

Lafférs, Lukáš; Schmidpeter, Bernhard

Working Paper

## Mothers' job search after childbirth

Ruhr Economic Papers, No. 915

**Provided in Cooperation with:**

RWI – Leibniz-Institut für Wirtschaftsforschung, Essen

*Suggested Citation:* Lafférs, Lukáš; Schmidpeter, Bernhard (2021) : Mothers' job search after childbirth, Ruhr Economic Papers, No. 915, ISBN 978-3-96973-061-4, RWI - Leibniz-Institut für Wirtschaftsforschung, Essen, <https://doi.org/10.4419/96973061>

This Version is available at:

<https://hdl.handle.net/10419/235893>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

Lukáš Lafférs

Bernhard Schmidpeter

## Mothers' Job Search After Childbirth

## Imprint

---

### Ruhr Economic Papers

Published by

RWI – Leibniz-Institut für Wirtschaftsforschung  
Hohenzollernstr. 1-3, 45128 Essen, Germany

Ruhr-Universität Bochum (RUB), Department of Economics  
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences  
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics  
Universitätsstr. 12, 45117 Essen, Germany

### Editors

Prof. Dr. Thomas K. Bauer

RUB, Department of Economics, Empirical Economics  
Phone: +49 (0) 234/3 22 83 41, e-mail: thomas.bauer@rub.de

Prof. Dr. Wolfgang Leininger

Technische Universität Dortmund, Department of Economic and Social Sciences  
Economics – Microeconomics  
Phone: +49 (0) 231/7 55-3297, e-mail: W.Leininger@tu-dortmund.de

Prof. Dr. Volker Clausen

University of Duisburg-Essen, Department of Economics  
International Economics  
Phone: +49 (0) 201/1 83-3655, e-mail: vclausen@vwl.uni-due.de

Prof. Dr. Ronald Bachmann, Prof. Dr. Manuel Frondel, Prof. Dr. Torsten Schmidt,  
Prof. Dr. Ansgar Wübker

RWI, Phone: +49 (0) 201/81 49-213, e-mail: presse@rwi-essen.de

### Editorial Office

Sabine Weiler

RWI, Phone: +49 (0) 201/81 49-213, e-mail: sabine.weiler@rwi-essen.de

### Ruhr Economic Papers #915

Responsible Editor: Ronald Bachmann

All rights reserved. Essen, Germany, 2021

ISSN 1864-4872 (online) – ISBN 978-3-96973-061-4

The working papers published in the series constitute work in progress circulated to stimulate discussion and critical comments. Views expressed represent exclusively the authors' own opinions and do not necessarily reflect those of the editors.

---

**Ruhr Economic Papers #915**

Lukáš Lafférs and Bernhard Schmidpeter

**Mothers' Job Search After Childbirth**

## **Bibliografische Informationen der Deutschen Nationalbibliothek**

---

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie;  
detailed bibliographic data are available on the Internet at <http://dnb.dnb.de>

RWI is funded by the Federal Government and the federal state of North Rhine-Westphalia.

<http://dx.doi.org/10.4419/96973061>

ISSN 1864-4872 (online)

ISBN 978-3-96973-061-4

---

Lukáš Lafférs and Bernhard Schmidpeter<sup>1</sup>

## Mothers' Job Search After Childbirth

### Abstract

*We explore the impact of successful job search after childbirth on mothers' labor market careers. Using a bounding approach and administrative data, we find strong heterogeneity in the returns to leaving the pre-birth employer. Moving to a new employer after childbirth leads to an increase in re-employment earnings only for mothers at the upper part of the earnings distribution. For these mothers, initial job search also increases long-term earnings. We provide evidence that earnings gains are the result of higher geographical mobility and longer commutes to work. Successful mothers are also more likely to move to faster growing firms and firms offering better opportunities to women. Our results do not suggest that husbands play an important role in supporting successful job search of mothers.*

*JEL-Code: C21, J13, J31, J62*

*Keywords: Parental leave; return-to-work; job search; earnings; earnings gaps*

*July 2021*

---

<sup>1</sup> Lukáš Lafférs, Matej Bel University; Bernhard Schmidpeter, Johannes Kepler University, Linz, RWI and IZA, Bonn. - We would like to thank Esther Arenas-Arroyo, Ronald Bachmann, Xavier d'Haultfoeuille, Jochen Güntner, Martin Halla, Martin Huber, Simon Jäger, Klara Kaliskova, Arizo Karimi, Astrid Kunze, Christos Mavridis, Maria Petrova, Anne Polivka, Daniel Schäfer, Daphne Skandalis, Pedro Sant'Anna, Michel Seranelli, Linh To, Arne Uhendorff, Rudolf Winter-Ebmer, and participants at seminars in Essen, Linz, and Prague as well as at SOLE 2021 and RES 2021 for valuable discussions and suggestions. Laers acknowledges support provided by the Slovak Research and Development Agency under contract no. APVV-17-0329 and VEGA-1/0692/20. - All correspondence to: Bernhard Schmidpeter, Department of Economics, Johannes Kepler University Linz, Altenberger Str. 69, 4040 Linz, Austria, e-mail: [bernhard.schmidpeter@jku.at](mailto:bernhard.schmidpeter@jku.at)

# 1 Introduction

Despite major progress for women in the labor market over the past decades, they still earn substantially less than men in most countries (e.g. [Goldin, 2014](#); [Blau and Kahn, 2017](#)). 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](#)). The role of childbirth and the associated “motherhood penalty” have received particular attention in explaining the persistence of the gender gap ([Angelov et al., 2016](#); [Lundborg et al., 2017](#); [Bütikofer et al., 2018](#); [Kuziemko et al., 2018](#); [Kleven et al., 2019, 2020](#)).<sup>1</sup> In contrast, little consideration has been given to the question of how motherhood affect women’s job search decisions and the impact on their future careers.<sup>2</sup> The lack in research is surprising given that a large share of mothers decide not to return to their pre-birth employer after childbirth. In the United States, around 20 percent of first-time mothers leave their pre-birth employer when returning to the labor market ([Laughlin, 2011](#)). The share is very similar in Europe.<sup>3</sup> These low return rates suggest a role for job search during maternity leave in explaining mothers’ future labor market success.

In our work, we analyze how mother’s decision to leave the pre-birth employer during maternity leave, what we call successful job search, affects her initial re-employment earnings and long-run earnings growth. We also investigate theoretically important channels, such as mobility and commuting, to better understand why some mothers gain from successful job search while other mothers do not.

In general, one normally thinks of job search as an important determinant for earnings growth and voluntary job-to-job transitions as means to move up the “wage ladder”.<sup>4</sup> The impacts of successful job search on mothers’ labor market careers are less clear, however. On the one side, some mothers may search for jobs and firms which allow them to balance work and family responsibilities ([Adda et al., 2017](#); [Hotz et al., 2018](#)). This may lead to both lower re-employment earnings and lower long-term earnings growth. On the other side, for some mothers the jobs held around childbirth may only constitute an intermediate career step. For those, job search during maternity leave may be an important

---

<sup>1</sup>Other explanations for the persistence of gender gaps 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. \(2017\)](#).

<sup>2</sup>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 can be quite unique and the impact on their labor market careers are not clear a priori.

<sup>3</sup>For example, in Germany, around 23 percent of mothers change employers when returning to the labor market after taking maternity leave ([Rupp, 2013](#)). Likewise, in Austria between 15 and 25 percent of mothers do not return to their pre-birth employer.

<sup>4</sup>See [Rogerson et al. \(2005\)](#) and [Wright et al. \(2019\)](#) for a recent summary of the literature on search models.

tool for earnings growth. What types of employment mothers prefer after childbirth may also depend on their positions in the earnings distribution.

A challenge arises in empirical work as a mother's decision to search for a new job and leave the pre-birth employer is likely endogenous. It is difficult, if not impossible, to obtain exogenous variation which can be exploited. We therefore follow a different approach in our analysis. Using administrative data for Austria, we bound the returns to successful job search on mothers' earnings. The approach only requires that search effort and therefore the likelihood of leaving the pre-birth employer is decreasing in both mother's pre-birth earnings and the *potential* re-employment earnings after childbirth offered by her pre-birth employer. These types of monotonicity assumptions are intuitive and inherent in many search models with endogenous search effort ([Christensen et al., 2005](#); [Faberman et al., 2017](#); [Wright et al., 2019](#)). We do not impose any other restrictions on mothers' abilities, preferences or require any structure on the underlying selection mechanism to obtain our bounds.

Our estimates reveal strong heterogeneous effects of mother's successful job search on re-employment earnings along the earnings distribution. We do not find evidence that mothers at the lower and middle part of the earnings distribution gain from search. Our bounds are wide and cover mostly zero for these groups. In contrast, successful job search substantially increases earnings for mothers at the upper quintile of the earnings distribution. Using our lower bound estimates, we calculate that moving to a new employer after childbirth increases mother's daily earnings by between 4 to 14 percent.

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 successful job search increases long-term earnings by at least 10 percent. These results show that job search during maternity leave can be an important tool for climbing the career ladder, at least for some mothers.

To obtain further insights into what can explain the heterogeneous returns to search, we also explore what types of mothers gain and why. We find that earnings gains from successful search are mainly concentrated among highly educated mothers and those mothers who have likely completed their desired fertility. These types of mothers have likely higher aspirations and are therefore more concerned about the impact of childbirth on their labor market career. At the same time, their pre- and post-birth job search decisions are likely influenced by strategic considerations and sorting into employment opportunities (see also [Adda et al., 2017](#)).

We also find that mothers with larger gains from successful job search are geographically more mobile and substantially increase their commuting time. This implies that these mothers tend to value an increase in earnings relatively more than a reduction in commuting time and therefore exhibit preferences similar to men, as in [Le Barbanchon](#)



et al. (2021). In addition, mothers with larger gains also move to faster growing firms and firms offering better opportunities to new female employees, as measured by the gender wage gap. Exploring the role of husbands, we do not find evidence that these adjust their own labor market outcomes to support mothers in their search. Overall, our results indicate that mothers at the upper earnings distribution search during maternity leave for better matches, also outside their local labor market.

Our work makes several contributions. First and foremost, it contributes to the literature on the (unintended) consequences of maternity leave policies on mothers' post-birth labor market outcomes (Lalive et al., 2014; To, 2018; Thomas, 2019).<sup>5</sup> 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.<sup>6</sup> In our paper, we consider explicitly the impact of successful job search during maternity leave as an important channel which can affect mothers' short- and long-term earnings using a bounding approach under arguably weak assumptions. Our results highlight that there is substantial heterogeneity in the returns to successful job search along the income distribution, but that for some mothers job search is an important channel to improve their labor market outcomes. On the one side, job search can therefore increase inequality among female workers. On the other side, our findings also imply that job search can help to decrease the motherhood penalty and the persistent gender gaps at the upper part of the earnings distribution (see, for example, Blau and Kahn, 2017; Maasoumi and Wang, 2019). To the best of our knowledge this is the first work looking investigating explicitly the importance of mothers' job search for earnings growth.

