supports our second monotonicity assumption.

Third, there has to be a strong and positive correlation between potential post-birth earnings $h(Y(0))$ and pre-birth earnings Z. We provide indirect evidence for this relation by estimating a local linear regression of $Y(0)$ on Z among mothers who returned to their pre-birth employer. Panel c in Figure 1 provides the results from this regression, together with 95 percent confidence intervals. As one can see, there is a clear positive and strong relationship between Z and Y.

5 Job Mobility after Childbirth and Earnings

5.1 Impact on Earnings after Return-to-Work Decision

Panel a in Figure 2 shows the estimated bounds on the effect of changing jobs on mothers' earnings potential $\Delta^D(y)$ at the time of the return-to-work decision. The shaded regions are 95 percent confidence intervals. Notice that in some cases the confidence intervals are very narrow and are hard to distinguish from the bounds in the graph.

[Figure 2]

Two interesting features emerge from the figure. First, earnings effects of job-to-job transitions are very heterogeneous along the earnings distribution. At most of the lower and middle parts of the earnings distribution, we do not find evidence that changing

employer increases mothers' re-employment earnings. Our estimated bounds are very wide and cover zero. The relatively wide bounds imply that there is substantial selection and heterogeneity in which type of jobs mothers move to at the end of maternity leave. On the one side, the large negative lower bounds imply that some mothers possibly trade earnings for other, non-monetary amenities, such as flexible work. This explanation is inline with the findings of Hotz et al. (2018) who show that mothers move to lower paying but more family friendly firms. On the other side, the positive upper bounds imply that some mothers move to jobs with higher earnings potential. Under our assumptions, both explanations are consistent with the data.

In contrast, we find that mothers with potential earnings above 60 euro per day, which corresponds roughly to the upper quintile of the observed earnings distribution, uniformly benefit from moving to a new job after childbirth. Mothers at the upper part of the earnings distribution might be more sensitive to career opportunities. Our results show that these mothers transit to jobs with higher earnings potential after childbirth. The estimated bounds are also considerably narrower compared to the ones at lower parts of the earnings distribution, suggesting that selection is strongly driven by earnings potential for this group. Notice that our estimates bound the causal effect of job mobility on earnings and do not reflect any differences in productivity, motivation, and other unobserved preferences.

Second, the increase in earnings potential from moving to a new job can be considerable for mothers at the upper part of the distribution. For example, job mobility after childbirth increases the likelihood of earning at least 60 euro by between 1 to 3 percentage points and the likelihood of earning at least 80 euro by between 0.5 to 1 percentage point.

Using the estimated lower bounds on the distribution functions, we can translate these effects into an approximated expected increase in earnings associated with moving to a new employer instead of returning to the pre-birth firm. Moving to a new firm increases expected daily earnings by at least 4 percent for mothers earning at least 60 euro per day.[28] For those mothers who earn at least 80 euros, moving to a new employer increases expected earnings by at least 7 percent in the new job. Mothers at the very top of the distribution can expect to earn at least 14 percent more at their new employer. These increases are sizable when compared to mothers' average re-employment earnings of 32 euros per day.[29]

[28] The calculations for the expected earnings increase are based on a truncated mean $E[Y(L)|Y(L) > \bar{y}] = \frac{\sum_{Y>\bar{y}} Y P(Y(L)=y)}{P(Y(L)>\bar{y})}$. For leavers we use the empirical cdfs to calculate $P(Y(1) > \bar{y})$ and $P(Y(1) = y)$. For stayers, we use the lower bound on $E[h_y(Y(0))|L = 1]$ defined in inequality (LB), and integrate over the distribution of X to obtain the counterfactual probabilities. The relative earnings effect is then calculated as the ratio of the truncated means between leavers and stayers.

[29] Remember that all earnings are reported in 1990 levels.

5.2 Impact on Long-Term Earnings

Our estimates from the previous section may not fully reflect life-time earnings impacts of job mobility after childcare. It is possible that firms offer returning mothers initially flexible but lower paid work after childbirth, with the potential to increase earnings and climb the career ladder later on. This may be true specifically for highly productive workers who are costly to replace. If this was the case, our estimates in the previous section would overstate the impact of changing employer on mothers' future earnings potential. It is also possible that mothers who leave their pre-birth employer and move to higher paying jobs become increasingly isolated from possible disruptions, such as job loss, in the future (as, for example, in Jarosch, 2015). This would lead to a persistent increase in earnings and our initial estimates would understate the impact of changing employer after childbirth on mothers' life-cycle earnings.

We investigate the impact of initial job mobility after childbirth on long-term earnings. The long-term earnings are calculated as mother's average earnings between 11 and 15 years after the return-to-work decisions. We take the averages to avoid that a single year affects our long-term estimates.[30] The estimated bounds on the long-term effects of changing employer are shown in Panel b of Figure 2.

As one can see from the figure, an initial job-to-job transition increases earnings for mothers at the upper part of the earnings distribution even up to 15 years after re-entering the labor market. Our estimated increase in long-term earnings is also sizable. For example, our bound show that leaving the pre-birth employer increase in the likelihood of earning at least 60 by between 0.5 and 7 percentage points, earning at least 70 Euro by between 1 and 6 percentage points, and earning at least 80 euro by between 1 and 5 percentage points. These effects translate into an approximated increase in expected long-term earnings by around 10 percent.

Our findings suggest an important role for job search during maternity leave and resulting job mobility not only in explaining the persistent gender pay gap between men and women, but also in explaining earnings gaps among mothers and women in general. On the one side, job search during maternity leave and a resulting job-to-job transition can lead to divergence in mothers' labor market careers. Mothers further up the earnings distribution are already more isolated from job loss and by moving up the career ladder may even be more isolated from involuntary work disruptions. They may also work in better paying firms, which can lead to long-lasting higher earnings in the future. These developments can affect both current inequality and through retirement savings also inequality at older age. In the extreme, these earnings differences due to job search may even spill over to the next generation as family earnings are an important determinant of children's development and educational success (e.g. Carneiro and Ginja, 2016). On the

[30] The results are similar when taking averages over a shorter time horizon.

other side, our results also imply that leaving the pre-birth employer after childbirth can reduce the sizable motherhood penalty and narrow gender pay gaps. It is interesting to note that this type of gender convergence is achieved without any policy interventions.

6 Understanding the Earnings Impacts of Mothers' Job Mobility

6.1 Exploring Underlying Mechanisms

Our findings presented in the previous section raise two important question. First, why do only mothers at the upper part of the distribution improve their earnings potential when leaving the pre-birth employer? And second, if changing jobs is beneficial for some mothers why do we not observe more job mobility after childbirth?

We concentrate on the role of firms and job characteristics as important labor market determinants to answer the first question. Firms play an important role in explaining workers' labor market outcomes (e.g. Card et al., 2012; Kaas and Kircher, 2015). Good employment possibilities also may not be available in close proximity and require longer commutes. To answer the second question, we look at the importance of search and mobility costs related to childcare and husband's support (e.g. Kleven et al., 2020). For example, insufficient support with childcare may preclude mothers to take up more demanding but higher paying job.

To better understand the underlying mechanisms, we first group our sample into five different sub-samples g, depending on the mother's position in the earnings distribution. Mothers earning less than 20 euro per day are assigned to the first group, mothers earning at least 20 euro but less than 40 euro are assigned to the second group and so on. This grouping is motivated by our results from Section 5.

