Job Search and Mobility Over the Life-Cycle: Implications for the Child Penalty*

PRELIMINARY - DO NOT CIRCULATE

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Abstract

We document using Dutch administrative and survey data that women's job mobility drops around childbirth. Women make fewer job-to-job transitions starting one year before birth until many years after. They are also less likely to engage in on-the-job search and work in jobs with low amenities related to irregular hours. We develop a life-cycle labor supply, job search and job switching model for women in which mothers and pregnant women face higher search costs. Jobs are characterized as bundles of wages and amenities, the latter decrease work disutility. We use the model to quantify a novel channel through which the child penalty operates: because (expecting) mothers perform less job search, they remain in jobs with low wages and amenities, therefore working and earning less. Search costs related to childbirth reduce lifetime earnings by 10.1%, accounting for 33.7% of the child penalty. We validate our model with a recent reform which eliminated tenure requirements for parental leave. Mothers increased job switching before birth but decreased employment in the year of birth.

JEL codes: J24, J31, J62

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1 Introduction

Women's careers are severely impacted by childbirth. Earnings and wage growth decrease dramatically, prominently known as the "child penalty." This is most commonly explained through mothers' drop in labor supply and human capital depreciation (Angelov et al., 2016; Kleven et al., 2019a,b). Other factors can play important roles, too and are less well-studied. Preferences for child-friendly job amenities can facilitate the labor supply of mothers but simultaneously come at a wage cost in line with compensating wage differentials. Moreover, searching for and switching to new jobs which offer more favorable conditions might be more difficult for pregnant women and mothers. The reason could be reduced time and mental capacity, monetary or non-monetary benefits for mothers tied to job tenure or discrimination from new employers. As a result, mothers may remain in low-amenity and low-wage jobs, which negatively affects their labor supply and wage growth. In this paper, we bring these factors together in a life-cycle framework and provide a comprehensive analysis of their contributions to the child penalty. For this, we examine how wages, amenities, job search, job switches and labor supply are jointly dynamically determined.

We first document a set of novel stylized facts on mothers' labor market activities around childbirth. Using Dutch administrative data and large, representative labor force survey data, we find lower on-the-job search and switching rates for women around the timing of the first child. Rates start declining up to one year before birth and remain low until up to eight years later. At the same time, we show that child-friendly job amenities, such as no overtime or weekend work, increase dramatically after birth. These findings suggest two mechanisms for the child wage penalty: 1) women with children or pregnant women make fewer job switches and therefore forgo possibilities to obtain better wages and amenities and 2) soon-to-be mothers and mothers have a high preference for high-amenity jobs which might allow them to work more or lead them to forgo higher wages when having to choose between prioritizing wages or amenities.

We quantify the impact of these two channels by developing a discrete-choice life-cycle model of women's employment and job search. In the model, each woman, who is subject to fertility and labor market shocks decides how much to work if she currently has a job. She chooses whether or not to engage in job search, including on-the-job search, which increases the probability of receiving job offers. We model each job as a bundle of

a wage and amenities. Thus, by searching for a new job, a woman might increase her wage or improve her job amenities. High levels of amenities may decrease the cost of working, particularly if the woman has children. A woman's wage increases in her human capital level, which evolves endogenously with labor supply, and also has a job-specific component.

The consideration to engage in a costly search for a new job depends on the characteristics of the current job and family circumstances. If a woman becomes pregnant or has a child, her search cost might increase; however, her need for better amenities might also increase. Search is random and the distribution of jobs affects the trade-off between wage and amenity: if many jobs offer either high wages and low amenities or vice versa, women may tend to switch to low-wage jobs when they have children and prefer higher amenities. However, if wages and amenities are positively correlated, then job search can allow women to obtain the best of both worlds and obtain both higher wages and amenities.

Our study benefits from novel high-quality data. The administrative data are longitudinal and record employment, wages, job-to-job switches and household composition, including the number of children, for the universe of Dutch residents. We merge it with cross-sectional labor force survey data, which provides information on on-the-job and off-the-job search, and rich job amenities. We create firm-specific wage and amenity measures to classify jobs into discrete types. The life-cycle model is estimated by the method of simulated moments.

Our estimated model shows that on-the-job search is effective and raises annual job-finding rates from 26% for the non-searchers to 79% for the searchers. High amenity jobs decrease work disutilty by 9%, which roughly translates to 170 EUR per month for a mother with two children working full-time. At the same time, high wage jobs increase wages by .27 log points, which is around one fifth of the average salary. Most women start their careers in low-wage and low-amenity jobs when young but rapidly transition to better job. By age 30, nearly 40% are employed in the "best" job type, high-wage and high-amenity jobs. The distribution of job offers is relatively even across types, ranging from 17% to 33%. Furthermore, our estimates show that the search costs are substantial and particularly high for mothers and pregnant women.

Using the estimated model, we first quantify the effects of child-related job-search costs

on the child penalty. In the simulation, we set the search cost of pregnant women and mothers with children to be equal to that of non-mothers. Our findings show that search rates and job switching rates of mothers increase by roughly 25%. This leads to more mothers working in high-wage and high-amenity jobs, which in turn incentivieses them to work longer hours and increases wages. Discounted earnings over the life-cycle increase by 10.1%, equivalent to a reduction of around a third of the overall child penalty (earnings loss due to children). This suggests that job search plays an important role for the career costs of children.

We then use the model to evaluate the job mobility and labor supply effects of a policy change in 2015 that eliminated a tenure requirement for parental leave. We further validate our model by comparing simulated effects to results obtained using a difference-in-difference strategy. Prior to the reform, women were only eligible for unpaid parental leave with an employer if they had worked there for at least one year. After 2015, parental leave entitlement no longer required any employer-specific tenure. The law change should have had a direct positive impact on expecting mothers' mobility since switching employers no longer signified losing parental leave entitlement. Indeed our simulations show that job switches of pregnant women increase by 12.6%. As all women can enjoy unpaid leave, the employment rate in the year of birth decreases by 3.8%. However, as non-working mothers can return their pre-birth employers, 1.8% work more in the first year after giving birth. Overall, life-time earnings decrease slightly by .2%, as the disemployment effect in the year of birth dominates.

Our difference-in-difference strategy exploits variation across industry-level bargaining agreements. In particular, one industry did not have a tenure requirement before 2015, and hence can serve as a control group. We demonstrate that parallel trends are satisfied. Comparing pregnant women working in treated vs. not treated industries, before and after the reform, we find that the reform led to a 18.2% increase in job switching. The magnitude of the effect closely aligns with our model simulations, providing confidence in the model's predictions.

To our knowledge, this is the first paper to investigate the dynamic role of job search and job switching on women's life-cycle labor supply and job-sorting.[1] Although the im-

[1] Arcidiacono et al. (2023) incorporate preference shocks in dynamic discrete choice models into continuous-time search models.

portance of job search and mobility for wage growth is well-established in the search literature, life-cycle models, which are commonly used to study female labor supply, typically set wages equal to marginal productivity (van der Klaauw, 1996; Francesconi, 2002; Blundell et al., 2016; Eckstein et al., 2019). A handful of papers examine job mobility between different occupations or career tracks (Adda et al., 2017; Hotz et al., 2017; Bang, 2022), but do not take into account search frictions. On the other hand, search models are often limited in their life-cycle features in order to preserve stationarity and tractability. This is particularly limiting when studying women's labor market behavior which varies starkly by precise family circumstances. The search framework closest to ours is Xiao (2019), who estimates a model for men and women transitioning across firms of varying productivity and child-friendly amenities. She studies gender-based discrimination but does not consider labor supply decisions nor job search decisions.