Our work also contributes to the literature on mothers' sorting into jobs and firms, and the consequences for earnings (e.g. Felfe, 2012; Adda et al., 2017; Hotz et al., 2018).<sup>7</sup> Our findings imply that there is substantial heterogeneity in mothers' preferences for certain jobs and therefore search effort and success after childbirth. Both career aspirations and strategic considerations are not only drivers for sorting into firms and jobs prior to childbirth but also important determinants for the search for higher paying employment after childbirth. We provide evidence that mothers who gain from successful search are geographically more mobile, trade lower commuting time for higher earnings, and seem to exhibit similar preferences for certain work characteristics as men.

---

<sup>5</sup>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. None of these paper studies the impact of possible job search during maternity leave, however.

<sup>6</sup>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. Unlike our work, they do not explicitly evaluate the impact of job search on mothers' earnings and long-term earnings growth further, however.

<sup>7</sup>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).

We also contribute to the recent literature on the causes of rising inequality in the labor market caused by firms, mobility, and matching in the marriage market (e.g. [Abowd et al., 2018](#); [Song et al., 2019](#); [Calvo et al., 2021](#)). We show that job search during maternity leave has the potential to increase inequality, as some type of mothers prefer lower paying but likely more family friendly firms in near proximity while others use maternity leave to search for higher paying employment, also outside their local labor market. In contrast, our results point toward a limited role for husbands in explaining mothers' success. Overall, we find that the initial benefits from search are very persistent. Therefore successful search during maternity leave has the potential to acerbate existing inequalities further. At the same time, search during maternity leave can help to narrow the sizable motherhood penalty at the upper part of the wage distribution.

Our paper proceeds by first describing the institutional setting and the data. In Section 3, we describe our bounding approach. We present the returns to successful job search on both short- and long-term earnings in Section 4. In Section 5, we discuss what types of mothers benefits from job search and why. Section 6 concludes.

## 2 Institutional Setting and Data

### 2.1 Institutional Setting

Here, 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, however, 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, however, 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 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.<sup>8</sup>

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.<sup>9</sup> 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. Thus, if a mother is switching employers after childbirth she has most likely engaged in successful job search.

**Benefit Payments:** During the time period between July 1990 and the end of 1995 we consider in our analysis, mothers also received government transfers during the entire maternity leave.<sup>10</sup> 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. The duration of job protected leave and the time over which government transfers are paid are therefore the same in our setting.

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 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.<sup>11</sup>

It should be emphasized that job protected maternity leave is not unique to Austria and 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. In some states, the job protected leave is even extended if certain requirements are fulfilled.<sup>12</sup> In Germany mothers are eligible

---

<sup>8</sup>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.

<sup>9</sup>The exact period for notifying the employer is often set by collective bargaining and is normally one month.

<sup>10</sup>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.

<sup>11</sup>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).

<sup>12</sup>For example, in Connecticut mothers are eligible for up to 16 weeks of job protected leave within 24 months if they work in a firm with at least 75 employees and have accrued at least 1,000 working hours over a 12 months period. The District of Columbia offers 16 workweeks of medical leave and 16 weeks of family leave during a 24 months period to mothers if they work in an establishment with at least 24 employees and accrued 1,000 working hours over a 12 months period (Gault et al., 2014).

for up to 3 years of job protected leave after the birth of the child. 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.

## 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.

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 benefits of successful job search.

Around 65 percent of all mothers who take up re-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 also perceive the extended leave taking as a signal of lower attachment to work ([To, 2018](#)). These mothers arguably do not engage in job search but their return decision and job selectivity is likely driven by the age of the child. 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 maternity leave

period.<sup>13</sup> In Appendix B, we provide further support and discussion 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.<sup>14</sup> 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 their pre-birth firm.

[ Table 1 ]

We also provide summary statistics separately for mothers who successfully searched for a new job and left 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 gender pay gaps 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). In the next section, we describe how we estimate the returns to job search if this unobserved heterogeneity affects mothers' decision to search for a job during maternity leave.

### 3 Bounding the Returns to Successful Search

There are many difficulties in estimating the returns to successful job search during maternity leave. Some mothers may try to move to more productivity and higher paying jobs after childbirth. Other mothers may look for jobs which make it easier to combine

---

<sup>13</sup>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; Kunze, 2002). On the other side, women returning faster to the labor market after childbirth might be negatively (Ejrnaes and Kunze, 2013) or positively selected (To, 2018). In the appendix, we present results when allowing for a longer return period. The estimates are qualitatively similar to those presented here.

<sup>14</sup>Expressed in current terms, these mean daily earnings correspond to 45 euro and 65 euro per day respectively.

work and family responsibilities, but also offer lower pay.<sup>15</sup> Which type of jobs a mother prefers and searches for may also depend on her position in the earnings distribution. In general, important factors such as motivation, taste for workplaces, and search intensity are all endogenously determined and unobserved in our data. To overcome these difficulties, we estimate the effect of successful job search on the distribution of earnings by using a bounding approach based on two intuitive and relatively weak monotonicity assumptions.

Denote by  $L$  the indicator if a mother successfully searched for a new job, 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 search on mothers' earnings can be defined as

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

The effect in Equation (1) captures potentially different search success depending on a mother's position in the earnings distribution. For a given  $y$ , the estimate  $\Delta^D(y)$  gives the effect of leaving the pre-birth employer on the probability of obtaining post-birth earnings of greater than  $y$  for mothers who decided to leave their employer. Therefore, it can be interpreted as how successful job search affects mother's earnings potential.

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 job search effort and success to two weak and intuitive monotonicity assumptions, similar as in [d'Haultfoeuille \(2010\)](#). Specifically, we assume that mother's search effort and therefore the likelihood of leaving the pre-birth employer is decreasing in both her pre-birth earnings and her *potential* re-employment earnings after childbirth offered by the pre-birth employer. Other than these two assumptions, no other restrictions are imposed on mothers' preferences, productivity, and the selection mechanism. In the following, we describe each of our monotonicity assumptions in more detail. Empirical support for the assumptions is provided in Section 4.

Denote by  $Z$  mother's earnings prior to entering maternity protection and by  $X$  a vector of the mother's background characteristics which may affect her job search 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.

---

<sup>15</sup>As shown, for example, in [Adda et al. \(2017\)](#), there is substantial sorting into employment and career opportunities depending on future planned fertility.

We assume that mother’s search effort, and therefore the likelihood of leaving her pre-birth employer, is decreasing in  $Z$ , for given potential earnings  $Y(0)$  and covariates  $X$ . More formally, this first monotonicity assumption can be stated as

**Assumption M1.**

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

In our setting, mothers always can choose to return to their pre-birth employers and receive earnings  $Z$ ; see the discussion in Section 2. As searching for a new job requires effort and is costly, the expected gain from moving to a new employer is therefore smaller for higher values of  $Z$  (see also, for example, the model of [Christensen et al., 2005](#)). Facing smaller marginal benefits from search, mothers’ with higher values of  $Z$  are therefore more likely to return to their pre-birth employer. In line with our Assumption M1, [Faberman et al. \(2017\)](#) find that search effort is indeed decreasing in individuals’ own earnings.

Assumption M1 would be violated if, for example, mothers with higher pre-birth earnings value family friendly but lower paying careers more after childbirth than those with lower values of  $Z$ , and therefore exert more search effort. One would expect, however, that sorting into such different careers happens before childbirth and not afterwards, as shown in [Adda et al. \(2017\)](#). In addition, for mothers with higher pre-birth earnings it may be a better and 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.<sup>16</sup> 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. Notice that Assumption M1 is perfectly in line with this type of renegotiation.

Besides decreasing search effort in  $Z$ , we also assume that mother’s search effort, and therefore the likelihood of leaving the pre-birth employer, is decreasing in *potential* earnings offered by the pre-birth employer  $Y(0)$ , for given pre-birth earnings  $Z$  and background characteristics  $X$ . Our second monotonicity assumption can therefore be expressed as

**Assumption M2.**

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

Mothers with higher  $Y(0)$  at their pre-birth employer will gain less from searching more intensively compared to mothers with lower  $Y(0)$  and possible more productive

---

<sup>16</sup>For example, [Ginja et al. \(2020\)](#) show that the costs family leave programs impose on firms can depend on the availability of substitutes.

matches elsewhere. Facing smaller earnings gains and costly search, mothers further up the earnings distribution will therefore likely exert less effort to find a new job; see also the discussion in [Wright et al. \(2019\)](#).<sup>17</sup> Notice, that Assumption M2 does not rule out that we observe mothers with higher  $Y(0)$  to move to higher paying jobs somewhere else.

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 and thus also searched more intensely for a new job. 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 Vejlín \(2016\)](#) 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 monotone 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 how leaving the pre-birth employer is affecting the selection bias ([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 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.

Besides our two monotonicity 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.<sup>18</sup>

<sup>17</sup>In the model considered in [Wright et al. \(2019\)](#) 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.

<sup>18</sup>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):

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

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

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

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

and can be thought of as the probability of returning to the pre-birth employer.<sup>19</sup>

Using these expressions, we can bound the conditional returns to successful job search  $\Delta_x^D(y)$

$$\begin{aligned} LB_x(y) &\equiv E[h_y(Y)|L = 1, X = x] - E[E[h_y(Y)|L = 0, Z, X = x] | L = 1, X = x] \\ &\leq \Delta_x^D(y) \leq \end{aligned} \quad (3)$$

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

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

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

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  $\Delta^D(y)$  from Equation (1). We discuss how we estimate these bounds from the data in Appendix A.

It should be emphasized 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

<sup>19</sup>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).

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 [To \(2018\)](#). In all these cases, we still are able to bound the returns to job search under the assumptions that mothers' search effort is decreasing in pre-birth earnings  $Z$  and potential future earnings  $Y(0)$ .

## 4 Returns to Successful Search

### 4.1 Support for Identification Assumptions

The three assumptions discussed in the previous section are key for identification of the bounds on  $\Delta^D(y)$ . First, 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 a 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  $Y$ .

Second, 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,  $\hat{P}(L = 0|Z)$ , are shown in [Panel b of Figure 1](#). As one can see, there is a strong relation between  $Z$  and the return probability, supporting our first monotonicity assumption.

Third, [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  $P(Y)$  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.

### 4.2 Initial Returns to Successful Search

[Panel a in Figure 2](#) shows the estimated bounds on the returns to successful job search  $\Delta^D(y)$  using mothers' earnings at the time of the return-to-work decision as outcome.

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, returns to leaving the pre-birth employer and successfully searching for better jobs during maternity leave 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 search increases mothers' re-employment earnings. Our bounds are very wide and cover zero. The relatively wide bounds imply that there is substantial heterogeneity in which type of jobs are chosen after the end of maternity leave. On the one side, the large negative bounds imply that some mothers possibly trade earnings for other, non-monetary amenities. 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 large upper bounds implies that some mothers may look for better earnings possibilities. Under our identification 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 searching for new employment. Mothers at the upper part of the distribution are also those who are in general more successful in the labor market. They are likely more concerned about their future career and also are more sensitive to earnings growth. Our results imply that these higher aspirations lead to search for more productive and higher paying jobs after childbirth.