For each of these five groups we estimate a flexible, fully interacted linear regression of the form[31]

$$Y_i^g = x_i^{g'} \beta^g + \delta^g L_i^g + \epsilon_i^g \tag{5}$$

where Y_i^g is the outcome of interest for mother i belonging to group g. L_i^g is the leave-indicator as before, taking a value of one if the mother left her pre-birth employer and zero otherwise. The vector x_i^g contains information about mother's background characteristics

[31] In general, our fully-interacted approach is more robust than using simple linear regressions as it accounts for any potential differences in the distribution of the observed covariates between leavers and stayers within our groups. At the same time, it is also more demanding with respect to sample size and may therefore be less efficient. In most of our analysis, we choose robustness over efficiency concerns.

such as age at birth and education as well as information about her pre-birth employer; see also Table 1.

The parameter of interest in Equation (5) is δ^g which reflects differences in the underlying mechanism possibly explaining earnings potential between stayers and leavers in group g. It should be emphasized, however, that we do not interpret the estimates of δ^g as ultimate causal evidence. We see them as interesting but suggestive evidence on the underlying mechanisms which may explain our results.

6.2 The Role of Firm and Job Characteristics

We first investigate if leavers move to more successful firms after childbirth, approximated by firms' growth rates. Faster growing firms may offer higher wages to fill open positions faster and may also offer higher life-time earnings (Davis et al., 2013; Kaas and Kircher, 2015). Moving to such firms can therefore be an important source of earnings growth for mothers. We measure firm growth as the differences in the log of the total number of employees and the number of female employees respectively between the time of the return to work decision and the start of the maternity leave. The results are reported in Columns (1) and (2) in Table 3.

[Table 3]

The new firms of leavers tend to grow faster compared to firms of stayers. Mothers who leave their pre-birth employer also move to firms with stronger hiring of female employees. Theses differences become more pronounced at the upper part of the earnings distribution. At the top of the earnings distribution, leavers move to firms which increase total employment by almost 50% over the considered period and hire 35% more women compared to firms of stayers.

We also investigate if mothers who change jobs move to firms which do not only grow faster but also offer better career opportunities to women. To proxy such career opportunities we use both the gender pay gap among incumbent workers and the gender gap among new hires. Firms with smaller gender pay gaps may offer more equal opportunities to men and women, for example, in terms of promotions and earnings growth. The results are shown in Column (3) and (4) in Table 3.

Leavers at the bottom of the earnings distribution move in general to firms which have higher gender pay gaps among both incumbent and newly hired workers than firms of stayers. In contrast, leavers at the upper part of the earnings distribution move to firms where the existing gender pay gap is smaller compared to the gap at their pre-birth employer. These differences become particular pronounced when looking at the difference in the gender gap among newly hired workers. Mothers who leave their pre-birth employer

move to a firm with a 20 percentage points lower pay gap among newly hired workers compared to stayers.

Taken together, these findings highlight the importance of firms in explaining mothers' labor market success after childbirth, mirroring the general findings in the literature (e.g. Card et al., 2016; Song et al., 2019). Mothers who increase their earnings potential by changing jobs tend to move to faster growing firms. They also move to firms which have more equal gender pay structures, at least for newly hired workers. In that sense, our results complement the findings in Hotz et al. (2018) who show that (potential) mothers tend to move to more family friendly firms. Our result imply that some mothers move to firms offering better chances for promotions and stronger earnings growth potential to females employees after childbirth. The transition to more successful firms can explain our estimated effects of job mobility on earnings.

Given the importance of firms in explaining mothers' labor market success, it is interesting to see if leavers are more likely to search in a geographically wider areas for such job opportunities or if they match with local firms. Searching in different local labor markets for employment gives mothers a higher chance of matching with more productive and better paying firms (Blanchard and Katz, 1992; Bound and Holzer, 2000). Difference in the willingness to commute may therefore be one reason for the unequal impact on earnings we find in our analysis (e.g. Le Barbanchon et al., 2021). The results for differences in geographical mobility between stayers and leavers are shown in Columns (5) and (6) in Table 3.

In Column (5) of the table, we show the estimated differences in geographical mobility between leavers and stayers, using an indicator whether the mothers has moved postal codes between the birth of the child and the return-to-work decision as an outcome.[32] Our results indicate that leavers tend to be geographically more mobile in general. The estimated pattern is getting stronger the further up a mother is in the earnings distribution. At the top of the distribution, leavers have a 6 percentage points higher probability of having moved postal code at the time of the return-to-work decision than stayers. This finding suggests that increases job mobility is at least partially associated with higher geographical mobility. By moving local areas, some mothers are able to find better matches after childbirth.

We also find evidence that leavers at the top of the earnings distribution search in geographically wider areas for better employment. Leavers increase significantly the time spent commuting to work after childbirth; see the results in Column (6). Our estimates indicate that mothers at the very top of the distribution increase commuting time by around 25% after the return-to-work decision, corresponding to an increase in

[32]Location information is only available on the postal code level and we cannot account for changes within the same postal code. Therefore our estimates likely understates the correlation between job-to-job transitions and local mobility as well as commuting patterns.

the average commuting time by roughly 5 minutes. Our results provide strong evidence that mobility and therefore the likelihood of finding better firm-worker matches is an important driver for our estimated earnings gains from job-to-job transitions. They also imply that mothers who change jobs at the upper part of the earnings distribution tend to exhibit similar preferences as men, valuing an increase in earnings relatively more than a reduction in commuting time (Le Barbanchon et al., 2021). The impact on local mobility and commuting time we find also raises the question about the role of search and mobility costs in precluding mothers to move to better employment

6.3 The Role of Search and Mobility Costs

We evaluate search and mobility costs associated with formal childcare provision and husband's support next.[33] In a first step, we explore if husbands of movers adjust their labor market outcomes differently post-birth compared to husbands of stayers.[34] In many countries, policies which encourage father to take some time off the labor market after childbirth to achieve gender equality have been introduced over the past years, although take-up can be low (e.g. Lalive et al., 2014). The adjustment of fathers own labor market outcomes could facilitate the labor market re-entry of mothers and their search for better job opportunities, however. The estimated differences in husbands' labor market outcomes between leavers and stayers are reported in Table 4.

[Table 4]

Columns (1) to (3) in the table show the impact of leaving the pre-birth employer on the changes in husbands' short-term labor market outcomes, measured between the mother's time of the return-to-work decision and the year prior to childbirth. We do not find evidence that husbands of leavers are more likely to adjust their labor market attachment; see Column (1). These results therefore do not point toward a complete shift in the care burden from the mother toward father as an explanation for our results.

A complete withdrawal from the labor force may be too strong of a decision. Husbands may reduce working hours or move to more flexible but lower paying jobs to support mothers job transitions. Any such move should be reflected in the husband's earnings growth.[35] The differences in the earnings growth rate between husbands of leavers and husbands of stayers are reported in Column (2) of Table 4. Our results do not support

[33] There may also other, non-exclusive factors, such as preferences and expectations about job search which determine the moving decision. Our data does not allow us to directly investigate such explanations.

[34] In our data we only observe the partner mentioned during the application for childcare benefits, but not the exact relationship between the partner and the mother. For simplicity, we refer to these partners here as "husbands" noting that the person is not necessarily married to the mother.

[35] We do not observe working hours in our data and therefore cannot directly measure any adjustments on this margin.

the explanation that husbands trade their own career for the career of mothers. All our estimates are close to zero and not statistically significant on any conventional level.

We do find evidence that childbirth also leads husbands to reconsider their job at the current employer, however. Husbands of leavers are more likely to change employers after childbirth, too; see the results reported in Column (3) of Table 4. This "joint mobility" effect is becoming stronger the further up a mother is in the earnings distribution. At the very top, husbands of leavers have an almost 20 percentage point higher probability of moving employer compared to husbands of stayers. Moving jobs and the associated necessity to adjust to a new working environment may make those husbands more responsive to the childcare burden of women, leading to more support with daily routines in the household. We discuss such a behavioral adjustment response further below.