The novelty of our approach lies in integrating a wide array of mechanisms behind the child penalty within a unified framework. By combining a rich structural framework with detailed data on job search and workplace amenities, we are uniquely positioned to examine women's dynamic search and sorting decisions across the life cycle. How women's labor supply and fertility are jointly determined has been studied, among others, by Francesconi (2002), Adda et al. (2017), and Wang (2023). We also add to a handful of recent papers which emphasize the role of amenities for mothers' careers. For instance, job flexibility is examined in Flabbi and Moro (2012); Goldin (2014); Adda et al. (2017); Hotz et al. (2017); Xiao (2019); Bang (2022). Le Barbanchon et al. (2020) find that mothers accept lower wages in exchange for shorter commutes.

In addition, a handful of papers examine how job mobility might affect women's and men's wage growth. For example, Loprest (1992) suggest low wage growth of women compared to men can be attributed to differences in wage growth when changing jobs. Also, Lafférs and Schmidpeter (2023) document the importance of job mobility after birth on mother's long-term earnings and Bronson and Thoursie (2023) highlight the role of within-firm mobility on the wage growth.[2] Beyond analyzing how reduced job search and mobility around childbirth affect labor market outcomes within our model, we also offer

[2]Other channels have also been explored in the literature. Albanesi and Olivetti (2009); Gayle and Golan (2012); Tô (2018); Xiao (2019) investigate wage discrimination and bargaining in the labor market. Bertrand et al. (2015, 2021) focuses social norms. Our detailed microdata allow us investigate a novel channel through which children affect women's earnings and employment: decreased job search activity and fewer job-to-job transitions around and after childbirth. Moreover, we can identify different job types when it comes to amenity values at the firm level.

	Low Edu.	High Edu.
Proportion	0.60	0.40
Employed	0.76	0.90
Earnings	1487	2425
Age First Birth	27.9	30.8

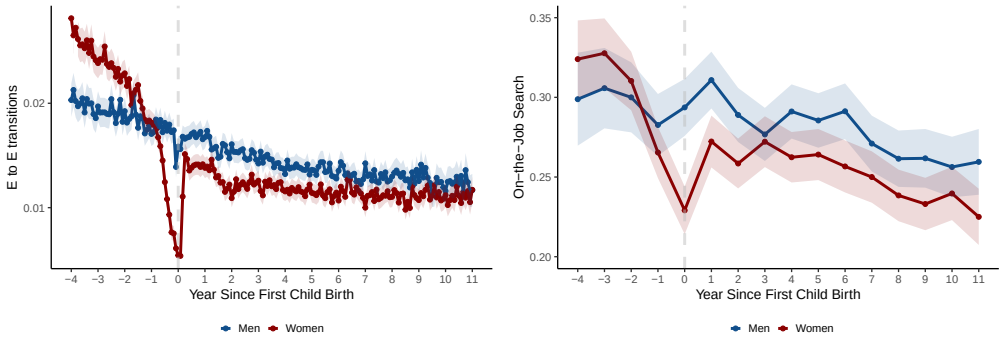
new regression-based evidence showing that tenure-linked child benefits significantly reduce job switching among pregnant women.

The rest of the paper is organized as follows: Section 2 describes our data sets, and Section 3 documents stylized facts describing women's endogenous job search, switching, and amenity choices around childbirth. Section 4 develops our life-cycle model, and Section 5 discusses the key parameter estimates of the model. Section 6 discusses the counterfactual simulation results including comparing simulated reform effects with results from the difference-in-difference analysis.

2 Data

We combine various data sources that can be linked through unique person IDs spanning the years 2006-2020. The largest data sets are administrative data on the universe of all Dutch individuals' employment histories, and characteristics such as age, gender, education level and household composition. On the employment side, we can observe monthly hours, and wages for all job spells. The data further allows us to identify couples and fertility events. To obtain information on job search and amenities, we supplement the data with the Dutch Labor Force Survey data. These are, for the most part, yearly cross-sectional data but have an important panel component. Roughly 20% of respondents are interviewed again from year to year. Moreover, selected questions are answered repeatedly in each quarter of a year by the same respondents. We use the panel feature of this data to compute important dynamic moments for our estimation, such as job-to-job switching rates between jobs of different wage and amenity combinations. The large sample size of roughly 60,000 households per year makes it particularly beneficial. Lastly, we cross-check our findings with a household survey (Longitudinal Internet studies for the Social Sciences - LISS), which features roughly 5,000 households starting from 2007.

Figure 1: Changes in Job Switching Rates and On-the-Job Search around First Birth, Admin Data and LFS



3 Stylized Facts

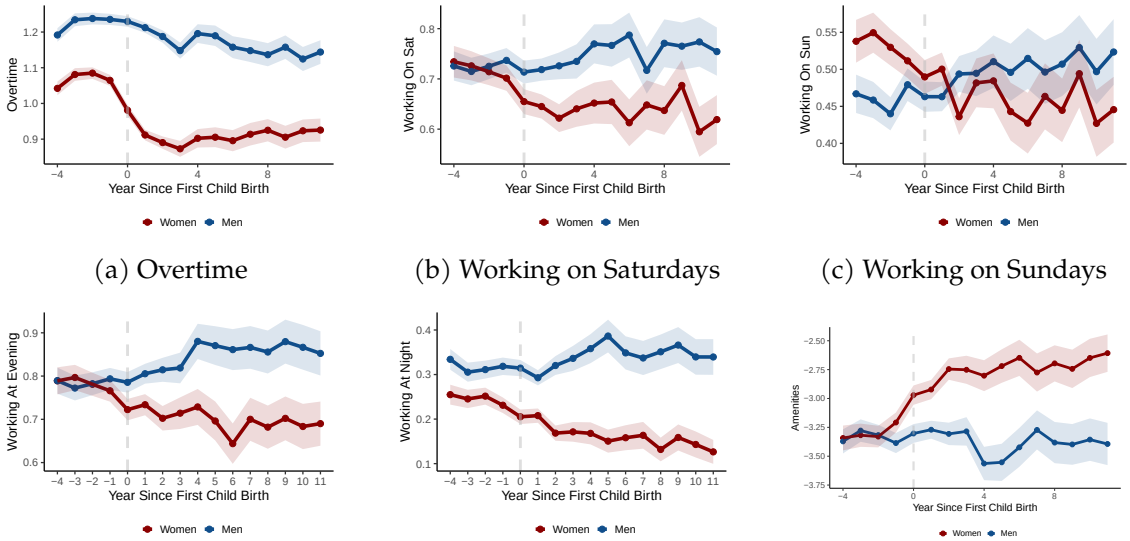
We document important empirical facts describing women's endogenous job search, switching, and amenity choices around childbirth. Figure 1 shows the changes in job search and switching rates for men and women by the time until the birth of the first child. Compared to men, expecting mothers start to reduce their labor market search and, consequently, switch less starting from a year or two before birth. Mothers' search activities recover slightly upon their return from birth but remain at a significantly lowered level persistently over the post-birth period. Similarly, job transitions happen less after childbirth, and only after 4-5 years after birth, mothers' switching rate starts to recover.

Moreover, women's child-friendly amenities increase after first birth as shown in Figure 2. After birth, women are more likely to work in jobs that require less irregular working hours (evening, night, weekends) and overtime work. The outcomes are measured in categories of frequencies where answers can take values 0 - never, 1 - sometimes and 2 - regularly. For men, there is little change; the pre-birth trends continue for most amenities. Panel (f) further shows a composite amenity measure that sums up the five other categories.[3] Again, it is evident that differences between men and women's amenities emerge 1-2 years before the birth of the first child.