Second, the earnings gains from successful search can be considerable. For example, leaving the pre-birth employer 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.<sup>20</sup> For those mothers who earn at least 80 euros, successful job search 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

---

<sup>20</sup>The calculations for the expected earnings increase are based on a truncated mean  $E[Y|Y > \bar{y}] = \frac{\sum_{Y>\bar{y}} YP(Y=y)}{P(Y>\bar{y})}$ , where the probabilities  $P(\cdot)$  are based on the estimated bounds of the cdfs.

at their new employer. These increases are sizable when compared to mothers' average re-employment earnings of 32 euros per day.<sup>21</sup>

One explanation for our findings may be that mothers at the upper part of the distribution are more sensitive to better earnings opportunities rather than other non-monetary amenities and therefore also geographically more mobile. In contrast, mothers with lower earnings potential are more inclined to move to family friendly firms in close proximity of their home. We will explore these possible determinants of search further in Section 5. Notice, however, that our estimates bound the true effects of successful job search on earnings, even if mothers differ in their unobserved preferences for workplace and job characteristics.

### 4.3 Long-Term Returns to Successful Search

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 for re-employment earnings would overstate the impact of successful job search. 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 successful job search during maternity leave on mothers' life-cycle earnings.

We show the estimated bounds on the long-term effects of successful job search in Panel b of Figure 2. The long-term earnings are calculated as mother's average earnings between 11 and 15 years after the return-to-work decisions.<sup>22</sup>

As one can see from the figure, successful job search increases earnings for mothers at the upper part of the distribution even up to 15 years after re-entering the labor market. Our estimated increase in long-term earnings is also sizable. For example, using the upper bound we estimate that job search can increase long-term earnings of at least 60 euro by up to 7 percentage points, of at least 70 euro by up to 6 percentage points, and of at least 80 euro by up to 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 maternity leave policies not only in explaining the persistent gender pay gap between men and women, but also in explaining earnings gaps among mothers and women more general. On the one side, job search during maternity leave can lead to divergence in mothers' labor market careers. Mothers

---

<sup>21</sup>Remember that all earnings are reported in 1990 levels.

<sup>22</sup>We take the averages to avoid that a single year affects our long-term estimates. The results are similar when taking averages over a shorter time horizon.

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 (Abowd et al., 2018), an implication we analyze in the next section. 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 other side, our results also imply that successful job search during maternity leave narrows gender pay gaps at the upper part of the earnings distribution. If mothers did not engage in job search the already sizable motherhood penalty would even be larger.

## 5 Who Gains from Successful Search and Why?

### 5.1 What Type of Mothers Gain from Search?

One possible explanation for our findings is that, at least for some mothers, taking up family friendly but lower paid employment may only be an intermediate step in order to have children, with the option to look for better matches during maternity leave. The desire to have children coupled with career concerns or strategic considerations may lead mothers to postpone the search for better employment until after childbirth. After the birth, mothers with higher aspirations may be more concerned about their future labor market career. Maternity leave may enable them to spend time with their child while also searching for more productive matches. If this explanation was true, then one would expect to see higher gains from leaving the pre-birth employer for mothers with higher career aspirations and those who have likely completed their desired fertility.

To explore this hypothesis further, we split our sample by educational attainment and first consider all mothers with a university degree. It is very likely that women with higher educational achievements have in general higher expectations about their labor market outcomes and therefore are more sensitive to potential career disruptions (e.g. Del Bono et al., 2012).<sup>23</sup>

We also split the sample by mothers’ number of children. Mothers with higher order births may have completed or being close to completing their desired fertility. They

---

<sup>23</sup>Our approximation of mothers’ career aspirations differs from the one used in Del Bono et al. (2012). Evaluating the impact of mass layoffs on future fertility, they approximate female career aspirations by pre-displacement earnings and earnings growth. As our bounding approach relies on pre-birth earnings for identification we cannot follow this definition here. We therefore use educational achievement as proxy which is also strongly related to earnings and earnings growth.

may therefore be more likely to leave their intermediate employment and move to more demanding and higher paying jobs, in the spirit of [Adda et al. \(2017\)](#).<sup>24</sup>

Figure 3 presents the estimated bounds for these two groups. Panels a and b depict the bounds on the initial and long-term effects of successful search for mothers with a university degree. Panels c and d do the same, but for mothers who have had at least two births.

[Figure 3]

From Panel a in the figure one can see that successful job search increases future earnings potential almost over the entire earnings distribution for highly educated mothers. The gains for this group are also substantial higher compared to our baseline results. For example, leaving the pre-birth employer increases the likelihood of earning at least 60 euro per day by between 6 to 12 percentage points, compared to 1 to 3 percentage points at baseline. As before, the positive effects of initial job search is very persistent and substantially increases mothers' average long-term earnings 11 to 15 years after the return to work decision, see Panel b.

We come to a similar conclusion when considering mothers who have had at least two births. Concentrating on this group yields a positive effect of successful job search on earnings over most part of the distribution; see Panel c. As one can see in Panel d, we also find that leaving the pre-birth employer increases long-term earnings almost over the entire distribution for these type of mothers. The estimates for this group are also larger in magnitude compared to our baseline results, but slightly smaller than what we estimate for highly educated mothers.

The results presented here shed more light on the question why some mothers wait until after childbirth to search for a better job. Mothers with higher career aspirations see their job around childbirth only as an intermediate career step. For this group, maternity leave is an option to search for better employment and to climb the career ladder. Our results also imply that there is a strategic component depending on the desired fertility which motivates mothers' job search during maternity leave. In that sense, our findings add and complement to those of [Adda et al. \(2017\)](#) and [Hotz et al. \(2018\)](#). They show that women substantially adjust their labor market career not only before having children, but also engage in strategic search after they completed their fertility resulting in long-term positive earnings effects.

---

<sup>24</sup>We provide results for mothers with lower education and first-time mothers in Appendix C. There, we also show that our results do not depend on the inclusion of covariates.

## 5.2 Why Do Some Mothers Gain from Search?

To better understand why some mothers gain from leaving the pre-birth employer, we also investigate possible underlying mechanisms. We first group our sample into five different sub-samples  $g$ , depending on the mother's position in the distribution of re-employment earnings. 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. As our results from Section 4 show, the further up a mother is in the earnings distribution, the more likely does she gain from successful job search. For each of these five groups we estimate a simple linear regression of the form

$$Y_i^g = x_i^g \beta^g + \delta^g L_i^g + \epsilon_i^g \quad (5)$$

where  $Y_i^g$  is the outcome of interest of mother  $i$  belonging to group  $g$  and  $x_i^g$  are the same set of covariates we used in Section 4.  $L_i^g$  is the leave-indicator as before, taking a value of one if the mother left her pre-birth employer and zero otherwise.

The coefficient of interest in Equation (5) is  $\delta^g$  which reflects the difference in the outcome in group  $g$  due to successful job search. These estimates therefore capture differences in the underlying mechanisms between stayers and leavers possibly explaining our results. It should be emphasized that we do not interpret the estimates of  $\delta^g$  as causal. We see them rather as suggestive but interesting evidence on the underlying channel and the search behavior of mothers.

We first look at differences in employer characteristics, such as firm growth rates and gender pay gaps among incumbent and newly hired workers. Faster growing firms may offer higher wages to fill open positions faster and moving to such firms can be an important source of earnings growth for mothers (Davis et al., 2013; Kaas and Kircher, 2015). Similarly, firms with smaller gender pay gaps may offer more equal opportunities to men and women, for example, in terms of promotions. Moving to such firms can therefore lead to higher earnings and future earnings growth.

Second, we investigate the role of geographic mobility and location. Mothers who are geographically more mobile may be better in adjusting to local economic conditions and have therefore higher chances of matching with more productive and better paying firms (Blanchard and Katz, 1992; Bound and Holzer, 2000). Commuting time is another factor and some mothers may value shorter commuting times more than higher wages, specifically after childbirth (Le Barbanchon et al., 2021). Related, local amenities, such as the availability of nurseries, may also play an important role not only for mother's decision to return to work but also for the type and quality of jobs taken when returning to the labor market.

Third, we explore the possible supporting role of husbands.<sup>25</sup> To support the job search and labor market re-entry of mothers, husbands may take on some part of the childcare burden and choose to move into more flexible and likely lower paying jobs, at least for some time. The size of husbands' labor market adjustment may depend on the degree of assortative matching between partners and the distribution of bargaining power within the household, that is mothers' position in the earnings distribution (e.g. [Calvo et al., 2021](#)).

Lastly, we also look at the role of co-worker networks in the group of leavers. In general, co-worker networks play an important role for labor market outcomes. Former co-workers may inform mothers about job opportunities and also provide prospective with information they otherwise would not have ([Dustmann et al., 2016](#)). These effects may not only depend on the network size but also on the strength and the quality of the network. Co-workers in the network with whom the mother worked together longer or who have higher earnings may provide move valuable information about job opportunities. Higher-earning workers may also be of higher productivity and therefore be able to provide better information to the employer about the job prospect.

***The Role of Employers:*** Our estimates for differences in employer characteristics are reported in Table 2. Column (1) and (2) show the difference in firm growth between firms of leavers and those of stayers, measured as the differences in the log number of the total number of employees and the number of female employees respectively between the return to work decision and the start of the maternity leave. Mothers who leave their pre-birth employer move in general to faster growing firms compared to stayers. They also move to firms with stronger hiring of female employees. These differences become more pronounced at the upper part of the wage distribution. At the top of the earnings distribution, leavers move to firms who increase total employment by almost 50% over the leave period and hire 35% more women compared to firms of stayers.

[Table 2]

Column (3) and (4) present results for the difference in the gender pay gap among incumbent and newly hired workers mothers face. 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. In contrast, leavers further up the earnings distribution are more likely to move to firms with smaller gender pay gaps compared to their pre-birth employer. This becomes particular pronounced when looking at the difference in the gender gap among newly hired workers. Mothers who leave their pre-birth employer

---

<sup>25</sup>In our data we actually 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.



move to a firm with a 20 percentage points lower pay gap among newly hired workers compared to stayers, although our estimates are somewhat noisy. Overall, these findings suggest an important role of sorting into firms in explaining returns to successful search for mothers, mirroring the general findings in the literature (e.g. [Card et al., 2016](#); [Song et al., 2019](#)). Mothers more successful in their search tend to move to faster growing firms. They also move to firms offering more equal wages to newly hired women, and therefore to firms which likely offer higher chances of future promotions and earnings growth for females.

***The Role of Mobility and Location:*** We report the estimates for differences in local mobility and amenities, such as nurseries, in [Table 3](#). Column (1) shows the results when we use a binary indicator if the mothers has moved postal codes between the birth of the child and returning to the labor market as an outcome.<sup>26</sup> Leavers in general and more specifically those further up the earnings distribution are geographically more mobile than stayers. At the top of the distribution, leavers have a 6 percentage points higher probability of moving postal codes than stayers.

[ [Table 3](#) ]

Mothers at the top of the earnings distribution are not only geographically more mobile, they also spend significantly more time commuting to work. Our estimates indicate that these mothers increase commuting time by around 25%, corresponding to an increase in the average time by roughly 5 minutes. These results imply that leavers 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](#)). Taken together, our results here show that mobility and therefore the likelihood of finding better firm-worker matches is another important driver of earning gains from successful job search. They also imply that successful mothers search for better jobs in geographically more distant locations.