One possible explanation for the small effects on short-term labor market outcomes is, that husbands are reluctant to adjust their own labor market career during maternity leave and the job starting phase of the mother. Once mothers are again established in the labor market and have successfully (re-) started their career, husbands may be more inclined to take on some additional (childcare) responsibilities and adjust their work accordingly. In Columns (4) to (6) we explore this hypothesis further, using the same set of outcomes as before but we measure the differences now between the age of 5 of the child and the year prior to childbirth. As it was the case with our short-term effects, we do not find that husbands adjust their labor market outcome in the long-run. Interestingly, we also do not find that husbands of stayers catch up in terms of employer mobility, implying a persistent difference in the joint mobility effect.

In light of our previous results, we explore the provision of childcare or the lack thereof as an important underlying mechanism. Little or no childcare available may constrain mothers in their decision to move to higher paying and likely more demanding jobs.[36] We consider first formal childcare using the numbers of nurseries available in the county of residence at the time of the return-to-work decision as outcome. As counties with a higher birthrate may also provide more formal care, we also look at the number of nursery places available for each child between 0 and 3 as an additional outcome. The results for difference in formal childcare provision between leavers and stayer is shown in Columns (1) and (2) in Table 5.

[Table 5]

[36] Another explanations might be hat mothers choose lower paying but more flexible jobs to be able to substitute relatively expensive formal childcare with informal one. Compare to the U.S. or UK, childcare is relatively cheap in Austria. In addition, subsidies for low-income families are available. Therefore, choosing informal childcare over formal care solely due to monetary reasons and adjust employment accordingly is unlikely to explanation our results.

We do not find evidence that leavers have better access to formal childcare. Our estimated difference are rather small when considering the total number of nurseries available in the county of residence; see Column (1). That differences in access to formal childcare are unlikely to explain our results becomes even clearer once we consider the number of nursery places per child, see Column (2). Again, our estimates are small and not statistically significant on any conventional level. These results complement those of Kleven et al. (2020) who show that childcare policies have had little effects on gender convergence. Access to formal childcare is unlikely an explanation for our findings.

Second, we also look at informal childcare agreements. It is interesting to see if husbands of leavers tend to help more with childcare than husbands of stayers, given that they are also more likely to change employer and therefore may be more responsive to the burden of childcare. We also consider help from relatives, such as grandparents, as an additional source of informal care. As we do not observe directly these outcomes in our data, we use information from mothers' "synthetic selves" in the Austrian Microcensus. Specifically, we use information on mothers' pre-birth labor market characteristics to find comparable mothers in the Austrian Microcensus. Once such a mother is found, we assign the information about childcare agreements to the relevant mother in our data set. Comparing mothers in our sample to mothers with the same characteristics in other data sources is motivated by a similar approach used in Kuziemko et al. (2018). We provide a detailed explanation in Appendix C. The estimated differences in informal childcare arrangements between leavers and stayers using our synthetic sample, are reported in Columns (3) to (5) in Table 5.

We find that mothers who leave their pre-birth employer and have higher earnings tend to receive more help from their husbands and also, to a lesser extend, from other relatives. The differences in informal care arrangements between leavers and stayers is particularly strong at the very top of the distribution. These findings corroborate our theory that the joint decision to leave the pre-birth employers makes husbands more responsive to childcare needs and therefore take on a higher share of the burden, but only for high earning mothers. They also highlight the importance of search and moving costs and show why we do not observe more mothers moving to better employment. Norms in care taking likely play an important role in precluding mothers to move jobs (see also, for example, Bertrand, 2011).

Interpreted through the marriage and labor market sorting model of (Calvo et al., 2021), our results also imply that assortative matching play a important role. Couples with high complementary in household production are more likely to match and share

childcare burdens more equally.[37] This in turn leads to more equal labor market outcomes and mothers moving to better jobs after childbirth. Such differences in matching likely increase between household inequality even further.

While we find strong evidence that high search and mobility costs are important obstacles for mothers at the upper part of the distribution, it is still not entirely clear why movers at the lower part of the distribution do not benefit from job mobility. A possible explanation may be that mothers at the lower part of the earnings distribution do not have access to all relevant information about job opportunities, specifically when taking some time out of the labor market.[38]

We proxy access to labor market information by a mother's strength and quality of pre-birth co-workers network in the new firm. (Former) Co-workers are an important information source for job opportunities. They also provide prospective employers with information about the applicant they otherwise would not have (Dustmann et al., 2016). Table 6 presents the results.

[Table 6]

Three strong patterns emerge from the results in the table. First, leavers at the upper part of the earnings distribution have a larger network of former co-workers in the current firm. At the top, mothers previously worked with around 25% of her current co-workers together, compared to around 10% at the bottom. There is no clear pattern when looking at the network size of female co-workers, however; see Column (2).

Second, the further up a mother is in the earnings distribution the stronger is her network, both overall and when considering female co-workers only. Mothers at the top of the earnings distribution worked on average almost three years previously with a co-worker in the network. This is almost twice as long compared to mothers at the lower part of the earnings distribution.

Third, the quality of the network also seems to matter for job mobility associated with earnings increases. Past and current average daily earnings of co-workers in the network of mothers at the upper part of the distribution are with 61 euro and 75 euro more than 60% higher than average daily earnings of co-workers in the network of mothers at the lower part of the distribution. Interestingly, average current earnings of co-workers

[37] In support of the matching hypothesis, we find that the within-couple earnings gap decreases by around 5% due to job mobility for mothers at the upper part of the earnings distribution. Our estimates are rather noisy, however.

[38] Alternatively, mothers at the lower part of the earnings distribution may face more restrictive opening hours of childcare facilities. Exploring such a hypothesis using mothers with pre-school children in the Austrian Microcensus, we do not find evidence for it. In general, we find that most mothers in the survey are satisfied with opening hours but that satisfaction is slightly decreasing in mother's own earnings. This suggests that restrictive hours are more important for mothers at the upper part of the earnings distribution.

in the network are roughly comparable with the re-employment earnings of mothers at the upper parts of the distribution. This points toward information sharing of co-workers about similar jobs. The results presented provide indirect evidence that information frictions play an important role why not more mothers with lower earnings move to better employment.

7 Conclusion

Improving gender equality has become one of the top priorities in many countries. Despite major improvement of women's labor market outcomes in many dimensions, they still earn substantially less than men. Recently, this persistent gender gap has been linked to the unequal impact of parenthood on men and women. Discouragingly, family policies introduced to improve gender convergence have had only limited impacts. Therefore, the question what determines labor market success of mothers and how to improve it sill remains open.

In our work, we have a closer look at the labor market behavior of mothers after childbirth and their earnings. We show that mothers have substantially higher job mobility after childbirth than comparable non-mothers. Such job mobility has important implications for earnings. To the best of our knowledge such a job search and mobility channel has been largely neglected in the literature so far. Employing a bounding approach relying on intuitive and weak monotonicity assumptions inherent in many theoretical job search models, we find that job mobility after childbirth can increase mothers' re-employment earning substantially, but only for mothers at the upper part of the earnings distribution. For those mothers, the earnings impact of job mobility after childbirth is also very persistent. We find positive effects of initial job mobility on earnings even up to 15 years after the initial return-to-work decision.