The last piece of evidence that underlines the importance of job switching for wage growth is shown in Figure 3. The sample here is women aged between 22 and 45. The left panel shows a discrete jump in hourly wage after the event of a job-to-job switch. The

[3]We use this summary index of amenities as our measure of "amenity" in our model.

Figure 2: Changes in Job Amenities around First Birth, LFS

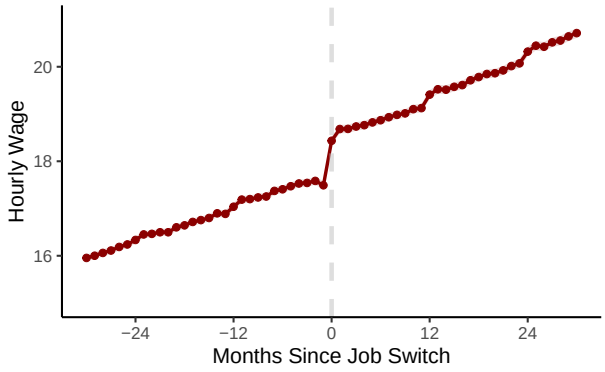


(a) Overtime (b) Working on Saturdays (c) Working on Sundays

(d) Work in Evening (e) Work at Night (f) All Amenities

right panel shows the same result using regressions with and without an individual fixed effect. Women's hourly wage increases roughly by .72 EUR following a job switch, and this is roughly 4% of the average wage. Compared to the yearly within-job wage increase, job-to-job switching increases hourly wage by an additional 140%.

Figure 3: Δ Hourly Wage EE Transition

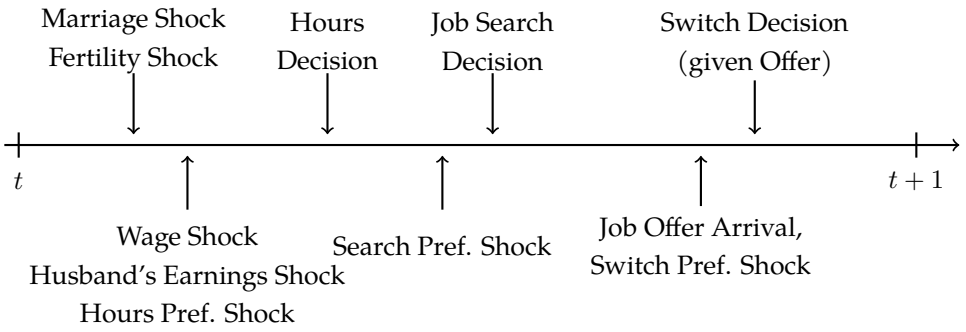


	Hourly Wage	
Switch	0.721	0.744
	(0.023)	(0.056)
t	0.069	0.064
	(0.001)	(0.002)
N	842967	842967
Indiv. FE	Yes	No

4 Model

To quantify the life-cycle impact of job search and switching behaviors associated with childbirth, we develop and estimate a discrete-choice life-cycle model of women's employment and job search. Our model features women's decisions on whether to search for a job as an employed or unemployed person, whether to accept a particular job with a wage and amenity value attached to it upon job arrival, and how many hours to work given the work conditions and family environment. Jobs are characterized by different wages and amenity values drawn from a known distribution. When a woman searches, she is subject to a search cost, which may depend on the motherhood or pregnancy status. Also, once she decides to switch her job upon job arrival, she is subject to a switching cost, which again may depend on the observable characteristics of the household. Human capital may appreciate or depreciate depending on the current job characteristics and working hours. Allowing the current job characteristics to affect the human capital level in the next period creates persistent effects of employer choices on the future labor market outcomes and, eventually, lifetime career outcomes. We elaborate on the key model features below.

4.1 Timing Assumption



Let t denote the age of a woman in the model, and p_t denote the spouse's characteristics if married, such as labor income and working hours at t. At the beginning of each period t, the woman gets to know whether she will have a newborn in the next period. The probability of giving birth next period is π, which is a function of age t, education e, and the number of existing children k_t. Upon a fertility shock, a child will be born at the beginning of the next period after one year of pregnancy. At the same time, marriage (if unmarried) or divorce (if married) shocks will be drawn for the individual, which may depend on the age and the number of children in the household. Subsequently, an

exogenous wage shock and spouse's earnings shock will be realized.

Once these shocks are realized, the woman makes her labor supply decision conditional on preference shocks. If she is employed, she chooses how many hours to work (including zero hours, i.e., not working) given the current wage level and job amenity from a discrete set of working hours.[4] When she chooses not to work (zero working hours), the employment relationship with the current employer may be lost, given her tenure and parental leave status. If she starts the period as non-employed, nothing happens.

After the labor supply decision, the woman gets to choose whether to search for a job or not, which will be denoted as $s_t \in \{0, 1\}$. Both employed and unemployed women can search for a new job. We assume a job search is costly with a search cost $c_s(k_t)$, which is a function of the number of children in the household and the pregnancy status. Once the woman decides to search, she may get a job offer with some probability $\phi(s, h, w, a)$. We allow the job finding rates to depend on the search decision (s), employment status (h), and the current job type (w, a). Jobs are characterized by a wage offer and amenities, and are drawn from a joint distribution, F of wages (w) and amenities (a): $(w, a) \sim F(w, a)$. After receiving a job offer, the individual can choose whether to accept or reject the job offer. If they change their job from the existing one, they are subject to a switching cost $c_d(t)$, which is a function of age t.

4.2 Human Capital

Human capital evolves depending on the current job type and working hours, and we allow the accumulation rates to partly differ by the education level. Specifically, the law of motion for the human capital is as follows:

$$x_{t+1} = g_1(e, h_t) * (x_t + g_2(w_t, a_t))$$

When the individual chooses not to work $(h_t = 0)$, then the human capital depreciates with rate δ.

[4] We do not differentiate unemployment from non-employment, and we use the terms interchangeably throughout this paper.

4.3 Value Functions

As there are multiple stages of decision-making within a period, we have a few different recursive formats to represent the value functions of an individual. Specifically, there are three different value functions within a period t.

- V^h: value function at the hours choice stage
- V^s: value function at the job search stage
- V^a: value function at the job acceptance/switching stage

Let $\Omega_t = \{e, x_t, k_t, n_t, m_t, p_t\}$ denote all the relevant state space variables, where e denotes education level, x_t denotes the human capital, n_t the number of children, k_t the age of the youngest child, m_t the marital status, and p_t the spouse's labor market characteristics. At each decision node, there is a choice-specific preference shocks $(\epsilon^s, \epsilon^a, \epsilon^h)$, which are independent across all choices.[5] A detailed description of each value function is given below:

Hours Decision: At the beginning of each period, employed workers will decide how many hours to work, given all their state variables. Relevant state variables include the current wage and amenity (w, a), family structure (k_t, n_t), and spouses' characteristics (p_t). The woman's labor income depends on the current job characteristics, working hours, and current level of human capital. We also allow for a wage shock η_t. Total household income is the sum of a woman's and her spouse's labor income, and there is no saving in the model.