One explanation for the lower mobility of mothers at the lower part of the earnings distribution may be local childcare availability. Little or no childcare available may constrain mothers in their decision to search for and move to higher paying and likely more demanding jobs.<sup>27</sup> We explore this explanation further and present estimates for the number of local nurseries available in [Column \(3\)](#) and the number of nursery places available

<sup>26</sup>Location information is only available on the postal code level. Thus, we cannot account for changes within the same postal code. This drawback likely leads to an underestimation of mobility and commuting time patterns.

<sup>27</sup>Another explanations might be that 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 solely due to monetary reasons and adjust employment accordingly is unlikely to explain our results.

per child in Column (4), measured as the approximated number of total nursery places divided by the number of children age 0-3 in the county. The estimates are small and mostly close to zero, specifically when using nursery places per child as outcome. They do not imply that local childcare availability is the main explanation for our findings.<sup>28</sup>

***The Role of Husbands:*** Our estimates on the impact of leaving the pre-birth employer on husbands' labor market outcomes are presented in Table 4. Columns (1) to (3) show the impact of mothers leaving the pre-birth employer on the changes in husbands' labor market outcomes between mother's time of the return-to-work decision and the year prior to maternity leave. From the results, one can see that husbands' outcomes mostly do not react to mothers' successful job search. Our results on labor market participation decisions and changes in earnings does not lead to the conclusion that husbands adjust their own labor market career to support mothers in their job search. We find, however, that husbands of leavers at the top of the earnings distribution tend to change employers more likely compared to husbands of stayers, mirroring the mobility behavior of mothers discussed above.

[Table 4]

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 the differences are now measured between age 5 of the child and the year prior to maternity leave. As it was the case with our short-term effects, we also do not find that husbands adjust their labor market outcome in the long-run. All of our labor force and earnings effects are small and not statistically significant. We do find, however, that there is a persistent difference in employer mobility between husbands of leavers and those of stayers. Overall, our results suggests that husbands play at most a limited role in explaining the successful job search of mothers at the upper part of the earnings distribution, at least when looking at labor market adjustments.

***The Role of Networks:*** Lastly, we also look on the possible impact of co-worker networks in explaining successful job search. For this exercise, we use the sample of movers only and define three different network measures: network size, network strength

---

<sup>28</sup>There might be other important factors, such as restricted opening hours of childcare facilities or the availability of grandparents which influences the job search decision (see, for example, the discussion in [Frimmel et al., 2020](#)). Optimally, one would use information on maternal time use to explore the role of childcare constraints further. Unfortunately, such time use data does not exist for our sample period.

measured by the number of days previously worked together, and network quality approximated by average past and current earnings. The results are presented in Table 5.

[Table 5]

From the results presented in Table 5 three strong patterns emerge. First, leavers at the upper part of the earnings distribution have a larger network 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 successful job search. 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 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. Taken together, our results point toward important network effects in explaining successful job search of mothers.

## 6 Conclusion

There has been an increasing interest in what determines labor market success of mothers and how to improve it. In this paper, we investigate the role of job search during maternity leave as one important tool. This channel has been largely neglected in the literature so far, despite its importance. Our empirical approach bounds the true earnings gains from leaving the pre-birth employer. To derive our bounds, we only assume that mother's search effort is decreasing in both her pre-birth earnings and the *potential* re-employment earnings offered by her pre-birth employer. These assumptions are similar to those imposed in the literature on job search with endogenous search effort. Besides these two monotonicity assumptions, we do not impose any other restrictions on mothers' preferences, search effort, productivity, and the underlying selection mechanism.

Our estimates show that job search during maternity leave can be an important way of increasing earnings, but only for mothers at the upper part of the earnings distribution.

For this group, we find that moving to a new employer after childbirth can increase re-employment earnings after childbirth by between 4 to 14 percent. We also show that initial successful job search after childbirth puts mothers on a higher earnings trajectory leading to very persist long-term gains.

Exploring further what types of mothers gain and why, we find that our results are mainly driven by mothers with higher career concerns and those who have likely finished their desired fertility. Mothers who gain from successful search also move to faster growing firms and firms which likely offer more equal chances of future promotions and earnings growth for females. They are also geographically more mobile and more likely trade commuting time for higher earnings growth, therefore exhibiting employment preferences similar to men.

Our results highlight two opposing effects of family leave policies. On the one side, we find that the introduction of family policies can lead to unintended consequences. In our case, job-protected maternity leave enables mothers further up the earnings distribution to search for higher paying employment. By moving employer after childbirth they climb the earnings ladder faster and enjoy strong long-term earnings growth. In contrast, we do not find evidence that mothers in the lower and middle part of the distribution gain from search. These developments lead to an increase in inequality, not only in current labor market outcomes but also likely in pension income at older age. In the extreme case, the resulting earnings differences from search may even affect the next generation. On the other side, our findings imply that job search can be an important tool in closing the motherhood penalty and, in general, the gender pay gap, at the upper part of the distribution. Further encouraging and supporting job search would be one way of improving mothers' labor market outcomes.

## References

- Abowd, J. M., McKinney, K. L. and Zhao, N. L. (2018), ‘Earnings Inequality and Mobility Trends in the United States: Nationally Representative Estimates from Longitudinally Linked Employer-Employee Data’, *Journal of Labor Economics* **36**(S1), 183–300.
- Adda, J., Dustmann, C. and Stevens, K. (2017), ‘The Career Costs of Children’, *Journal of Political Economy* **125**(2), 293–337.
- Albrecht, J. W., Edin, P.-A., Sundström, M. and Vroman, S. B. (1999), ‘Career Interruptions and Subsequent Earnings’, *Journal of Human Resources* **34**(2), 294–311.
- Angelov, N., Johansson, P. and Lindahl, E. (2016), ‘Parenthood and the Gender Pay Gap’, *Journal of Labor Economics* **34**(3), 545–579.
- Azmat, G., Cunat, V. and Henry, E. (2020), ‘Gender Promotion Gaps: Career Aspirations and Workplace Discrimination’, *mimeo* .
- Baker, M. and Milligan, K. (2008), ‘How Does Job Protected Maternity Leave Affect Mothers’ Employment’, *Journal of Labor Economics* **26**(4), 655–691.
- Barth, E., Pekkala Kerr, S. and Olivietti, C. (2017), ‘The Dynamics of Gender Earnings Differentials: Evidence from Establishment Data’, *NBER Working Paper No. 23381* .
- Berger, L. M. and Waldfogel, J. (2004), ‘Maternity leave and employment of new mothers in the United States’, *Journal of Population Economics* **17**(2), 331–349.
- Bertrand, M., Goldin, C. and Katz, L. F. (2010), ‘Dynamics of the Gender Gap for Young Professionals in the Financial and Corporate Sectors’, *American Economic Journal: Applied Economics* **2**(3), 228–255.
- Blanchard, O. J. and Katz, L. F. (1992), ‘Regional Evolutions’, *Brooking Papers on Economic Activity* **1**, 1–75.
- Blau, F. D. and Kahn, L. M. (2017), ‘The Gender Wage Gap: Extent, Trends, and Explanations’, *Journal of Economic Literature* **55**(3), 789–865.
- Bound, J. and Holzer, H. J. (2000), ‘Demand Shifts, Population Adjustments, and the Labor Market Outcome during the 1980s’, *Journal of Labor Economics* **18**(1), 20–54.
- Bureau of Labor Statistics (2019), ‘Highlights of women’s earnings in 2018’, *BLS Report 1083* .
- Bütikofer, A., Jensen, S. and Salvanes, K. G. (2018), ‘The Role of Parenthood on the Gender Gap among Top Earners’, *European Economic Review* **109**, 103–123.

- Cai, X., Lu, Y., Pan, J. and Zhong, S. (2019), ‘Gender Gap under Pressure: Evidence from China’s College Entrance Examination’, *Review of Economics and Statistics* **101**(2), 249–263.
- Calvo, P., Lindenlaub, I. and Reynoso, A. (2021), ‘Marriage Market and Labor Market Sorting’, *NBER Working Paper 28883* .
- Card, D., Rute Cardoso, A. and Kline, P. (2016), ‘Bargaining, Sorting, and the Gender Wage Gap: Quantifying the Impact of Firms on the Relative Pay of Women’, *Quarterly Journal of Economics* **131**(2), 633–686.
- Carneiro, P. and Ginja, R. (2016), ‘Partial Insurance and Investments in Children’, *The Economic Journal* **126**, F66–F95.
- Christensen, B. J., Lentz, R., Mortensen, D. T., Neumann, G. R. and Werwatz, A. (2005), ‘On-the-Job Search and the Wage Distribution’, *Journal of Labor Economics* **23**(1), 31–58.
- Cortes, M., Jaimovich, N. and Siu, H. E. (2020), ‘The “End of Men” and Rise of Women in the High-Skilled Labor Market’, *mimeo* .
- Cortes, P. and Pan, J. (2018), Occupation and Gender, *in* S. L. Avert, L. M. Argys and S. D. Hoffman, eds, ‘The Oxford Handbook of Women and the Economy’, Oxford University Press.
- Davis, S. J., Faberman, R. J. and Haltiwanger, J. C. (2013), ‘The Establishment-Level Behavior of Vacancies and Hiring’, *Quarterly Journal of Economics* **128**(2), 581–622.
- Del Bono, E. and Vuri, D. (2011), ‘Job mobility and the gender gap in Italy’, *Labour Economics* **18**(1), 130–142.
- Del Bono, E., Weber, A. and Winter-Ebmer, R. (2012), ‘Clash Of Career and Family: Fertility Decisions After Job Displacement’, *Journal of the European Economic Association* **10**(4), 659–683.
- d’Haultfoeuille, X. (2010), ‘A new instrumental method for dealing with endogenous selection’, *Journal of Econometrics* **154**(1), 1–15.
- Dustmann, C., Glitz, A., Schönberg, U. and Brücker, H. (2016), ‘Referral-based Job Search Networks’, *Review of Economic Studies* **83**(2), 514–546.
- Ejrnæs, M. and Kunze, A. (2013), ‘Work and Wage Dynamics around Childbirth’, *The Scandinavian Journal of Economics* **115**(3), 856–877.