Exploring the mechanisms underlying our results, we find that earnings gains are driven by mothers moving to more successful firms, even if this requires longer commutes. While job mobility can improve mothers' future labor market success, we also find an important role for search and mobility costs, hindering many mothers to move to better employment opportunities. Although our results do not reveal any significant impact of the provision of formal childcare, informal help in the household by the husband is important. We also provide indirect evidence that information frictions are a likely explanation why we do not find any earnings effects of job mobility for mothers at the lower part of the earnings distribution.

On the one side, wee see our results as encouraging, specifically in relation to the rather pessimistic findings in the literature on the motherhood penalty. Overall, our

results imply that gender convergence is an achievable goal. Changes in the labor market can lead to a reduction in gender inequality, at least for some mothers.

On the other side, while supporting job search and provide mothers with information about labor market opportunities is one way of achieving higher job mobility and reduce the motherhood penalty, our results also highlight the importance of search and mobility costs mothers face. Husbands play a key role here. We find that they take over care responsibilities in addition to their work and without any policy intervention. This suggests an important role for preferences and norms. It also implies that assortative matching is another important channel through which gender inequality is acerbated.

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Tables

Table 1: Sample Overview

	Overall Sample	Leavers $L = 1$	Stayers $L = 0$	Raw Difference
Personal Characteristics				
Age at Birth (Years)	27.80	26.65	28.01	−1.37†
No. of Children	1.80	1.77	1.81	−0.04†
Non-Austrian (Shares)	0.05	0.05	0.05	−0.00
University Degree (Shares)	0.10	0.07	0.10	−0.03†
Pre-Birth Labor Market Outcomes				
Daily Earnings (Euros)	24.77	22.27	25.24	−2.96†
Tenure (Days)	1,238.40	1,116.34	1,261.16	−144.82†
White Collar (Share)	0.72	0.69	0.73	−0.04†
Pre-Birth Employer				
Firm Size (Median)	79.50	39.75	92.50	−52.75†
Share Females (Median)	0.64	0.68	0.63	0.05†
Log Pay Gap (Median)	−0.31	−0.34	−0.31	−0.03†
No. of Mothers	59,229	9,307	49,922	

The sample consists of all mothers who gave birth between July 1990 and December 1995, who returned to the labor market within the maternity leave period of 24 months after giving birth, and who had at least one year of tenure in the pre-birth firm. Leavers (Stayers) are all mothers who leave (return to) the pre-birth employer after returning to work.
† indicates a significance difference between leavers and stayers at least at 5%.

Table 2: Average Marginal Effects of Motherhood on Job-to-Job Transition Propensity

	(1)	(2)	(3)	(4)	(5)
	Overall		By Education		
			University	Matura	Apprenticeship & Others
Mother	7.41	7.41	5.16	7.03	7.71
	(0.16)	(0.17)	(0.56)	(0.50)	(0.20)
Tenure (Years)		−0.59	−1.44	−1.02	−0.53
		(0.03)	(0.17)	(0.12)	(0.04)
Earnings (Euro)		−0.14	−0.08	−0.10	−0.15
		(0.00)	(0.01)	(0.01)	(0.00)
Age (years)		−0.50	−0.31	−0.52	−0.50
		(0.00)	(0.05)	(0.04)	(0.00)

This table provides summary of average marginal effects. The estimates were obtained from a logistic regression of a binary indicator whether the individual had a job-to-job transition within two years after the assigned reference date on the motherhood indicator and other control variables; see Section 3. All marginal effects were multiplied by 100. Mothers are all individuals in our baseline sample, which consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth; 59,220 observations in total (see Section 2). The control sample consists of a random sample of women with similar characteristics as mothers, but who did not give birth within a 4-year window around the assigned reference date; 1,194,317 observations in total. Robust standard errors are reported in parentheses.

Table 3: The Role of Employers and Jobs

	(1)	(2)	(3)	(4)	(5)	(6)
	The Role of Employer				The Role of Mobility	
	Δ Log Employees Overall x 100	Δ Log Employees Females x 100	Δ Log Pay Gap among Incumbent x 100	Δ Log Pay Gap among New Hires x 100	Moved Postal Code x 100	Δ Log Commuting Time x 100
$Y < 20$	22.62	19.13	−8.37	−13.94	3.78	−6.37
	(10.37)	(8.14)	(4.96)	(12.32)	(2.98)	(14.82)
$20 \leq Y < 40$	34.42	29.22	−1.18	−2.53	3.29	−5.94
	(11.26)	(8.55)	(4.59)	(12.33)	(2.98)	(13.99)
$40 \leq Y < 60$	39.45	32.69	0.53	−2.37	6.03	−2.58
	(10.57)	(8.85)	(4.65)	(13.15)	(2.85)	(15.06)
$60 \leq Y < 80$	22.98	18.97	0.33	7.06	4.72	−3.51
	(10.79)	(8.34)	(4.77)	(12.79)	(2.89)	(14.96)
$80 \leq Y$	45.29	34.54	−1.98	20.51	5.60	25.34
	(10.75)	(8.54)	(4.60)	(12.64)	(2.81)	(14.23)

This table provides summary of the estimates of leaving the pre-birth employer on differences in employer characteristics and geographic mobility. For each earnings group g the estimates are obtained from linear regressions of the outcome on the mobility indicator (and other covariates); see also Section 6. The baseline sample consists of all mothers who had at least one year of tenure in their pre-birth firm and who returned to the labor market within the parental leave period of 24 months after giving birth; 59,229 observations in total. Δ *Log Employees* measures the change in the log number of employees in the firm. Δ *Log Pay Gap* measures the change in the log pay gap within the firm between women and men. A positive coefficient indicates a narrowing of the gender pay gap. The location sample requires in addition valid residence information at childbirth and when returning to the labor market; 27,916 observations in total. Firm outcomes are in first difference and are measured between the start of maternity leave and the return to the labor market. *Moved* is a binary indicator whether the mother moved ZIP codes between birth and the return-to-work decision. Δ *Log Commuting Time* measures the difference in the log commuting time between the travel time to the employer after the return to work decision and the travel time to the pre-birth employer. Bootstrapped standard errors using 999 replications are reported in parentheses.

Table 4: The Role of Husbands' Labor Market Adjustments

	(1)	(2)	(3)	(4)	(5)	(6)
	At End of Maternity Leave			At Age 5 of Child		
	Δ LF Participation x 100	Δ Log Earnings x 100	Δ Employer x 100	Δ LF Participation x 100	Δ Log Earnings x 100	Δ Employer x 100
$Y < 20$	−2.17	1.02	4.05	−4.05	0.99	3.22
	(5.01)	(1.74)	(6.40)	(6.40)	(3.30)	(5.38)
$20 \leq Y < 40$	−1.45	0.87	3.97	−2.69	1.05	4.88
	(5.00)	(1.83)	(6.53)	(3.66)	(3.18)	(5.18)
$40 \leq Y < 60$	0.30	0.19	5.52	−0.26	−0.91	7.39
	(4.91)	(1.73)	(6.31)	(3.32)	(3.20)	(5.45)
$60 \leq Y < 80$	−0.77	−0.64	5.96	−2.72	−2.69	10.91
	(5.02)	(1.80)	(6.24)	(3.60)	(3.25)	(5.84)
$80 \leq Y$	10.43	−0.29	18.82	4.00	−1.84	14.72
	(5.04)	(1.86)	(6.76)	(3.41)	(3.30)	(5.28)

This table summarizes estimates of the effect of leaving the pre-birth employer on husbands' labor market outcomes. For each earnings group g the estimates are obtained from linear regressions of the outcome on the mobility indicator (and other covariates); see also Section 6. The sample consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth, and information about the husband is available; 43,598 observations in total. All outcomes are defined as the difference between the variable measured at 2 years (*End of Maternity Leave*) and 5 years (*Age 5 of Child*) and the respective variable one year prior to birth. Δ *LF Participation* refers to changes in the labor force participation status of the husband. Δ *Earnings* is the change in log daily earnings. Δ *Employer* measures if the husband moved to a new employer. Bootstrapped standard errors using 999 replications are reported in parentheses.