Choosing not to work (zero working hours) can mean two different things: 1) voluntary quitting or 2) parental leave. The woman will be entitled to take parental leave when her child is less than or equal to 8 years old and her job tenure with the current employer is more than one year. The baseline model specification assumes the pre-reform parental leave regime with a one-year tenure requirement. Otherwise, not working would lead to a non-employment. This tenure requirement binds women who just started a new job

[5] In the estimation, we assume these choice shocks follow the extreme value type I distributions, and we estimate the scale of the shocks within the model. The scale of the preference shock for hours choice is normalized to be 1.

and gave birth to a child in the same year. The model would create incentives for women who are expecting a child not to change their jobs during the pregnancy period.

$$V_t^h(\Omega_t, w_t, a_t, \tau_t) = \max_{h \in \{0, PT, FT\}} \underbrace{u(y_t, n_t)}_{\text{utility from consumption}} + \underbrace{u(k_t, n_t, a_t, p_t)}_{\substack{\text{disutility of working} \\ \text{depending on children and job amenities}}} + \epsilon_t^h$$

$$+ \mathbb{I}(h=0) \Bigg(\underbrace{\mathbb{I}(\tau_t = 1 \ \& \ k_t \leq 8) \mathbb{E} V_t^s(\Omega_t, w_t, a_t, \tau_t)}_{\text{parental leave, keep the current job}}$$

$$+ \underbrace{(1 - \mathbb{I}(\tau_t = 1 \ \& \ k_t \leq 8) \mathbb{E} V_t^s(\Omega_t, 0, 0, 0))}_{\text{voluntary quitting, lose the current job}} \Bigg)$$

$$y_t = f(w_t, a_t, x_t, h_t, \eta_t) + y_p(p_t) \quad \text{(labor income)}$$

Job Search Decision: At the job search stage, the only choice variable is whether to search or not, $s \in \{0, 1\}$. Both employed and unemployed women can search. If she searches, i.e., $s = 1$, she bears the search cost $c_s(k)$, regardless of her employment status. However, we allow the job-finding rates to depend on both the employment and search status. Also, we let the job-finding rates depend on the current/previous job characteristics. In particular, an employed (unemployed) woman would have a higher probability of finding a job within the same wage and amenity group as the current (previous) employer. This is to capture the persistence in the job types that a person holds in the data.

The probability of finding a job is $\phi(s, h, w, a)$, and a new job offer (w', a') will be drawn from a distribution F. There is a choice-specific preference shock, ϵ_t^s, which follows an extreme value type I distribution with a scale parameter, σ_s. Upon a job offer, the woman proceeds to the job acceptance stage. If no job offer arrives, the current period ends and she moves to the hour-decision stage in the next period with the current job characteristics, (w, a, τ).[6]

[6]For the unemployed, the current job characteristics would be (0,0,0).

$$V_t^s(\Omega_t, w_t, a_t, \tau_t) = \max_{s\in\{0,1\}} \phi(s,h,w,a)\mathbb{E}V_t^a(\Omega_t, w_t', a_t', w_t, a_t, \tau_t) + (1-\phi(s,h,w,a))\mathbb{E}V_{t+1}^h(\Omega_{t+1}, w_{t+1}, a_{t+1}, \tau_{t+1}) + c_s(k)\mathbb{I}(s=1) + \epsilon_t^s$$

Job Acceptance Decision: Conditional on having a job offer, she can decide whether to accept or reject the offer, $d \in \{0,1\}$. If she accepts, $d=1$, then she starts the next period with the new employer (w', a') and pays a switching cost $c_d(t)$. Otherwise, she continues with the current employer (w, a) on choosing working hours in the next period. Similar to the job search stage, there is a choice-specific preference shock, ϵ_t^a, which follows an extreme value type I distribution with a scale parameter, σ_a.[7]

$$V_t^a(\Omega_t, w_t', a_t', w_t, a_t, \tau_t) = \max_{d\in\{0,1\}} d\left(\mathbb{E}V_t^h(\Omega_t, w_t', a_t', 0) + c_d(t)\right) + (1-d)\mathbb{E}V_{t+1}^h(\Omega_t, w_t, a_t, \tau_t) + \epsilon_t^a$$

At the end of the period, all the state variables evolve either deterministically based on the decisions or stochastically based on the exogenous law of motion. Flow utility consists of the utility from consumption and utility from children (disutility of working), search and switching costs, and choice-specific preference shocks. Transition to the next period also depends on the working hours in the current period. In particular, our baseline model is based on the institutional details in the pre-reform period. Thus, if the woman chooses zero working hours when she has a newborn (i.e., taking a parental leave), depending on her tenure status, she may be able to keep her current employment contract (w, a) or not. If she loses her job, she becomes unemployed and has to search and obtain a job offer next period in order to be able to work. When a childless woman chooses to work zero hours, we treat this as a voluntary transition to unemployment/nonemployment.

[7] All the choice-specific shocks are period-specific, and we assume these are independent of each other. The scale parameters, σ_s and σ_a, will be estimated within the model.

$$x_{t+1} = \Gamma(x_t, h_t, a_t) \quad \text{(human capital evolution)}$$

$$n_{t+1} = \begin{cases} n_t & \text{with prob. } 1-\pi_t\text{, no fertility shock} \\ n_t + 1 & \text{with prob. } \pi_t\text{, fertility shock} \end{cases} \quad \text{(number of children)}$$

$$k_{t+1} = \begin{cases} k_t + 1 & \text{with prob. } 1-\pi_t\text{, no fertility shock} \\ 0 & \text{with prob. } \pi_t\text{, fertility shock} \end{cases} \quad \text{(age of the youngest child)}$$

$$\tau_{t+1} = \begin{cases} 1 & \text{if} \quad h_t > 0 \quad \& \quad d_t = 0 \\ 0 & \text{if} \quad \text{otherwise} \end{cases} \quad \text{(tenure)}$$

4.4 Remarks

Our model incorporates a comprehensive list of factors through which having children affects women's labor market outcomes. Often, these channels are interdependent, possibly in a dynamic way. For instance, women expecting a lower labor market mobility in the future may be pickier when it comes to choosing their first job. Or, having less mobility in the future may force women to choose a better amenity job now at a cost of lower wages. These forward-looking women's dynamic incentives have some important policy implications. First, policies targeting different ages of women can potentially have differential contemporaneous effects at the targeted ages, as well as differential long-term effects.

5 Estimation

We estimate the main part of our model using the Method of Simulated Moments. Prior to this, we first estimate the fertility process, husband's earnings process, and initial characteristics, such as distributions of job types at the starting age and educational attainment, directly from the data.

In addition, we construct firm-specific wage and amenity values from our data and define job types based on these estimates. In our estimation, we use two levels of wages (high/low) and two levels of amenities (high/low), thus having four different job types. We call these four job types LALW (Low-Amenity-Low-Wage), LAHW (Low-Amenity-High-Wage), HALW (High-Amenity-Low-Wage), and HAHW (High-Amenity-High-Wage) in the rest of the paper. First, to sort jobs into high- and low-wage jobs, we residualize hourly wages from life cycle trends, education, and individual fixed effects.[8] Then, we compute the firm-level average of the residual wages, i.e., the firm fixed effects. Firms with above median fixed effect are then assigned as the "high" wage type. For amenity, we regress the composite amenity measures from panel (f) in Figure 2 on firm fixed effects and proceed analogously to the wage type. The resulting types have high explanatory power: the amenity type explains 34% of the variation in amenities, and the wage type 44% of the wage residual.

Except for the parameters estimated outside of the model, we finally have 43 parameters and 112 moments. Moments used to identify these parameters pertain to full-time, part-time rates, job search and switching rates, and average hourly wages by education, age, number and age of children, as well as job type. Moreover, we include various dynamic moments such as job-type to job-type transitions, work hour transitions and wage growth by job type and work hours choice.

[8] Specifically, we control for age, age squared interacted with education level, and individual fixed effects.