- Eurostat (2020), ‘Gender pay gap statistics’, [https://ec.europa.eu/eurostat/statistics-explained/index.php/Gender\\_pay\\_gap\\_statistics#Gender\\_pay\\_gap\\_levels\\_vary\\_significantly\\_across\\_EU](https://ec.europa.eu/eurostat/statistics-explained/index.php/Gender_pay_gap_statistics#Gender_pay_gap_levels_vary_significantly_across_EU). (Online; accessed 24-August-2020).
- Faberman, R. J. and Kudlyak, M. (2019), ‘The Intensity of Job Search and Search Duration’, *American Economic Journal: Macroeconomics* **11**(3), 327–357.
- Faberman, R. J., Mueller, A. I., Sahin, A. and Topa, G. (2017), ‘Job Search Behavior among the Employed and Non-Employed’, *NBER Working Paper 23731*.
- Felfe, C. (2012), ‘The Motherhood Wage Gap: What about Job Amenities?’, *Labour Economics* **19**, 59–67.
- Flinn, C., Todd, P. and Zhang, W. (2020), ‘Personality Traits, Job Search and the Gender Wage Gap’, *HCEO Working Paper 2020-010*.
- Frimmel, W., Halla, M., Schmidpeter, B. and Winter-Ebmer, R. (2020), ‘Grandmothers’ Labor Supply’, *forthcoming Journal of Human Resources*.
- Gault, B., Hartmann, H., Hegewisch, A., Milli, J. and Reichlin, L. (2014), ‘Paid Parental Leave in the United States: What the Data Tell Us Paid Parental Leave in the United States: What the Data Tell Us about Access, Usage, and Economic and Health Benefits about Access, Usage, and Economic and Health Benefits’, *Report, Institute for Women’s Policy Research*.
- Ginja, R., Karimi, A. and Xiao, P. (2020), ‘Employer responses to family leave programs’, *mimeo*.
- Goldin, C. (2014), ‘A Grand Convergence: Its Last Chapter’, *American Economic Review* **104**(4), 1091–1119.
- Ho, K. and Rosen, A. (2017), Partial Identification in Applied Research: Benefits and Challenges, *in* B. Honore, A. Pakes, M. Piazzesi and L. Samuelson, eds, ‘Advances in Economics and Econometrics: Eleventh World Congress (Econometric Society Monographs)’, Vol. II, pp. 307–359.
- Hotz, V. J., Johansson, P. and Karimi, A. (2018), ‘Parenthood, Family Friendly Workplaces, and the Gender Gap in Early Work Careers’, *mimeo*.
- Imbens, G. and Wooldridge, J. M. (2009), ‘Recent Developments in the Econometrics of Program Evaluation’, *Journal of Economic Literature* **47**(1), 5–86.
- Jarosch, G. (2015), ‘Searching for Job Security and the Consequences of Job Loss’, *mimeo, December*.

- Kaas, L. and Kircher, P. (2015), ‘Efficient Firm Dynamics in a Frictional Labor Market’, *American Economic Review* **105**(10), 3030–3060.
- Kleven, H., Landais, C., Posch, J., Steinhauer, A. and Zweimüller, J. (2020), ‘Do Family Policies Reduce Gender Inequality? Evidence from 60 Years of Policy Experimentation’, *mimeo* .
- Kleven, H., Landais, C. and Sogaard, J. E. (2019), ‘Children and Gender Inequality: Evidence from Denmark’, *American Economic Journal: Applied Economics* **11**(4), 181–209.
- Kunze, A. (2002), ‘The Timing of Careers and Human Capital Depreciation’, *IZA Discussion Paper No. 509* .
- Kunze, A. and Troske, K. R. (2012), ‘Life-cycle patterns in male/female differences in job search’, *Labour Economics* **19**(2), 176–185.
- Kuziemko, I., Pan, J., Shen, J. and Washington, E. (2018), ‘The Mommy Effect: Do Women Anticipate the Employment Effects of Motherhood?’, *NBER Working Paper No. 24740* .
- Lalive, R., Schlosser, A., Steinhauer, A. and Zweimüller, J. (2014), ‘Parental leave and mothers’ careers: The relative importance of job protection and cash benefits’, *Review of Economic Studies* **81**(286), 219–265.
- Laughlin, L. (2011), ‘Maternity Leave and Employment Patterns for First-Time Mothers: 1961-2008’, *Current Population Reports* (October).
- Le Barbanchon, T., Rathelot, R. and Roulet, A. (2021), ‘Gender Differences in Job Search: Trading off Commute against Wage’, *Quarterly Journal of Economics* **136**(1), 381–426.
- Loprest, P. (1992), ‘Gender Differences in Wage Growth and Job Mobility’, *American Economic Review P&P* **82**(2), 526–532.
- Lundborg, P., Plug, E. and Würtz Rassmussen, A. (2017), ‘Can Women Have Children and a Career? IV Evidence from IVF Treatments’, *American Economic Review* **107**(6), 1611–1637.
- Maasoumi, E. and Wang, L. (2019), ‘The Gender Gap between Earnings Distribution’, *Journal of Political Economy* **127**(5), 2438–2504.
- Manski, C. (1997), ‘Monotone Treatment Response’, *Econometrica* **65**(6), 1311–1334.
- Manski, C. (2003), *Partial Identification of Probability Distributions*, Springer: New York.



- Manski, C. and Pepper, J. V. (2000), ‘Monotone Instrumental Variables: With an Application to Schooling’, *Econometrica* **68**(68), 997–1010.
- Rogerson, R., Shimer, R. and Wright, R. (2005), ‘Search-Theoretic Models of the Labor Market: A Survey’, *Journal of Economic Literature* **43**(4), 959–988.
- Rupp, M. (2013), ‘Die Berufsrückkehr von Müttern unter den Bedingungen des neuen Elterngeldes’, *ifb-Materialien 1-2013* .
- Schönberg, U. and Ludsteck, J. (2014), ‘Expansion in Maternity Leave Coverage and Mothers’ Labor Market Outcomes after Childbirth’, *Journal of Labor Economics* **32**(3), 469–505.
- Song, J., Price, D. J., Guvenen, F., Bloom, N. and von Wachter, T. (2019), ‘Firming Up Inequality’, *Quarterly Journal of Economics* **134**(1), 1–50.
- Sorkin, I. (2017), ‘The Role of Firms in Gender Earnings Inequality: Evidence from the United States’, *American Economic Review P&P* **107**(5), 384–387.
- Taber, C. and Vejlín, R. (2016), ‘Estimation of a Roy/Search/Compensating Differential Model of the Labor Market’, *IZA DP No. 9975* .
- Thomas, M. (2019), ‘The Impact of Mandated Maternity Benefits on the Gender Differential in Promotions: Examining the Role of Adverse Selection’, *mimeo* .
- To, L. T. (2018), ‘The Signaling Role of Parental Leave’, *mimeo* .
- Wright, R., Kircher, P., Julien, B. and Guerrieri, V. (2019), ‘Directed Search and Competitive Search Equilibrium: A Guided Tour’, *forthcoming Journal of Economic Literature* .
- Zweimüller, J., Winter-Ebmer, R., Lalive, R., Kuhn, A., Wuellrich, J.-P., Ruf, O. and Büchi, S. (2009), ‘Austrian Social Security Database’, *NRN Working Paper No. 0903 April* .

# Tables

Table 1: Sample Overview

	Overall Sample	Leavers $L = 1$	Stayers $L = 0$	Raw Difference
<i>Personal Characteristics</i>				
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†
<i>Pre-Birth Labor Market Outcomes</i>				
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†
<i>Pre-Birth Employer</i>				
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	

† indicates a significance difference between leavers and stayers at least at 5%. 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 their pre-birth firm. Leavers (Stayers) are all mothers who leave (return to) their pre-birth employer after returning to work.

Table 2: Determinants of Successful Job Search - The Role of Employers

	(1)	(2)	(3)	(4)
	$\Delta \text{ Log Employees}$		$\Delta \text{ Log Pay Gap}$ among Employees	
	Overall x 100	Females x 100	Incumbent x 100	New Hires x 100
$Y < 20$	22.62 (10.37)	19.13 (8.14)	-8.37 (4.96)	-13.94 (12.32)
$20 \leq Y < 40$	34.42 (11.26)	29.22 (8.55)	-1.18 (4.59)	-2.53 (12.33)
$40 \leq Y < 60$	39.45 (10.57)	32.69 (8.85)	0.53 (4.65)	-2.37 (13.15)
$60 \leq Y < 80$	22.98 (10.79)	18.97 (8.34)	0.33 (4.77)	7.06 (12.79)
$80 \leq Y$	45.29 (10.75)	34.54 (8.54)	-1.98 (4.60)	20.51 (12.64)

This table provides summary of the estimates of leaving the pre-birth employer on differences in employer characteristics. The 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. All outcomes are in first difference and are measured between the start of maternity leave and the return to the labor market.  $\Delta \text{ Log Employees}$  measures the change in the log number of employees in the firm.  $\Delta \text{ Log Pay Gap}$  measures the change in the log pay gap within the firm between women and men. Therefore, a positive coefficient indicates a narrowing of the gender pay gap. *Changing Industry* measures if the new employer operates within the same industry as the pre-birth firm. For each maternal earnings group  $g$  after return to work, the estimates are obtained from linear regressions; see also Section 5. Bootstrapped standard errors using 999 replications are reported in parentheses.

Table 3: Determinants of Successful Job Search - The Role of Mobility and Location

	(1)	(2)	(3)	(4)
	Mobility		Childcare	
	Moved	$\Delta$ Log Commuting Time	No. Nurseries Available	Places Available per Child 0-3
	x 100			
$Y < 20$	3.78 (2.98)	-6.37 (14.82)	-4.00 (2.89)	-0.04 (0.03)
$20 \leq Y < 40$	3.29 (2.98)	-5.94 (13.99)	-1.74 (2.87)	-0.02 (0.03)
$40 \leq Y < 60$	6.03 (2.85)	-2.58 (15.06)	-0.23 (2.88)	-0.00 (0.03)
$60 \leq Y < 80$	4.72 (2.89)	-3.51 (14.96)	3.46 (2.84)	0.02 (0.03)
$80 \leq Y$	5.60 (2.81)	25.34 (14.23)	1.44 (2.85)	0.03 (0.03)

This table provides summary of the estimates of leaving the pre-birth employer on regional mobility, commuting time, and the availability of nurseries. 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 with valid residence information at childbirth and when returning to the labor market; 27,916 observations in total. *Moved* is an indicator if the mother has moved ZIP codes.  *$\Delta$  Log Commuting Time* measures the change 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. *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. For each maternal earnings group  $g$ , the estimates are obtained from a linear regression; see also Section 5. Bootstrapped standard errors using 999 replications are reported in parentheses.

Table 4: Determinants of Successful Job Search - The Role of Husbands

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

This table summarizes estimates of the effect of leaving the pre-birth employer on husbands' labor market outcomes. 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. Leavers (Stayers) are all mothers who leave (return to) their pre-birth firm. 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.  $\Delta$  *LF Participation* refers to changes in the labor force participation status of the husband.  $\Delta$  *Earnings* is the change in log daily earnings.  $\Delta$  *Employer* measures if the husband moved to a new employer. For each maternal earnings group  $g$  after return to work, the estimates are obtained from a linear regressions; see also Section 5. Bootstrapped standard errors using 999 replications are reported in parentheses.