Table 5: The Role of Formal and Informal Childcare Provision

	(1)	(2)	(3)	(4)	(5)
	Provision of Formal Care		Informal Care Arrangements		
	No. of Nurseries Available	No. of Places Available	Any Daily Help x100	Daily Help from Husband x100	Daily Help from Relatives x100
$Y < 20$	−4.00	−0.04	1.90	1.62	−4.02
	(2.89)	(0.03)	(2.25)	(2.24)	(1.20)
$20 \leq Y < 40$	−1.74	−0.02	2.49	2.18	−1.02
	(2.87)	(0.03)	(1.85)	(1.85)	(1.08)
$40 \leq Y < 60$	−0.23	−0.00	4.96	5.03	−3.36
	(2.88)	(0.03)	(2.98)	(2.99)	(1.45)
$60 \leq Y < 80$	3.46	0.02	−1.85	−6.32	3.25
	(2.89)	(0.03)	(6.85)	(6.86)	(4.22)
$80 \leq Y$	1.44	0.03	21.31	22.86	6.78
	(2.85)	(0.03)	(11.98)	(11.99)	(7.52)

This table provides summary of the estimates of leaving the pre-birth employer on formal childcare and informal childcare arrangements. The Formal Care sample consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth, and with valid residence information at childbirth and when returning to the labor market; 27,916 observations in total. The Informal childcare sample consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth, with a partner and who had a synthetic self in the Austrian Microcensus; 12,610 observations in total (see Appendix C). *No. Nurseries Available* is the number of nurseries available in the county of residence at the time of the return-to-work. Similarly, *Place Available* is the approximate number of places available per child age 0-3 in the county of residence. *Receiving Any Daily Help* is a binary indicator taking a value of one if the mother received daily help from either the husband or relatives (or both). Likewise, *Receiving Daily Help from Husband* is a binary indicator if the husband helps almost daily with childcare. *Receiving Daily Help from Relatives* is a binary indicator if grandparents or other relative help almost daily with childcare. For each earnings group g, the estimates in Columns (1) and (2) are obtained from a fully-interacted linear regression model and standard errors were obtained via the bootstrap with 999 replications; see also Section 6. Due to the smaller sample size and as estimating a fully-interacted model is not feasible, the estimates in Column (3) to (5) are obtained from a linear regression and robust standard errors are reported .

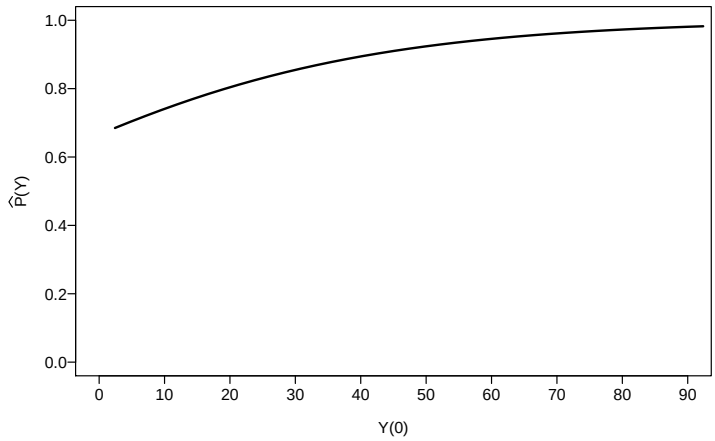
Table 6: The Role of Co-Worker Networks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Network Co-Workers in Current Firm (in %)		Days Worked Together Previously		Daily Earnings with Past Employers		Daily Earnings with Current Employer	
	Overall	Females	Overall	Females	Overall	Females	Overall	Females
$Y < 20$	9.31	5.03	576.56	582.43	34.19	30.27	45.00	39.27
	(6.34)	(1.69)	(152.13)	(113.08)	(9.37)	(7.83)	(3.14)	(3.10)
$20 \leq Y < 40$	14.61	6.81	666.90	669.48	39.91	35.11	50.73	44.97
	(6.35)	(1.70)	(155.65)	(113.49)	(9.31)	(7.82)	(3.06)	(3.05)
$40 \leq Y < 60$	21.93	9.32	772.23	757.08	47.67	42.36	62.37	56.20
	(6.34)	(1.72)	(153.67)	(116.72)	(9.27)	(7.87)	(3.19)	(2.99)
$60 \leq Y < 80$	22.78	8.79	761.28	770.28	52.11	46.77	68.25	61.21
	(6.39)	(1.73)	(149.42)	(114.51)	(9.33)	(7.84)	(3.22)	(3.08)
$80 \leq Y$	26.22	6.84	1005.91	887.02	60.63	52.57	75.36	66.43
	(6.39)	(1.70)	(152.36)	(115.28)	(9.28)	(7.87)	(3.14)	(3.07)

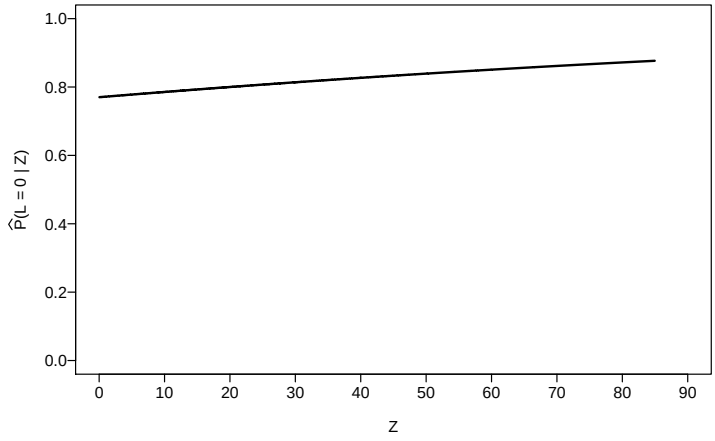
This table provides summary of the network of co-workers in the current firm for leavers. The sample consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth, and left the pre-birth firm; $9,307$ observations in total. The co-worker network consists of all current co-workers with whom the mother also has worked in the past at a employer different from the current one. *Days Worked Together* are the overlapping employment days of the co-worker in the network and the mother at a previous employer. *Past Daily Earnings* are measured during the last year of employment of the mother at a previous employer. *Current Daily Earnings* are measured during the first year of employment of the mother in the new firm. For each maternal earnings group g, the estimates are obtained from a linear regressions of the outcome on covariates; see also Section 6. Bootstrapped standard errors using 999 replications are reported in parentheses.