Table 1: Estimates: Utility Parameters

Parameter	
Consumption	
Constant	2.76
Scalar	1.25
Work Disutility	
Constant	0.92
PT Discount	0.00
Pregnancy	0.00
Child Age 0	0.83
Child Age 1-2	2.20
Child Age 3-6	2.37
Child Age 7-12	1.77
Child Age 13-17	0.45
First Kid	0.59
Second Kid	0.38
Third Kid	-0.08
HA Discount	0.92
HA Discount, Mothers	0.00

Table 2: Estimates: Human Capital and Wage Parameters

Parameter	
Human Capital Process	
Depreciation	0.95
Part-time*Educ1	-0.04
Part-time*Educ2	-0.84
Increase in HWHA	0.50
Increase in LWHA	-0.03
Increase in HWLA	-0.50
Wage Parameters	
Intercept	2.78
Experience	0.09
Experience Sq.	-0.01
Educ2	0.17
Educ2*Exp	-0.03
Educ2*Exp Sq.	0.01
HW Intercept	0.28

Table 3: Estimates: Search and Switching Parameters

Parameter	
Job Finding Rate	
When Search	0.80
Unemployed + Not Search	0.66
Unemployed + Search	1.00
Same Job Type	0.35
Offer Distribution	
LWLA Offer	0.33
LWHA Offer	0.29
HWLA Offer	0.17
Preference Shock Scale	
Switch	0.66
Search	0.93
Search Cost	
Constant	0.25
Child Age 0-2	0.88
Child Age 3-7	0.83
Child Pregnancy	0.89
Child Age 7-13	0.97

We highlight some of our key findings from these estimates. The full parameter estimates are reported in Tables 1 to 3. First, our finding shows that working women face 8% lower disutility of working when they work at high amenity jobs. Also, the estimates in the wage profile exhibit the high wage job type having .28 log points higher hourly rates, which is roughly 22% of average wages. Furthermore, as expected, search costs are higher for pregnant women and mothers. The coefficients range from .9 to 1.0, which corresponds to a monthly cost of approximately 1200-1300 EUR. Searching increases job finding rates from 13% to 80% if the individual is employed, and from 66% to 100% if the individual is not employed. The distribution of job offers is relatively even; around 30% are LALW and HAHW jobs, respectively, and roughly 20% are LAHW and HAHW jobs.

Most of our estimates are consistent with the general intuition about women's labor supply and labor market characteristics facing these women: work disutility increases in the number of children; The age of the youngest child does not seem to matter too much, as can be seen from the employment and hours profile in Appendix A.1. Wages increase with experience and more so for highly educated women. Human capital depreciates by .05 if the woman does not work and it also decreases when women work in a part-time position, especially for highly educated women.

Table 4: Model Fit - Transition Matrix by Job Types

t+1/t	LALW	HALW	LAHW	HAHW
LALW	0.41 / **0.46**	0.17 **0.18**	0.11 / **0.10**	0.07 / **0.08**
HALW	0.20 / **0.17**	0.37 **0.44**	0.07 / **0.09**	0.11 / **0.06**
LAHW	0.20 / **0.16**	0.11 **0.16**	0.65 / **0.59**	0.12 / **0.12**
HAHW	0.18 / **0.22**	0.35 **0.22**	0.18 / **0.21**	0.70 / **0.73**

Table 5: Model Fit - Job Switching by Job Type and Motherhood Status

	Model	Data
Job Switch LALW Childless	0.28	0.35
Job Switch LALW Mother	0.21	0.16
Job Switch HALW Childless	0.26	0.30
Job Switch HALW Mother	0.20	0.15
Job Switch LAHW Childless	0.17	0.20
Job Switch LAHW Mother	0.13	0.10
Job Switch HAHW Childless	0.12	0.18
Job Switch HAHW Mother	0.11	0.10

Overall, the model fits the data well. As can be seen from panel (a) in Figure 4, the model closely tracks the distribution of job types along the life-cycle. Most women start working in LALW jobs at age 22 and transition to HAHW within the first 10 years. The proportion of other off-diagonal job types does not change drastically with age, but there is a slight increase in LAHW jobs while HALW jobs decrease somewhat. Panel (b) and (c) show that the model reproduces full-time and part-time rates observed in the data by age and time to first birth.

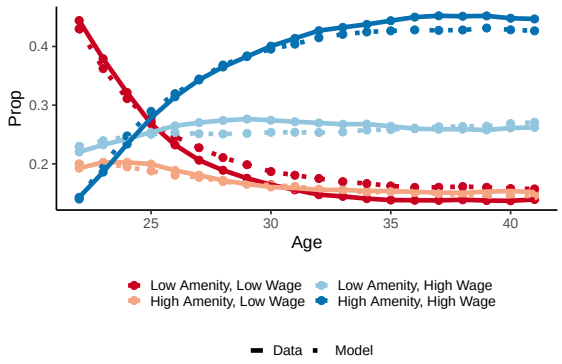
Tables 4 shows that our model can replicate the job type to job type transition rates almost perfectly, while Table 5 shows it can also generate higher transition rates for mothers and low-wage jobs just as there are in the data.

6 Counterfactual Simulation

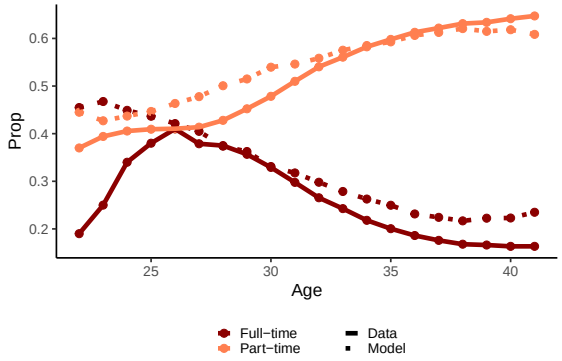
6.1 Child-Related Search Costs

We have shown that our model estimates provide convincing evidence as to why women with children have lower job search and switching rates, thus having lower wages. One thing that we can further investigate, using our estimated model, is to what extent the

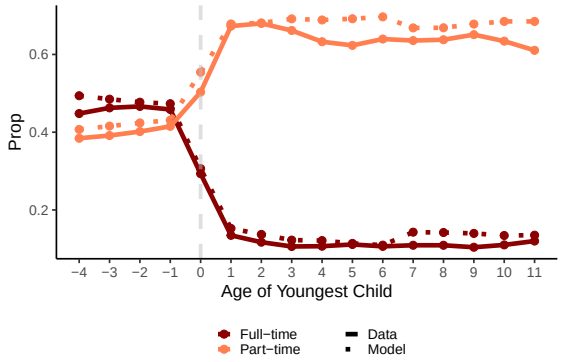
Figure 4: Model Fit



(a) Job Types by Age



(b) Full and Part-Time by Age



(c) Full and Part-Time Around First Birth

lower job search and switching contribute to the child penalty. Although a large proportion of job transitions into HAHW jobs occurs before the arrival of children, the reduced ability of mothers to transition into 'good jobs', especially when faced with high work disutility costs due to children, might lower their labor supply and exacerbate the child penalty. At the same time, mothers might prefer HALW jobs to LAHW jobs, the wage-amenity tradeoff, which can decrease wage levels further.