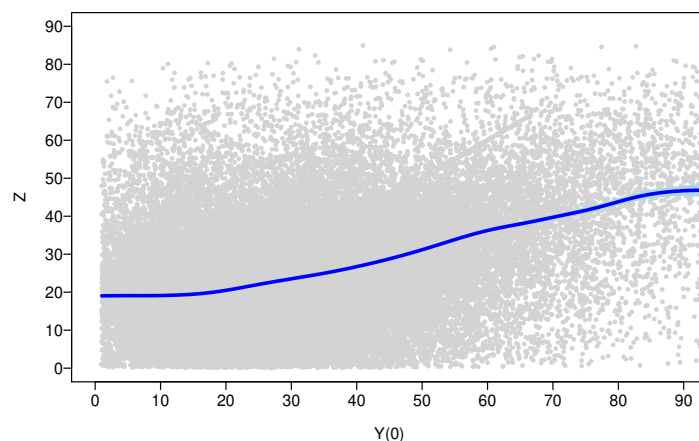
Table 5: Determinants of Successful Job Search - The Role of Networks

	(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 (6.34)	5.03 (1.69)	576.56 (152.13)	582.43 (113.08)	34.19 (9.37)	30.27 (7.83)	45.00 (3.14)	39.27 (3.10)
$20 \leq Y < 40$	14.61 (6.35)	6.81 (1.70)	666.90 (155.65)	669.48 (113.49)	39.91 (9.31)	35.11 (7.82)	50.73 (3.06)	44.97 (3.05)
$40 \leq Y < 60$	21.93 (6.34)	9.32 (1.72)	772.23 (153.67)	757.08 (116.72)	47.67 (9.27)	42.36 (7.87)	62.37 (3.19)	56.20 (2.99)
$60 \leq Y < 80$	22.78 (6.39)	8.79 (1.73)	761.28 (149.42)	770.28 (114.51)	52.11 (9.33)	46.77 (7.84)	68.25 (3.22)	61.21 (3.08)
$80 \leq Y$	26.22 (6.39)	6.84 (1.70)	1005.91 (152.36)	887.02 (115.28)	60.63 (9.28)	52.57 (7.87)	75.36 (3.14)	66.43 (3.07)

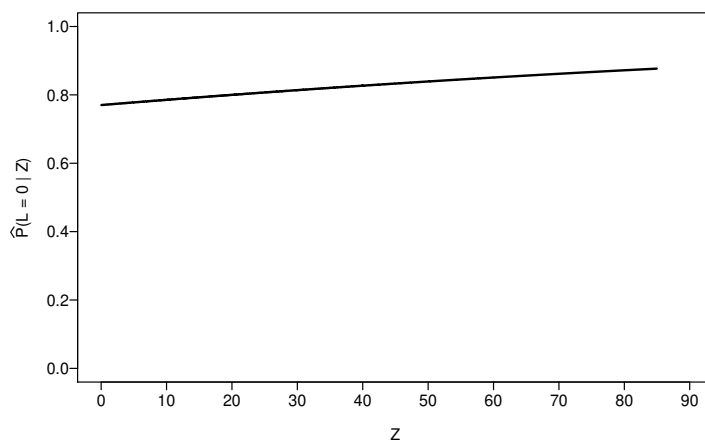
This table provides summary of the network of co-workers in the current firm for leavers. The sample consists of all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the parental leave period of 24 months after giving birth, and left the pre-birth 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; see also Section 5. Bootstrapped standard errors using 999 replications are reported in parentheses.

# Figures

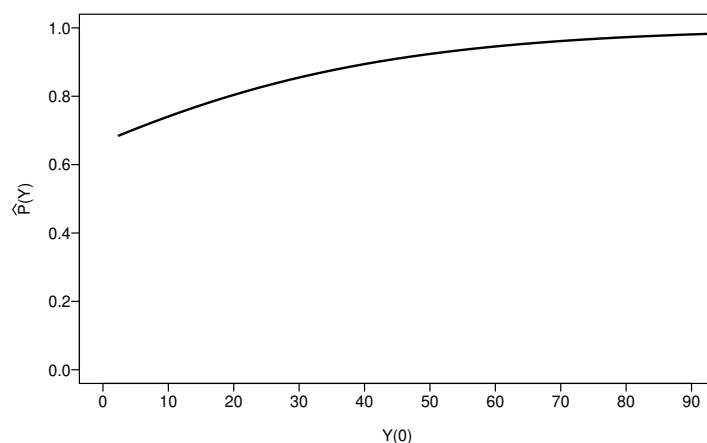
Figure 1: Support for Identification Assumptions



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



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

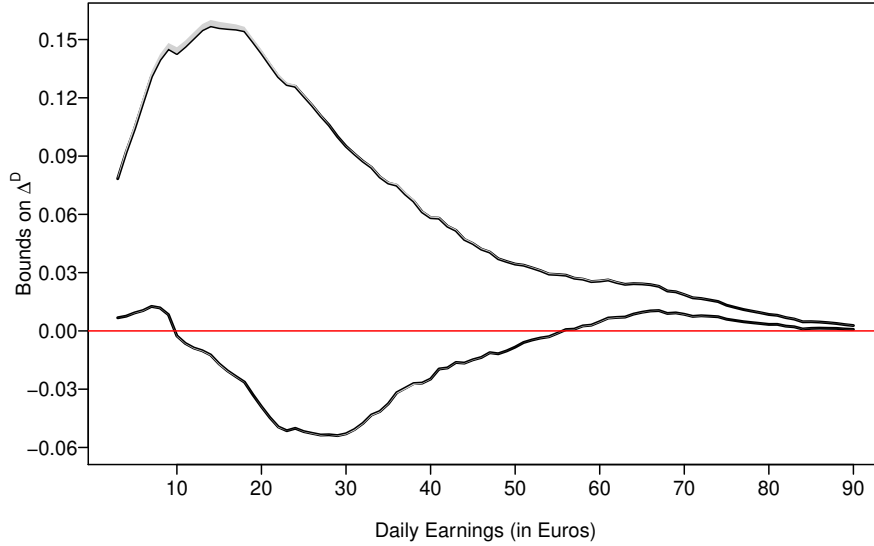


c. Predicted Return Probability  $\hat{P}(Y)$

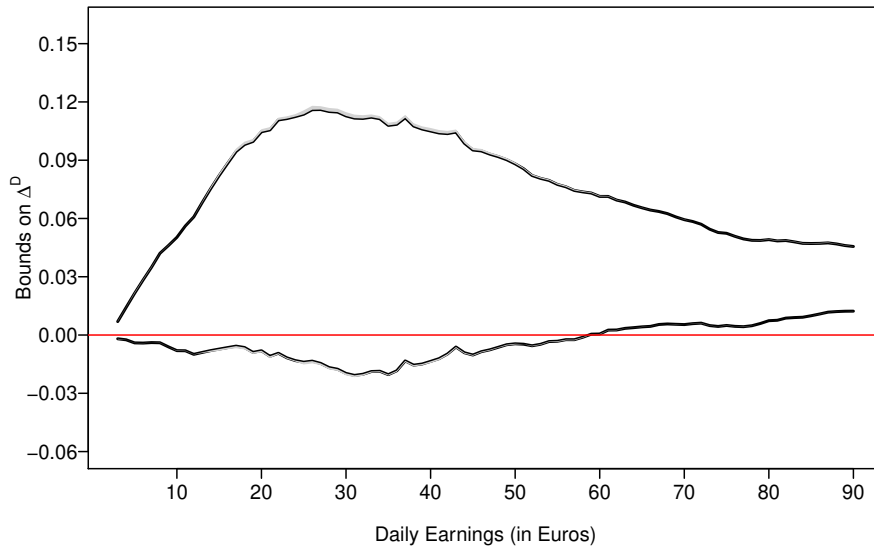
Panel a shows estimates from a local linear regression of  $Z$  on  $Y(0)$  for the sub-population of stayers ( $L = 0$ ), trimming the bottom 1 percent and top 99 percent of the earnings distribution. A Gaussian kernel was used and the bandwidth was obtained via cross-validation. The shaded area corresponds to the 95 percent confidence intervals. Dots represents the actual observed data values. Panel b 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 c provides support for Assumption M2 and shows the predicted return probabilities  $\hat{P}(Y)$  for stayers. The probabilities were estimated using Equation (2) and the logistic function to parameterize the probabilities; see Section 3.



Figure 2: Distributional Effects of the Short- and Long-Term Returns to Job Search



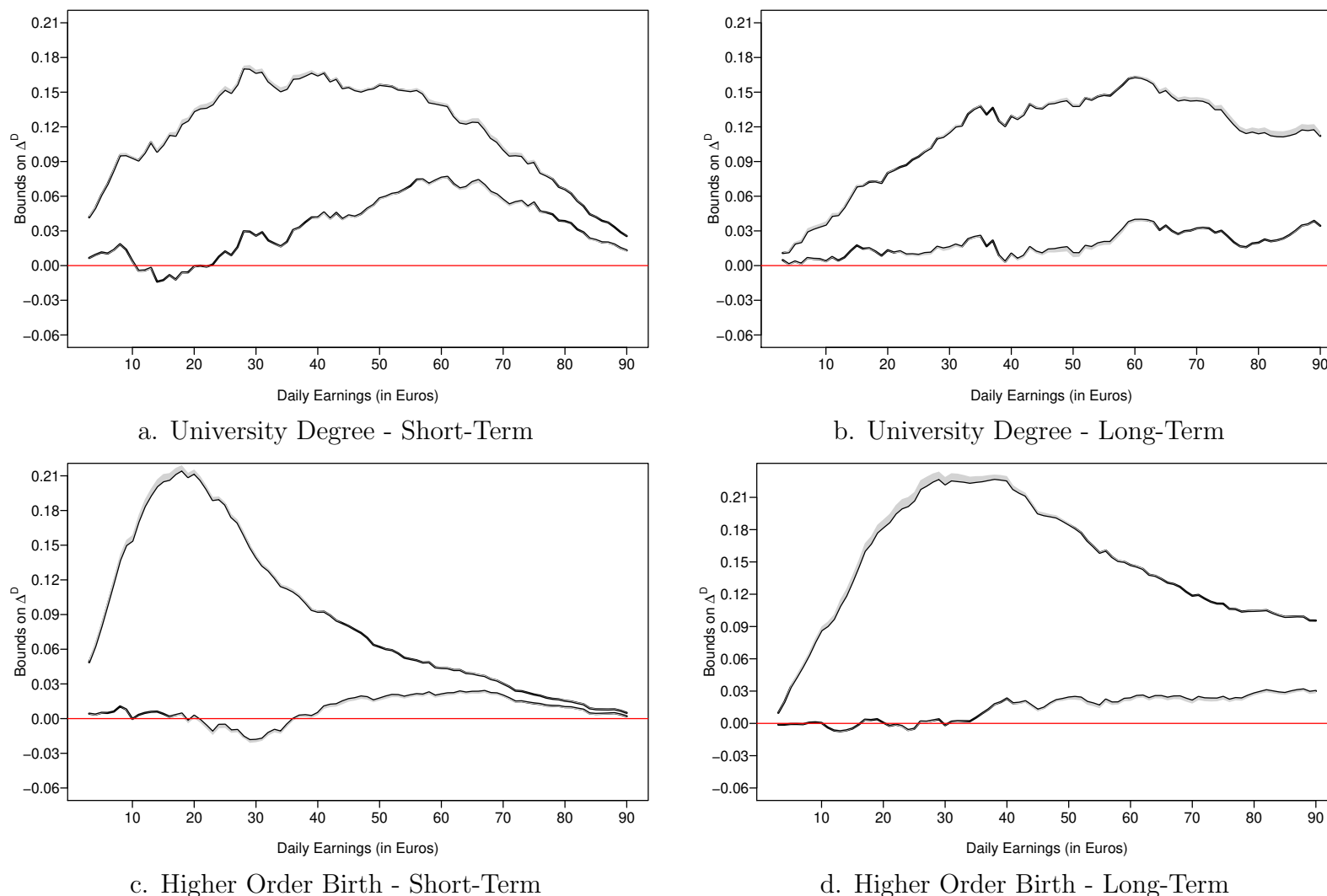
a. Short-Term Effects



b. Long-Term Effects

The figure shows the upper and lower bound on the returns to job search  $\Delta^D$ . 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 3. 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 maternal average employment earnings between 11 to 15 years after the return to the labor market. 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.