Figures

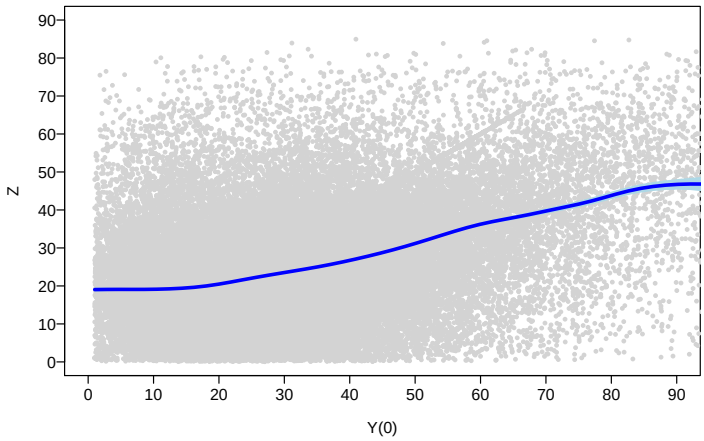
Figure 1: Support for Identification Assumptions



c. Predicted Return Probability $\widehat{P}(Y)$



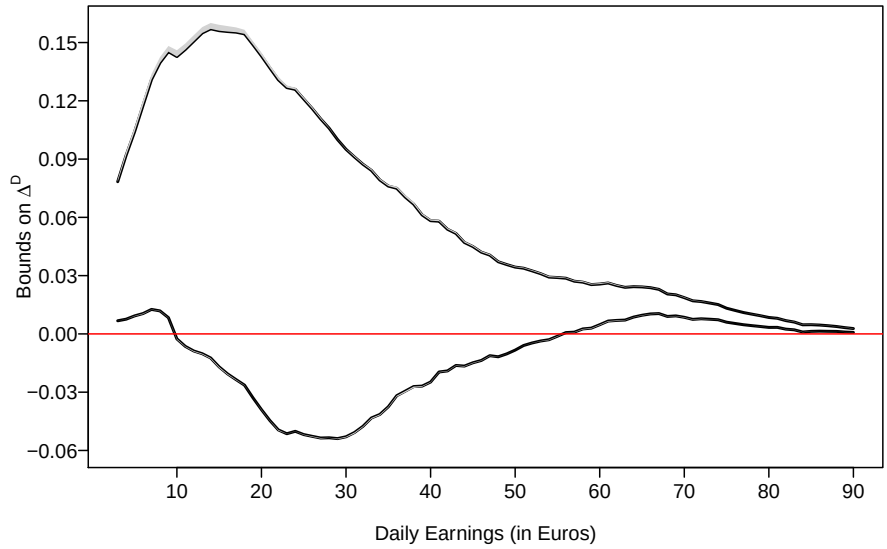
b. Predicted Return Probability $\widehat{P}(L = 0|Z)$



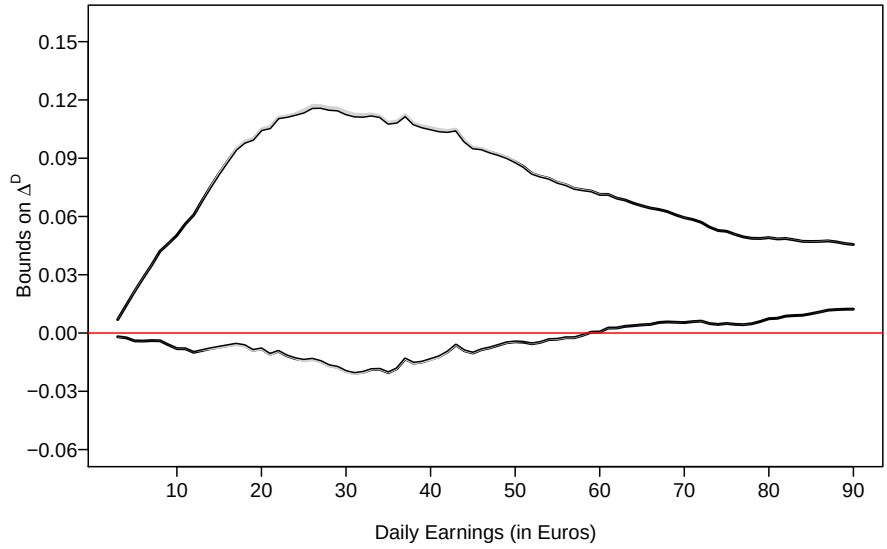
c. Relation between Z and $Y(0)$

Panel a provides support for Assumption M1 and shows the predicted probability for different values of pre-birth earnings. Coefficients underlying the predictions were obtained by logistic regressions. Panel b provides support for Assumption M2 and shows the predicted return probabilities $\widehat{P}(Y)$ for stayers. The probabilities were estimated using Equation (2) and the logistic function to parameterize the probabilities; see Section 4. Panel c shows estimates from a local linear regression of Z on $Y(0)$ for the sub-population of stayers ($L = 0$), trimming the bottom 1 percent and top 99 percent of the earnings distribution. A Gaussian kernel was used and the bandwidth was obtained via cross-validation. The shaded area corresponds to the 95 percent confidence intervals. Dots represents the actual observed data values.

Figure 2: Short- and Long-Term Earnings Effects of Job-to-Job Transitions



a. Short-Term Effects



b. Long-Term Effects

The figure shows the upper and lower bound on the returns to job search Δ^D. The shaded area corresponds to the 95 percent confidence intervals. Notice that in some cases the confidence intervals are small and therefore hard to distinguish in the figure. Bounds and confidence intervals were obtained using the method outlined in Section 4. The *Short-Term Effects* were estimated using employment earnings at the time of re-entering the labor market after childbirth. The sample comprises all mothers who had at least one year of tenure in their pre-birth firm, and who returned to the labor market within the maternal leave period of 24 months; in total 59,229 observations. The *Long-Term Effects* were estimated using average maternal earnings between 11 to 15 years after the initial return-to-work decision. The sample comprises all mothers who had at least one year of tenure in their pre-birth firm, returned to the labor market within the maternal leave period of 24 months, and who had at least once positive earnings during the aforementioned time period; in total 54,196 observations.

Online Appendix for "Mothers' Job Mobility after Childbirth and Earnings"

Lukáš Lafférs and Bernhard Schmidpeter

May 17, 2022

This Web Appendix provides additional details and results not discussed in the manuscript.

A Estimation of the Bounds

The bounds in Equation (3) in the main part of the manuscript are expressed in terms of survival functions. Notice that we can express $h_y(Y(L))$ in terms of a cumulative distribution function (cdf) $\gamma_y(Y(L))$: $h_y(Y(L)) = 1-\gamma_y(Y(L))$, which is more convenient. Rewriting the bounds yields therefore

$$\begin{aligned} &E\left[E\left[\gamma_y(Y)|L=0,Z,X=x\right]|L=1,X=x\right] - E[\gamma_y(Y)|L=1,X=x] \\ &\qquad \leq \Delta_x^D(y) \leq \\ &\frac{\pi_x}{1-\pi_x} E\left[\frac{1-P_x\left(Y\right)}{P_x(Y)}\gamma_y(Y)|L=0,X=x\right] - E[\gamma_y(Y)|L=1,X=x] \end{aligned} \tag{A.1}$$

where $P_x(Y)$ is the solution to the following moment condition

$$E\left[\frac{1-L}{P_x(Y)} - 1|Z,X=x\right] = 0. \tag{A.2}$$

For estimation, we transform our vector of background characteristics X, so that it has a discrete support. This allows for sufficient flexibility in our estimation. We include three educational groups and four age-at-birth groups into X. Mother's age and education are likely important determinants for her search behavior and effort to find new employment. We also include two groups for firm size and two groups for the share of female co-workers at the pre-birth firm into X.[1] The size of the pre-birth employer and share of female co-workers are also likely important factors considered by the mother

[1] We take the quartiles of the observed age distribution as the relevant cut-off points for the four age groups. To determine the cut-off for the firm size and share of female co-workers we use the median. In Appendix D, we show that our results and conclusions are robust to not incorporating any pre-birth characteristics into our estimation.

when making her return decision. For example, larger firms may be able to offer better working conditions or other non-monetary benefits.[2] Likewise, mothers working in firms with a lower share of female co-workers may be more inclined to change firms (e.g. Hotz et al., 2018).