For this counterfactual, we simulate the scenario in which women face no additional child-related search costs; that is, cost parameters for pregnancy and children of any age group are set to be equal to those for childless women. From Table 6, it is evident that this has a large direct effect on mothers' on-the-job search and job-to-job switching. Both increase by more than 20%. Non-mothers are barely affected, although there is a small increase in both search and switching by roughly 2%, likely driven by pregnant women who were also directly affected. From the last four rows of the table, we can see that increased search allows women to transition out of low-wage into high-wage jobs. This leads to an increase of 1.6% in hourly wage for women aged 45. At the same time, there are 3% more women working in high amenity jobs. As a result, we have more women working. Overall, women's employment increases by 3.1% while the impact on discounted earnings, which includes the effect on wages, is larger at 3.7%.

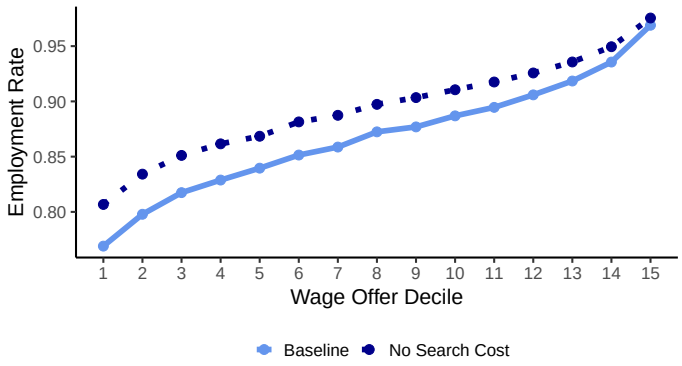
Figure 5 further illustrates how high amenity affects women's labor supply, thus discounted lifetime earnings. For any given wage offer, women are more likely to work in the counterfactual scenario with low search costs, since they are more likely to have a high amenity job and therefore face lower work disutility. At the median wage offer, the probability of working increases by roughly 3 pp. from 85%.

We further decompose the child penalty into various channels: higher work disutility and higher search costs due to children. For this simulate two scenarios, one where we set all to zero (this captures the entire child penalty) and one where only the child-related search cost parameters are zero. The results show that job search and switching contributes 34% percent of the overall child penalty. Figure 6 displays how the various channels affect lifetime wages of low and high education women. The overwhelming part of the effect is for highly educated women. While, search costs negatively affect wage growth for both education groups similarly, work disutility creates a large gap for the higher educated group.

Table 6: Counterfactual Results - No Search Cost

	Baseline	No Search Cost	% Diff
Search Non-Mothers	.553	567	+2.6%
Search Mothers	.425	.550	+29.5%
Switching Non-Mothers	.175	.179	+2.3%
Switching Mothers	.115	.142	+22.8%
Employment	.869	.897	+3.1%
Lifetime Earnings	514.2k	533.1k	+3.7%
% in HAHW	39.5	40.6	+2.7%
% in LAHW	27.1	27.8	+2.7%
% in HALW	15.4	14.5	-5.3%
% in LALW	18.1	17.1	-5.3%
Hourly Wage Mother Age 45	19.5	19.8	+1.6%

Figure 5: Counterfactual: No Search Costs - Wage Offer Acceptance

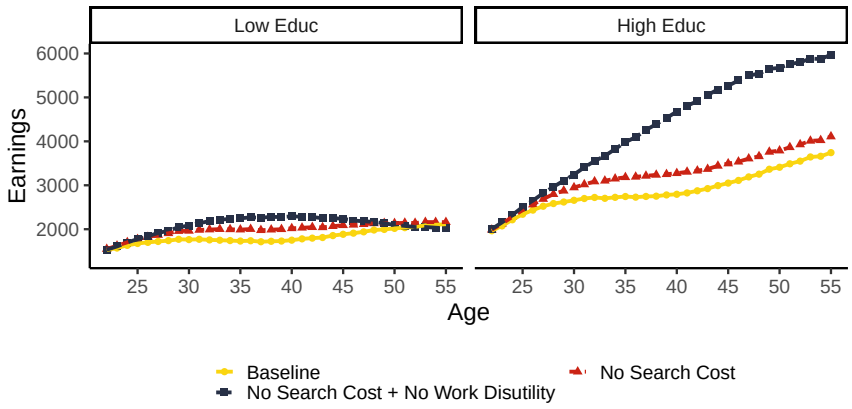


We conclude that low search costs allow many women to switch to both higher wages and higher amenity jobs on average and contribute significantly towards closing the child penalty. The wage-amenity trade-off is not very pronounced, as many women can switch along diagonal job types as opposed to along off-diagonal job types. In other words, the high prevalence of HAHW jobs allows many women to secure a pareto-dominant job.

6.2 No Amenity Value

Next, we quantify the importance of having higher amenity values on women's labor supply and earnings by evaluating a counterfactual scenario in which high amenity jobs do not offer any lower work disutility. In our estimated model, the channel through which high amenity jobs provide value is discounted work disutility. Thus, setting the discount parameter for the high-wage jobs to zero means the only dimension in which women can

Figure 6: Counterfactual: No Search Costs - Contribution to Child Penalty



obtain 'better' jobs is wages, and thus, the incentive for search might decrease as well.

Table 6 shows the effect of setting the amenity disutility discount to zero.[9] Both mothers and non-mothers work and earn less, since they now face higher work disutility. Mothers are more severely affected due to the additional disutility from working with children; their employment rate decreases by 4.4%. Also, since previously high amenity jobs decreased in value, women have lower incentives to search. Those in LALW jobs, previously the 'worst' jobs, search 1.1% less. At the same time, women in HAHW jobs search slightly more, since they are more likely to switch than in the baseline. The bottom four rows show that since HAHW and LAHW jobs are now equal, as are HALW and LALW jobs, the previously high amenity jobs lose in proportion while the previously low amenity jobs gain. Nevertheless, because women search less and job switching decreases, there are overall fewer women in high-wage jobs.

The overall negative impact on discounted earnings is 3.9%, comparable to the no search cost scenario. However, here, the behavior of all women is strongly affected, while it was mostly mothers who reacted to the previous scenario.

6.3 Childcare Subsidies

Since our model is the first to embed endogenous job search decisions into a life-cycle framework, we can use it to better understand how women's job search responds to other

[9] We keep four job types, in the sense that job offer distributions are unchanged.

Table 7: Counterfactual Results - No Amenity Value

	Baseline	No Amenity Value	% Diff
Search HAHW	.46	.46	+.6%
Search LALW	.51	.50	-1.1%
Earnings Non-Mothers	24.4	23.7	-3.1%
Earnings Mothers	20.8	19.9	-4.4%
Lifetime Earnings	514.2k	494.2k	-3.9%
% in HAHW	39.5	35.9	-9.1%
% in LAHW	27.1	29.9	+10.3%
% in HALW	15.4	14.9	-3.0%
% in LALW	18.1	19.4	+7.0%

commen child policies, such as child subsidies. In particular, consider giving a subsidy of 200 EUR per child which is contingent on mothers working. The results are presented in Table 8. It is evident that women's life-time earnings increase moderately more, by 1.8% instead of 1.4%, when women can adjust their search. This is because job search is complementary to labor supply. If a childcare subsidy increases labor supply incentive of mothers, it also raises the motivation to land a good job, as the overall gains are higher. Therefore, more women work in the highest type jobs when they can influence sorting.

Table 8: Counterfactual Results - Childcare Subsidies With and Without Search Adjustments

	Baseline	Fixed S & S	Endogenous S & S
Employment	0.869	+1.5%	+1.4%
Lifetime Earnings	512.8k	**+1.4%**	**+1.8%**
% in HAHW	0.410	-0.4%	+2.0%
% in LAHW	0.268	-0.1%	+0.6%
% in HALW	0.152	0.4%	-2.4%
% in LALW	0.169	0.2%	-3.9%

6.4 2015 Parental Leave Tenure Reform

Now we turn to a reform in 2015 that eliminated a tenure-requirement for parental leave. Prior to 2015, only women who had worked at the same employer for at least one year were eligible for unpaid parental leave. After the reform, women no longer had to be employed at the same employer for at least one year and could take leave even after just having switched jobs. We expect this reform to primarily have increased the job switching

of pregnant women, since doing so no longer disqualifies them for parental leave.