Figure 3: Distributional Effects of the Short- and Long-Term Returns to Job Search by Mother's Type



The figure shows the upper and lower bound on the returns to job search  $\Delta^D$ . 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 3. The *Short-Term University Sample* comprises all mothers who had at least one year of tenure in their pre-birth firm, have a university degree, and who returned to the labor market within the maternal leave period of 24 months; in total 5,710 observations. The *Short-Term Higher Order Birth Sample* comprises all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the maternal leave period of 24 months, and have at least two children; in total 14,887 observations. For the long-term estimates the same restrictions are applied, in addition to mothers having at least once positive earnings between 11 to 15 years after their return; in total 5,276 (University Sample) and 14,042 (Higher Order Birth Sample) observations respectively.

# Online Appendix for “Mothers’ Job Search After Childbirth”

LUKÁŠ LAFFÈRS AND BERNHARD SCHMIDPETER

June 30, 2021

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

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

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

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

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  $X$ .<sup>1</sup> The size of the pre-birth employer and share of female

---

<sup>1</sup>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 C, we show that our results and conclusions are robust to not incorporating any pre-birth characteristics into our estimation.

co-workers are also likely important factors considered by the mother when making her return decision. For example, larger firms may be able to offer better working conditions or other non-monetary benefits.<sup>2</sup> 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  $\widehat{F}_{1|X=x}^{LL}(y)$ .

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

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

where  $N_{1,x}$  is the number of mothers leaving their pre-birth employer with  $X = x$ . We parameterize  $F_{Y|Z, L=0, X=x}(y|Z_i) = \Lambda(\beta_0^x(y) + \beta_1^x(y)Z_i)$ , 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

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

In a first step, we estimate the selection probability via GMM using the moment condition defined in Equation (A.2) and parameterizing  $P_x(Y_i) = \Lambda(\Psi_0^x + \Psi_1^x Y_i)$ , where, as before,  $\Lambda(\cdot)$  is the logistic function.<sup>3</sup> In a second step, we use the predicted selection probabilities  $\widehat{P}_{x,i} \equiv \Lambda(\widehat{\Psi}_0^x + \widehat{\Psi}_1^x Y_i)$  and estimate a weighted empirical cdf  $\widehat{F}_{0|X=x}^{SS}(y)$ .

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

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

<sup>2</sup>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 and labor markets.

<sup>3</sup>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  $\Delta^D(y)$  :

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

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.<sup>4</sup>

## B Return-to-Work Patterns

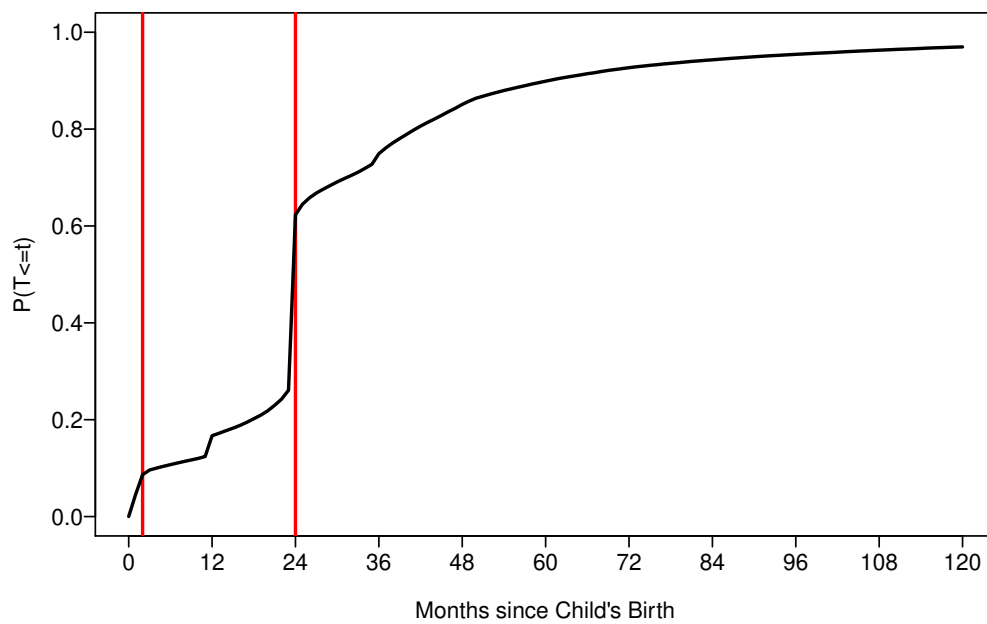
In this section, we provide details about the return-to-work patters of mothers after giving birth. Figure [B.1](#) presents estimates of the probability that a mother returns to work at or before time  $t$ ,  $P(T \leq t)$ . In the figure, the first vertical line at 2 months represents the end of the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

---

<sup>4</sup>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.

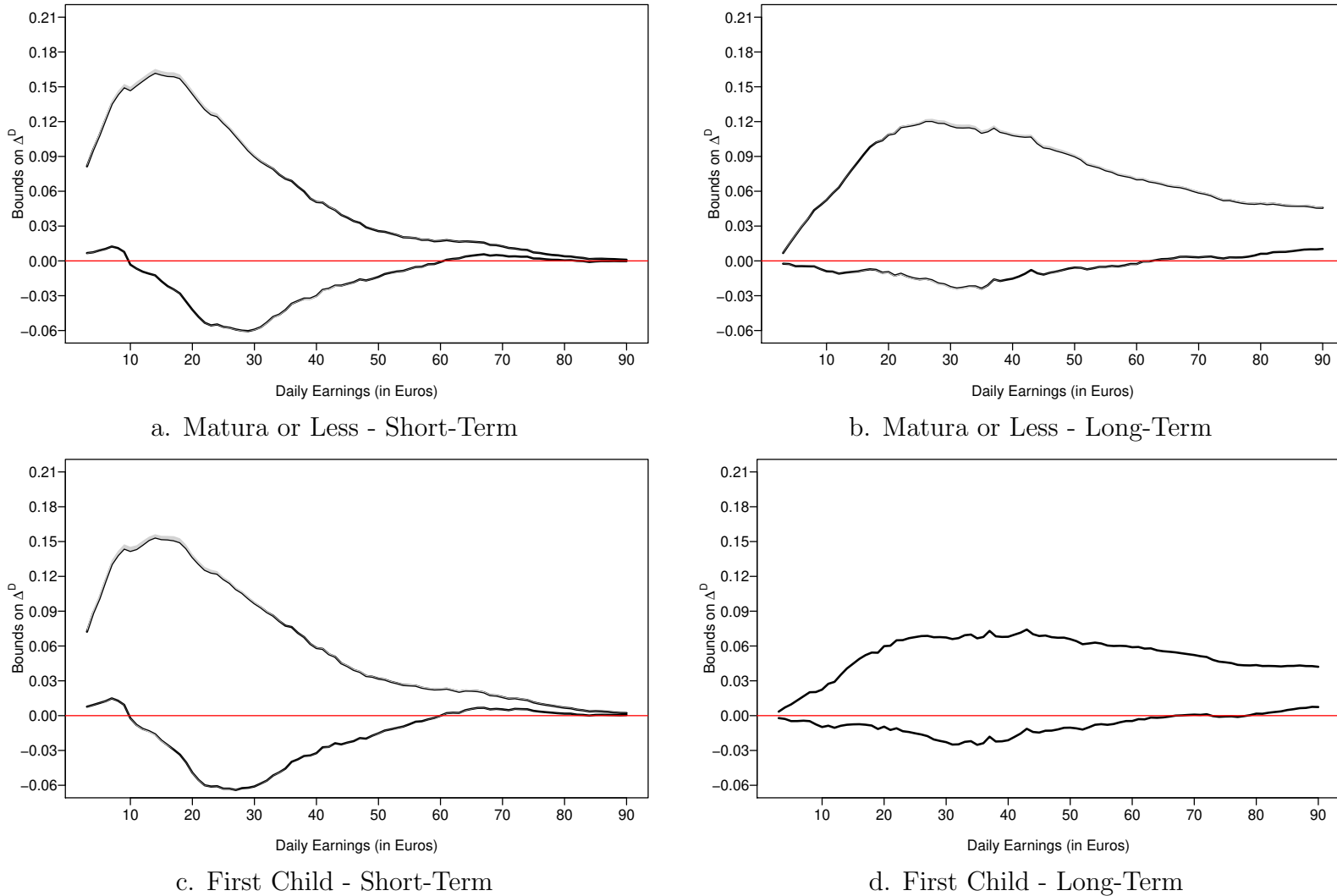
## C Additional Results

### C.1 Additional Results by Mothers' Types

In this section, we show the impact of leaving the pre-birth employer on short-term and long-term earnings for mothers with lower education and first-time mothers. As argued in the main part of the paper, these groups of mothers should have lower career concerns and should also be less likely to engage in strategic search. Consequently, we would expect these groups to benefit less from leaving the pre-birth employer. The results are shown in Figure C.2.

As it is clear from the figure, we do only find weak evidence that leaving the pre-birth employer leads to strong and persistent earnings increases for higher educated mothers and those who had a first birth. Over large parts of the earnings distribution our estimated bounds are wide and can cover zero. Only at the very top do we find some small increase in earnings as a result of leaving the pre-birth employer. Compare to the results for highly educated mothers and mothers who have likely completed their fertility, the estimated gains are small, however. Overall, the results support our hypothesis that mothers with higher aspirations and career concerns use the maternity leave period to search for better employment.