The bounds in (A.1) suggests then that we can estimate each part of the upper and lower bound from the data via weighted cdfs. Notice that $E[\gamma_y(Y)|L=1, X=x]$ can be directly estimated via the empirical cdf using the group of leavers with $X=x$. We denote this estimate by $\widehat{F}^{LL}_{1|X=x}(y)$.

We make use of distribution regression (Foresi and Peracchi, 1995) to obtain estimates of $F^{LS}_{1|X=x}(y) = E\left[E\left[\gamma_y(Y)|L=0, Z, X=x\right]|L=1, X=x\right]$. In particular, over a grid of values for y, we estimate a series of regressions

$$\widehat{F}^{LS}_{1|X=x}(y) = \frac{1}{N_{1,x}} \sum_{i:L_i=1, X_i=x} \widehat{F}_{Y|Z,L=0,X=x}(y|Z_i),$$

where $N_{1,x}$ is the number of mothers leaving their pre-birth employer with characteristics $X=x$. We parameterize $F_{Y|Z,L=0,X=x}(y|Z_i) = \Lambda\left(\beta^x_0(y) + \beta^x_1(y)Z_i\right)$, where $\Lambda(\cdot)$ is the logistic function and we made the dependence of parameters $(\beta_0(y), \beta_1(y))$ on x explicit. Hence, $\widehat{F}_{Y|Z,L=0,X=x}(y|Z_i)$ is estimated by a logistic regression in the subpopulation of stayers with $X=x$. In order to avoid having our results depend on the chosen grid of thresholds y, we estimate the distribution regression for every observed outcome value.

We follow a two-step approach to estimate

$$F^{SS}_{0|X=x}(y) = \frac{\pi_x}{1-\pi_x} E\left[\frac{1-P_x(Y)}{P_x(Y)}\gamma_y(Y)|L=0, X=x\right]$$

In a first step, we estimate the selection probability via GMM using the moment condition defined in Equation (A.2) and parameterizing $P_x(Y_i) = \Lambda(\Psi^x_0 + \Psi^x_1 Y_i)$, where, as before, $\Lambda(\cdot)$ is the logistic function.[3] In a second step, we use the predicted selection probabilities $\widehat{P}_{x,i} \equiv \Lambda(\widehat{\Psi^x_0} + \widehat{\Psi^x_1} Y_i)$ and estimate a weighted empirical cdf $\widehat{F}^{SS}_{0|X=x}(y)$.

The above estimates can then be combined into conditional lower and upper bounds on $\Delta^D_x(y)$:

$$\widehat{LB}_x(y) \equiv \widehat{F}^{LS}_{1|X=x}(y) - \widehat{F}^{LL}_{1|X=x}(y),$$
$$\widehat{UB}_x(y) \equiv \widehat{F}^{SS}_{0|X=x}(y) - \widehat{F}^{LL}_{1|X=x}(y).$$

[2] Larger firms may also have more market power in hiring, at least locally. This may affect the outside option of mothers; see Manning (2020) for a recent review on monopsony power and labor markets.

[3] As the selection function specified in Equation (A.2) is highly non-linear and convergence can be difficult, we follow Laffers and Schmidpeter (2021) and normalize both Y and Z to lie in the unit interval

Using the estimated sample proportion of mothers with $X = x$ among the population of leavers, denoted by $\widehat{P}(X = x|L = 1)$, we can obtain the unconditional bounds on our effect of interest $\Delta^D(y)$:

$$\widehat{LB}(y) \equiv \sum_x \widehat{LB}_x(y)\widehat{P}(X = x|L = 1),$$
$$\widehat{UB}(y) \equiv \sum_x \widehat{UB}_x(y)\widehat{P}(X = x|L = 1).$$

Inference is based on the nonparametric bootstrap using 500 replications. To obtain 95 percent confidence intervals we apply the method of Imbens and Manski (2004). They suggest to adjust the critical values when calculating confidence intervals in partially identified models, where the degree of the adjustment also depends on the width of the bounds.[4]

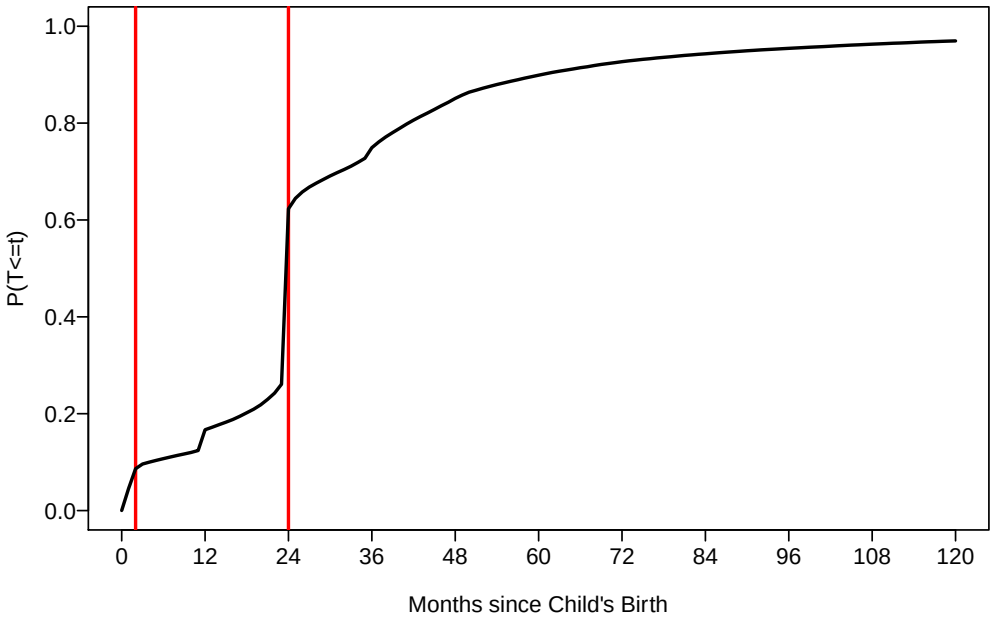
B Return-to-Work Patterns

In this section, we provide details about the return-to-work patters of mothers after giving birth. Figure B.1 presents estimates of the probability that a mother returns to work at or before time t, $P(T \leq t)$. In the figure, the first vertical line at 2 months represents the end of the maternity protection and the second vertical line at 24 months the end of the maternity leave.

As it is clear from the figure, the vast majority of mothers return to work within 24 months and therefore at or before the end of job-protected maternity leave. There is also a clear bunching in the return patter at the end of maternity leave at 24 months. The share of mothers returning to work increases from 20 percent to around 65 percent at this point, showing that the end of maternity leave constitutes indeed an important reference date for mothers' return-to-work decision. After the end of the job-protected maternity leave, we do not see a similar return-to-work pattern. The share of mothers returning to the labor market increase almost linearly over time. The bunching in the return patter at the end of maternity leave at 24 months also likely rules out that employer "top-up" government provisions during leave taking to encourage the mother to return earlier to work or to the pre-birth employer as an explanation for our findings. Overall, the patterns shown in the figure highlight the importance of job-protected maternity leave period for mothers' decision making.

[4]The idea behind the approach of Imbens and Manski (2004) is that the width of the confidence set will not shrink to zero, even in the limit. Thus in the limit one only needs to be concerned with calculating one sided-errors.

Figure B.1: Mothers' Return-to-Work Patterns



The figure shows the share of mothers returning to work before or at time t after childbirth. The sample comprises all mothers who gave birth between July 1990 and December 1995 and had at least one year of tenure in their pre-birth firm; in total $95,056$ observations. The first vertical line at 2 months denotes the end of maternity protection.The second vertical line at 24 months denotes the end of job-protected maternity leave.