Parental leave allows women to not work for a period of time and return to work at their pre-birth employer without having to search for a job first. In the Netherlands, unpaid leave is granted for 26 times the weekly hours that the woman worked on average in the previous year. That corresponds to a break of roughly 6 months. In addition, there is paid leave for 16 weeks which covers around one and a half months prior to giving birth and two and a half months after giving birth. For simplicity, we will assume that women can take one year of maternity leave in which they do not work and return to their previous employer.

6.4.1 Difference-in-Difference Estimates

We first provide empirical evidence on how the reform affected women's job mobility using a difference-in-difference approach. For this, we exploit variation in the pre-reform tenure requirement across sector-level bargaining agreements. One sector, 'Mental Health Care', did not impose the tenure requirement in the pre-reform years. This sector employs roughly 2% of the labor force and serves as a control group for our analysis. Given that we observe the universe of employees, this leaves us with a large enough sample of roughly 2000-3000 first-time pregnant women per year who work in this sector. Pregnant women working in all other sectors are treated by the reform.

The formal difference-in-difference estimation is specified as:

$$\text{Switch}_{it} = \beta_0 + \beta_1 Post_t \times Treated_i + \beta_2 Post_t + \beta_3 Treated_i + \gamma X_{it} + \epsilon_{it} \qquad (1)$$

where $Treated_i$ indicates whether woman i belongs to the treatment group, $Post_t$ indicates whether the time period t is after October 2014, and X_{it} represents a vector of control variables including age, education, and number of children.[10]

Table 9 presents the regression results with job switches measured in percentage points. The interaction coefficient (β_1) is positive and statistically significant, indicating that the reform announcement increased monthly job-switching rates among treated pregnant women by 0.198 percentage points when including control variables. This effect is eco-

[10]The reform was announced in October 2014 before its implementation in January 2015. To capture potential anticipatory responses, we define our pre-reform period as before October 2014 and post-reform period as October 2014 onwards in our empirical analysis.

Table 9: Difference-in-Difference Analysis: Effect of Parental Leave Reform on Monthly Job Switching

	Job Switches in Percentage Points	
	(1)	(2)
Post × Treated (β_1)	0.114***	0.198**
	(0.085)	(0.085)
Post (β_2)	0.077	0.233**
	(0.085)	(0.095)
Treated (β_3)	0.477***	0.231***
	(0.063)	(0.063)
Controls	No	Yes
R^2	0.0001	0.0123

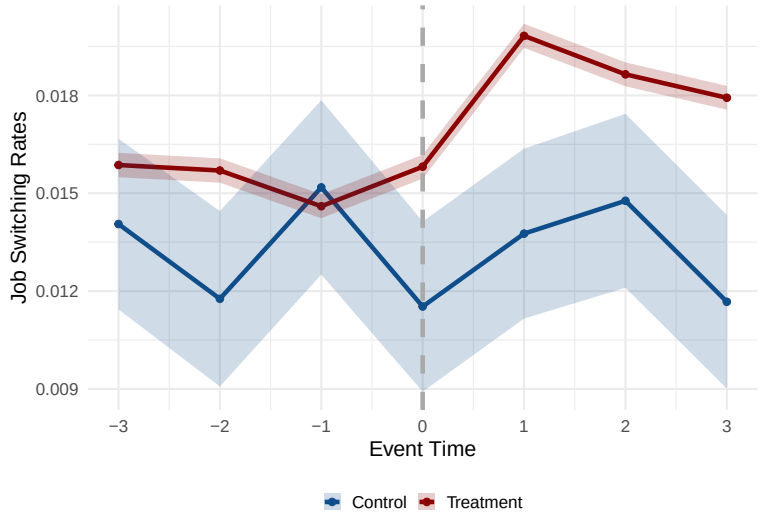
Standard errors in parentheses. *** p<0.001, ** p<0.01, * p<0.05

nomically significant: it represents approximately an 18.2% increase relative to the pre-reform baseline switching rate of 1.09 percentage points among the treatment group. In annual terms, this corresponds to an increase in the probability of switching jobs at least once during a year from 12.3% to 14.5%, a 2.2 percentage point or 18% relative increase. These results highlight how the removal of tenure-based restrictions on parental leave substantially enhanced pregnant women's job mobility.

To assess the validity of our difference-in-difference design, Figure 7 presents an event study analysis, plotting monthly job-switching rates for both treated and control women around the reform announcement. Time period 0 corresponds to October 2014, when the policy change was announced. Note that the estimates are quite noisy for the control group due to the much small sample size. Nevertheless, we observe that both control and treatment groups exhibit similar average switching rates before the reform, in a roughly parallel fashion. After the reform announcement treated women significantly increasing their job switching rates, while the control group shows no significant changes. The treatment group's switching rate jumps up sharply in period 1 and remains elevated in subsequent periods. This pattern is consistent with our difference-in-difference results.

These results strengthen our main insight that institutional factors can significantly impact mothers' job search and mobility decisions. The relaxation of the tenure requirement led to increased job switching among pregnant women, allowing them to poten-

Figure 7: Event Study: Impact of Parental Leave Reform on Annual Job Switching Rates of Pregnant Women



tially secure better job matches before childbirth. This finding provides direct evidence that tenure-contingent benefits like parental leave can create significant constraints on women's job mobility around childbirth, potentially contributing to the child penalty through reduced job-to-job transitions.

To ensure the robustness of our findings, we conduct several additional checks. First, we estimate the model using narrower time windows around the reform: one year (October 2013.10- September 2015), two years (October 2012- September 2016), and three years (October 2011-September 2017) before and after the announcement. The treatment effect remains positive and significant across all specifications, with coefficients ranging from 0.19 to 0.34 percentage points.

Second, we perform placebo tests using pseudo reform dates and unaffected women. Using post-reform periods (July 2017-June 2018 vs. July 2016- June 2017), we find an insignificant effect (-0.21 percentage points, p=0.277), as expected. For pre-reform periods (March 2012 -February 2013 vs. March 2011- February 2012), we found a negative and significant effect (-0.56 percentage points, p=0.003), suggesting if anything a declining trend in switching rates before the actual reform. We also set another falsified control using women covered by another treated collective agreements, and run the difference-

in-difference regression for women aged 40 (not likely to become pregnant) and childless women various years before first birth. None of these placebo tests yield positive and significant effects similar to our main specification, supporting the causal interpretation of our findings.

6.4.2 Simulated Reform Effects

Turning to the effects predicted by our model, Table 6 shows the simulated results. Pregnant women are 2 percentage points more likely to switch jobs, a 12.6% increase compared to pre-reform levels. This number is very close to the result of the difference-in-difference regression, validating the accuracy of our estimated model. There is some evidence that they switch to slightly better jobs, the percentage of HAHW workers increases by .2%. At the same time mothers work 2.8 percentage points less in the year of giving birth, which is driven by the women that became eligible for parental leave after the reform. These women switched jobs just in the year prior to giving birth, which are roughyl 21% in the baseline. In the subsequent year, employment increases by 1.4 percentage points. This is because job protection is offered to more women, and all those that did not work in the year of giving birth can return to their pre-birth employer instead of needing to search for a new job. Overall, lifetime earnings change only slightly and there is a decrease by .2 %. This is because positive job selection and employment are just outweighed by negative employment effects in the year of birth.