Figure C.2: Distributional Effects of the Short- and Long-Term Returns to Job Search by Mother's Type - Additional Results



9

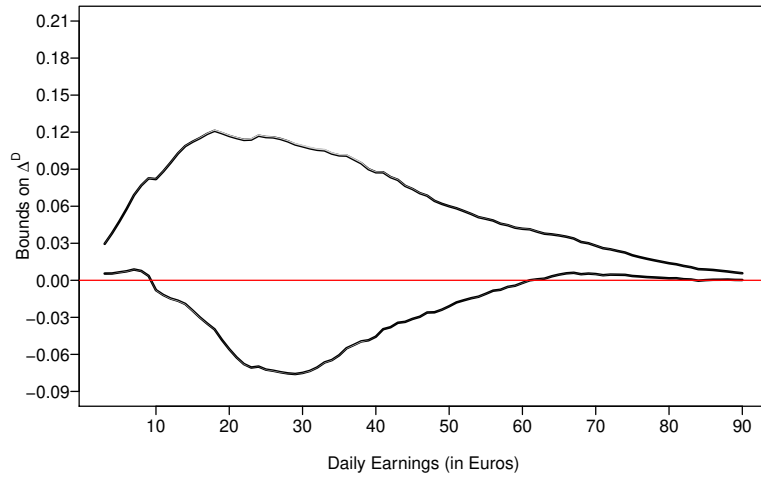
The figure shows the upper and lower bound on the returns to job search  $\Delta^D$ . The shaded area corresponds to the 95 percent confidence intervals. Notice that in some cases the confidence intervals are small and therefore hard to distinguish in the figure. Bounds and confidence intervals were obtained using the method outlined in Section 3. The *Short-Term Matura or Less Sample* comprises all mothers who had at least one year of tenure in their pre-birth firm, have at most Matura, and who returned to the labor market within the maternal leave period of 24 months; in total 53,519 observations. The *Short-Term First Child Sample* comprises all mothers who had at least one year of tenure in their pre-birth firm, who returned to the labor market within the maternal leave period of 24 months, and had their first birth; in total 44,342 observations. For the long-term estimates the same restrictions are applied, in addition to mothers having at least once positive earnings between 11 to 15 years after their return; in total 48,920 (Matura or Less Sample) and 40,154 (First Child Sample) observations respectively.



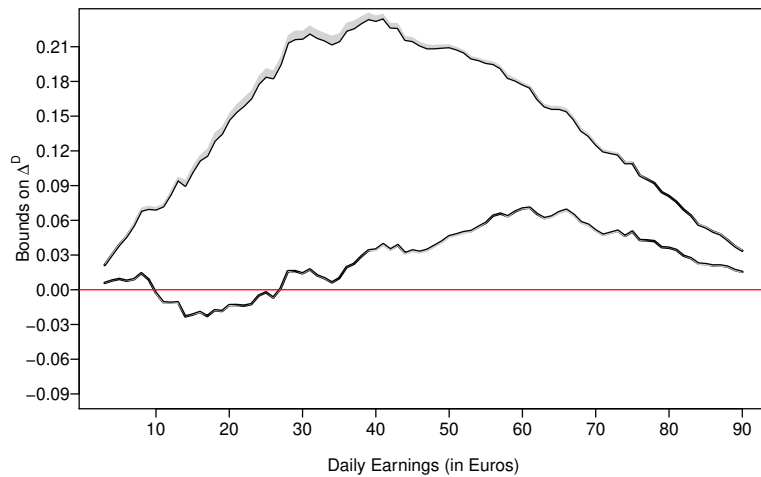
## C.2 Results not including Covariates

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, 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. For brevity’s sake we show the estimates for the overall sample and higher educated mothers as well as mothers with at least two children only. The results are summarized in [Figure C.3](#).

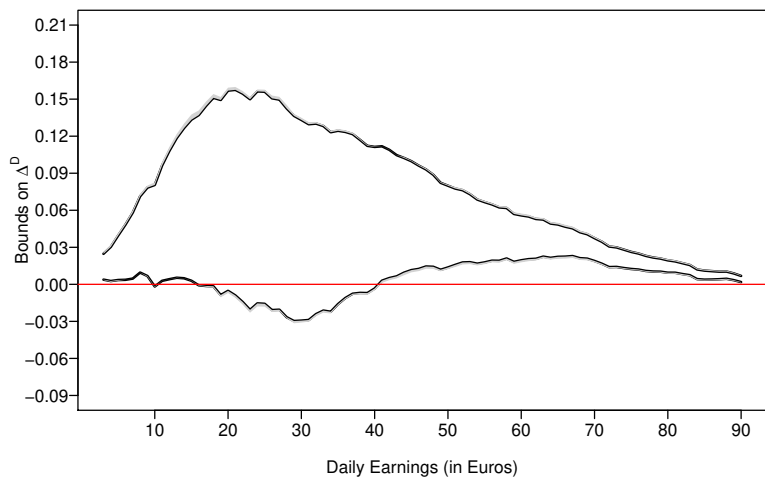
Figure C.3: Distributional Effects of the Returns to Job Search – No Covariates



a. Overall Sample



b. University Degree



c. Higher Order Birth

The figure shows the upper and lower bound on the returns to job search  $\Delta^D$ . 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 3 without controlling for pre-birth characteristics  $X$ . The *Overall 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. In the *University* and *Higher Order Birth* samples similar restrictions are applied with exception that only mothers having a university degree and with at least two children are considered respectively; in total 5,710 and 14,882 observations.

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. The bounds are now slightly wider, however. Nevertheless, one can see that job search is in general beneficial for mothers at the upper part of the distribution; see Panel a. We come to a similar conclusion as in the main part of the paper when looking at the bounds for highly educated mothers (Panel b) and those mothers with at least two children (Panel c). 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 search for these groups.

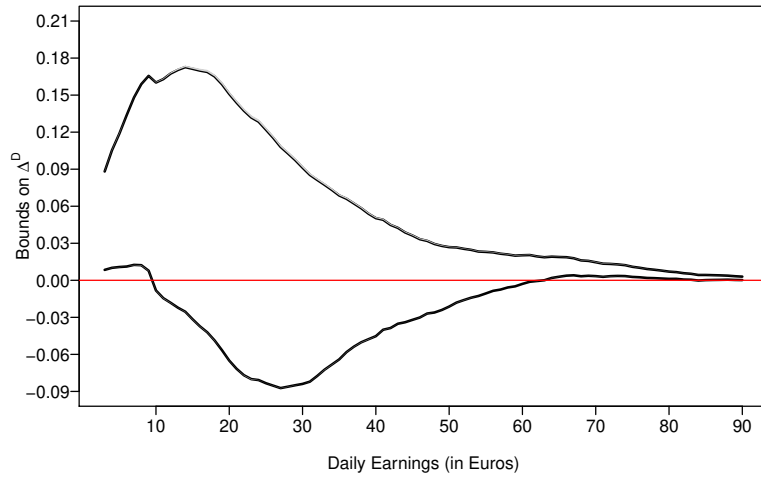
Overall, all our discussions and conclusions remain valid without including pre-birth characteristics in the estimation. Furthermore, the results presented here not only show that our estimates are robust to the exclusion of pre-birth characteristics but also imply that results do not depend on the choice of how we incorporate pre-birth characteristics into our model.

### **C.3 Results Extending Return-to-Work Period**

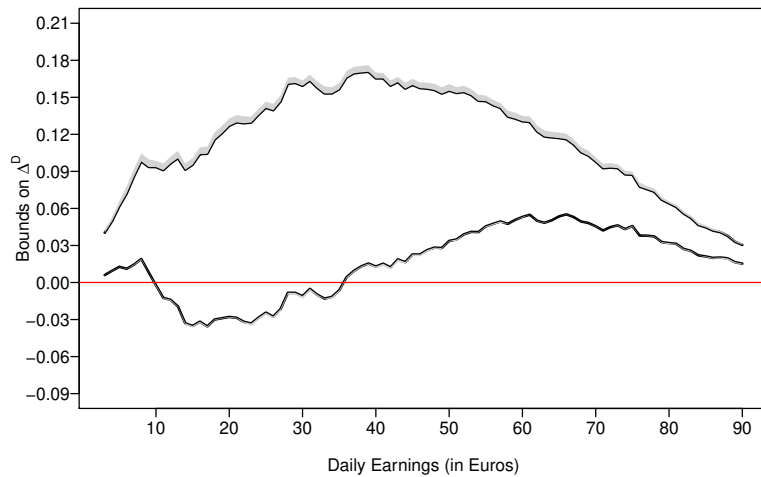
Mothers are only eligible to return to the same (or similar) position at their pre-birth employer within the maternity leave period of 24 months. In this section, we show that our results are robust to an extension of the return period. We now consider all mothers who returned to work within 30 months after childbirth, compared to the threshold of 24 months we use in the main part of our paper. Figure C.4 shows the results.

From Panel a in the figure, one can see that leaving the pre-birth employer increases the earnings potential for mothers at the upper part of the distribution. We find similar results when considering higher educated mothers (Panel b) and mothers who have at least two children (Panel c). Overall, the results presented in this section show that our results are robust to an extension of the considered return-to-work period. All our conclusions in the main part of the paper remain valid.

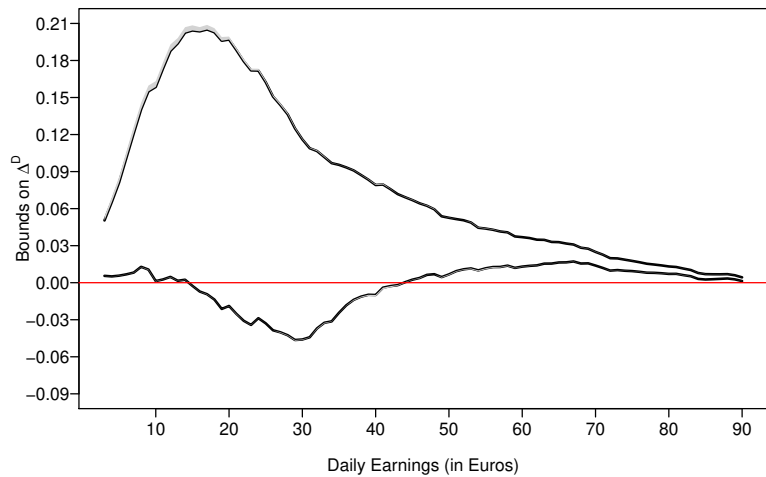
Figure C.4: Distributional Effects of the Returns to Job Search – Extended Return Period



a. Overall Sample



b. University Degree



c. Higher Order Birth

The figure shows the upper and lower bound on the returns to job search  $\Delta^D$ . 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 3. The *Overall 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; in total 65,678 observations. In the *University* and *Higher Order Birth* samples the same restriction on tenure are imposed but mothers have a university degree and with at least two children are considered respectively; in total 6,081 and 16,258 observations.

## References

- d'Haultfoeuille, X. (2010), 'A new instrumental method for dealing with endogenous selection', *Journal of Econometrics* **154**(1), 1–15.
- Foresi, S. and Peracchi, F. (1995), 'The Conditional Distribution of Excess Returns: An Empirical Analysis', *Journal of the American Statistical Association* **90**(430), 451–466.
- Hotz, V. J., Johansson, P. and Karimi, A. (2018), 'Parenthood, Family Friendly Workplaces, and the Gender Gap in Early Work Careers', *mimeo* .
- Imbens, G. W. and Manski, C. F. (2004), 'Confidence Intervals for Partially Identified Parameters', *Econometrica* **72**(6), 1845–1857.
- Laffers, L. and Schmidpeter, B. (2021), 'Early Child Development and Parents' Labor Supply', *Journal of Applied Econometrics* **36**(2), 190–208.
- Manning, A. (2020), 'Monopsony Power in Labor Markets: A Review', *forthcoming ILR Review* .