C Identifying Synthetic Selves in the Austrian Microcensus

Our administrative data does not contain information about possible informal childcare arrangements during the job-transition period, for example, by the husband. To investigate if leavers receive more support with childcare, we follow a similar idea as Kuziemko et al. (2018), and create "synthetic" selves of mothers in our sample using information on childcare arrangements provided in the Austrian Microcensus .

The Austrian Microcensus is a quarterly representative survey conducted by the Austrian Federal Statistical Office. Each quarter approximately 22,000 randomly selected households take part in the survey. The main focus of the survey is on housing conditions and employment, but some households are asked an additional and changing set of questions relevant to explaining labor market outcomes. In the 1995 survey, information about childcare arrangements were collected.[5]

From the 1995 survey of the Microcensus, we first select all mothers who were at the time of the interview in maternity protection. For these mothers, we obtain information about informal childcare arrangements from the data. Specifically, we assign each mother an indicator whether the husband or partner helps almost daily with childcare. To cover other forms of childcare arrangements, we also create an indicator whether the mother receives almost daily help with childcare from the grandparents or other relatives.

To be able to identity the synthetic selves of mothers later in our administrative data, we use information on mothers' age at birth, education, nationality, percentile in the earnings distribution, and industry in the pre-birth job (1-digit) provided in the Microcensus. In the Microcensus, mothers are only asked about their current average net monthly earnings. Since we concentrate on mothers who were in maternity protection during the interview and therefore received a 100% replacement of the previous earnings as government transfers, this measure is a good proxy of pre-birth average net monthly earnings; see also Section 2 in the main part of the paper. We disregard mothers who we cannot uniquely identified by the combination of our matching variables in the Microcensus.

Using the information on mothers' age at birth, education, nationality, percentile in the earnings distribution, and industry in the pre-birth job, we match mothers with valid information about the husband in our administrative data to their synthetic selves in the Microcensus. Notice that in our matching approach, we also implicitly assume that mothers' positions in the earnings distribution are not affected by payments. Mothers in the administrative data for whom we do not find a synthetic self in the Microcensus are dropped from our sample.

[5] In 2002, questions about childcare arrangements were asked, too. We choose to use only the results from the 1995 survey to be in line with the time frame of our administrative sample.

D Additional Results

D.1 Results not including Covariates

Accounting for any pre-birth characteristics is not required for identification of our bounds (see d'Haultfoeuille, 2010). Including pre-birth characteristics may help to tighten the bounds and lend more credibility to our monotonicity assumptions, however. In this section we show that our results are robust and all our discussion and conclusions presented in the main part of the paper remain valid when not controlling for mothers' pre-birth characteristics. The results are summarized in Panel a of Figure D.2.

From the figure it is clear that our results are very similar to those reported in the main part of the paper, even when excluding pre-birth characteristics from the estimation. One can see that moving employer after childbirth increases the earnings potential of mothers at the upper part of the distribution. While bounds are slightly wider compared to the estimates when including pre-birth characteristics, our bounds point toward large and highly significant gains from job-to-job transitions.

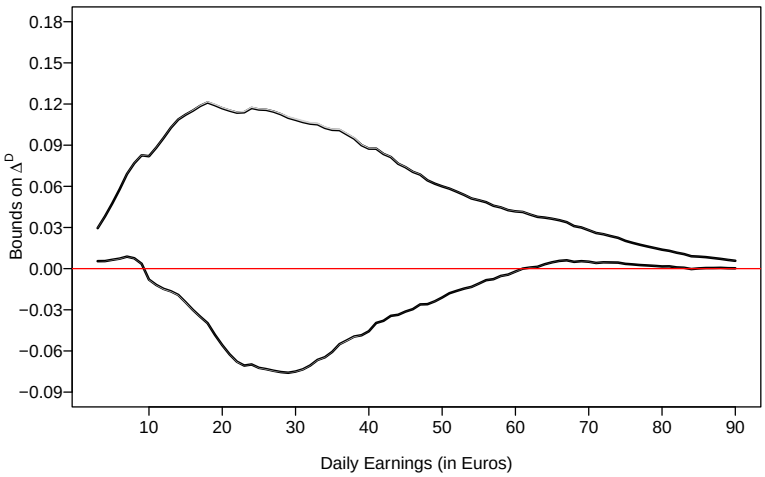
Overall, all our discussions and conclusions remain valid even when not including any pre-birth characteristics in the estimation. The results also lend additional support to our monotonicity assumption. Not accounting for any pre-birth characteristics delivers very similar results as those discussed in the main part of the paper. Furthermore, the results presented here not only show that our estimates are robust to the exclusion of pre-birth characteristics but also imply that results do not depend on the choice of how we incorporate pre-birth characteristics into our model.

D.2 Results Extending Return-to-Work Period

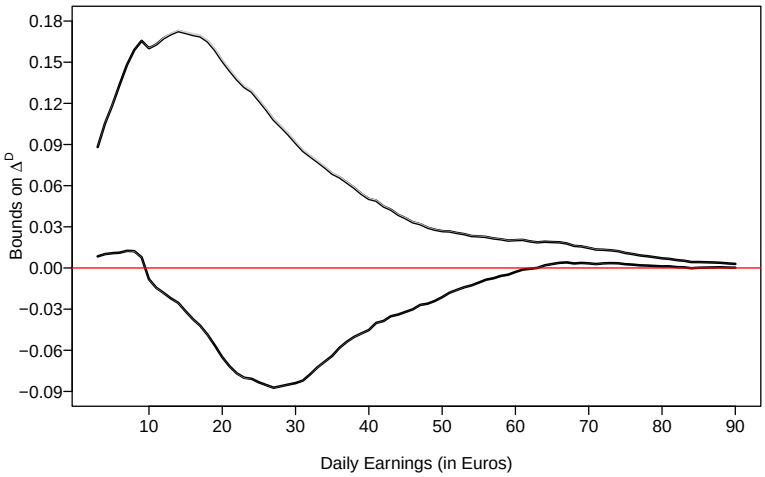
Mothers are only eligible to return to the same (or a similar) position at their pre-birth employer within the maternity leave period of 24 months. In this section, we show that our results are robust to an extension of the return period. We now consider all mothers who returned to work within 30 months after childbirth. The return period is therefore 6 months longer compared to the threshold of 24 months we use in the main part of our paper. Panel b of Figure D.2 shows the results.

From the figure, one can see that leaving the pre-birth employer increases the earnings potential for mothers at the upper part of the distribution, even when considering an extended return period. The pattern of our estimates are also very similar to the ones reported in the main part of the paper. Overall, the results presented in this section show that our estimates are robust to an extension of the considered return-to-work period. All our conclusions in the main part of the paper remain valid.

Figure D.2: Earnings Effects of Job-to-Job Transitions –Additional Results



a. No Covariates



b. Extended Return-to-Work Period

The figure shows the upper and lower bound on the returns to job search Δ^D. The shaded area corresponds to the 95 percent confidence intervals. Notice that in some cases the confidence intervals are small and therefore hard to distinguish in the figure. Bounds and confidence intervals were obtained using the method outlined in Section 4. The *No Covariates* comprises all mothers who had at least one year of tenure in their pre-birth firm, and who returned to the labor market within the maternal leave period of 24 months; in total $59,229$ observations. The bounds where calculated without including any pre-birth characteristics into the estimation The *Extended Return-to-Work Period Sample* comprises all mothers who had at least one year of tenure in their pre-birth firm, and who returned to the labor market within 30 months after childbirth; in total $65,678$ observations.

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