Despite small effects on lifetime earnings, there are sizeable contemporaneous effects around the birth of the first child. Figure 8 shows the how earnings and utility change around the birth of the first child. Earnings effects are negative overall and somewhat larger for high education women. In the year of birth, the decrease is largest at around 50 EUR per month or 3.3% of average earnings. Nevertheless, average utility is higher at any point in time, since women benefit from the option of staying at home. The increase in the year of birth is 2.5% in consumption equivalent terms.

Figure 8: Simulation of PL Reform Effects: Changes in Earnings and Utility Around First Birth

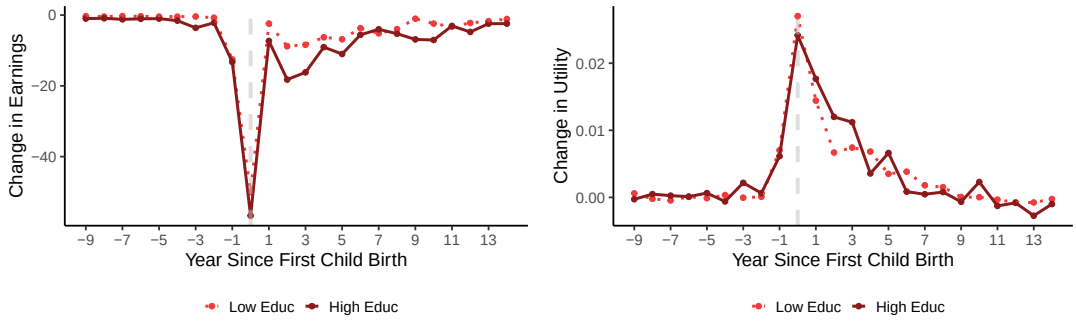


Table 10: Simulation of Reform Effects- No Parental Leave Tenure Requirement

	Baseline	PL Reform	% Diff
Search Pregnant Women	.443	.447	+0.9%
Switching Pregnant Women	.167	.188	+12.6%
Employment Mothers with Newborn	.746	.718	-3.8%
Employment Mothers with 1-yo	.872	.886	+1.8%
Lifetime Earnings	512.8k	511.9k	-.2%
% in HAHW Mothers	.426	.427	+.2%
% in LAHW Mothers	.261	.260	-.5%
% in HALW Mothers	.155	.155	+.4%
% in LALW Mothers	.158	.158	-.3%

7 Conclusion

In this paper, using Dutch administrative data and the representative household survey, we documented that women have lower job search and mobility starting shortly before childbirth until many years after. Simultaneously, family-friendly amenities such as regular and predictable work hours increase for women after childbirth, suggesting that these amenities benefit working mothers. Furthermore, we develop and estimate a novel dynamic discrete-choice model of women's work hours, job search, and switching behaviors, which can capture the observed pattern in the data. In our model, higher-amenity jobs allow women, especially mothers, to work with lower disutility of working. Our results show that women face child-related search costs that lead to a total of 3.7% decrease in discounted lifetime earnings. The main reason is that they fail to obtain better jobs and,

as a result, work and earn less. Lastly, we also find that eliminating high amenities has a similarly large negative impact on earnings. This is because women work less due to greater work utility costs, especially when they have children.

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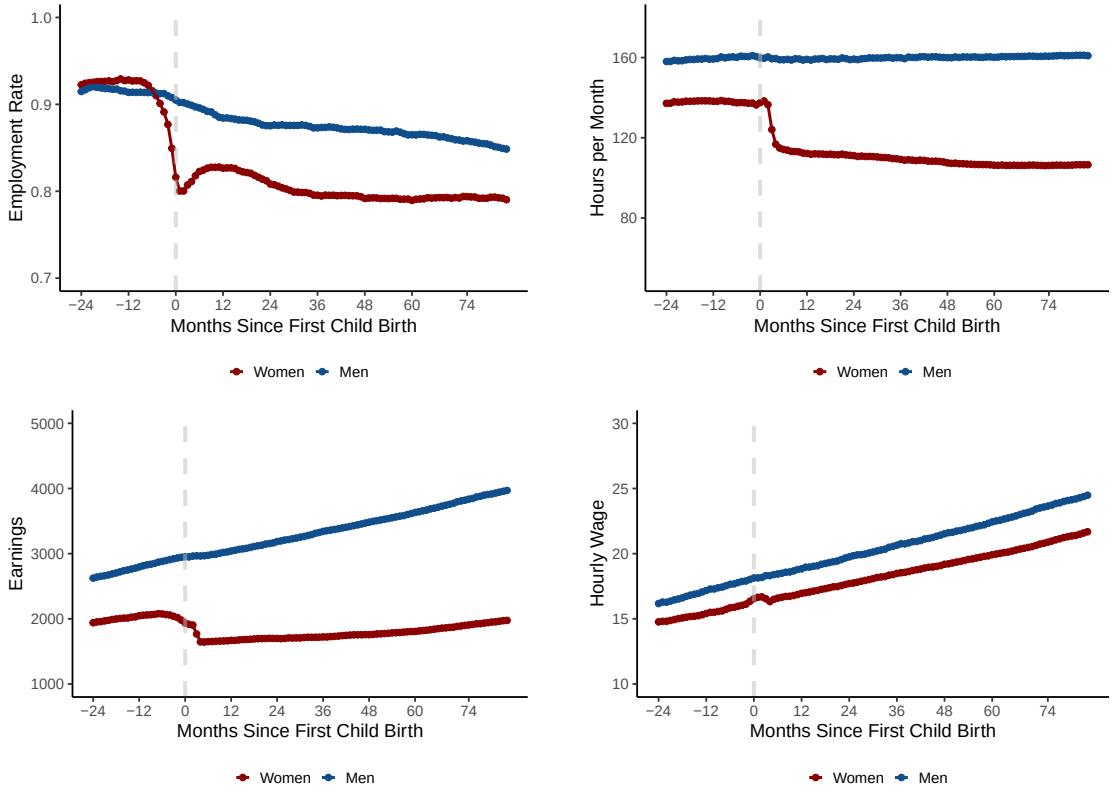
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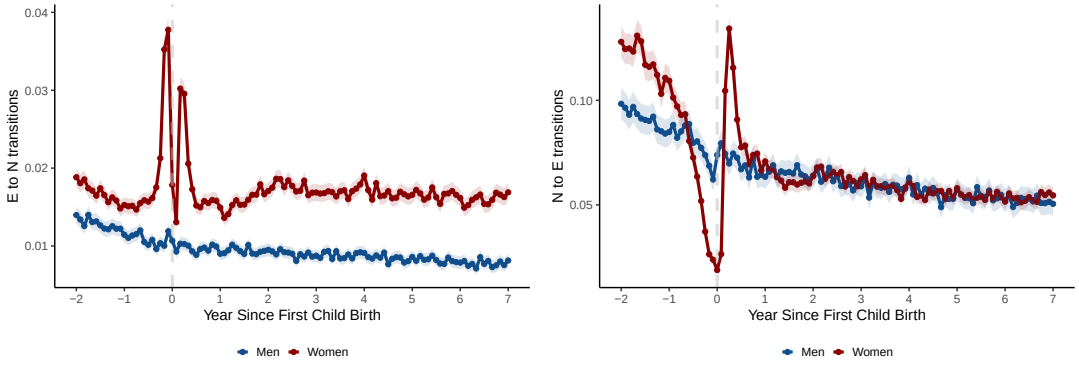
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A Appendix

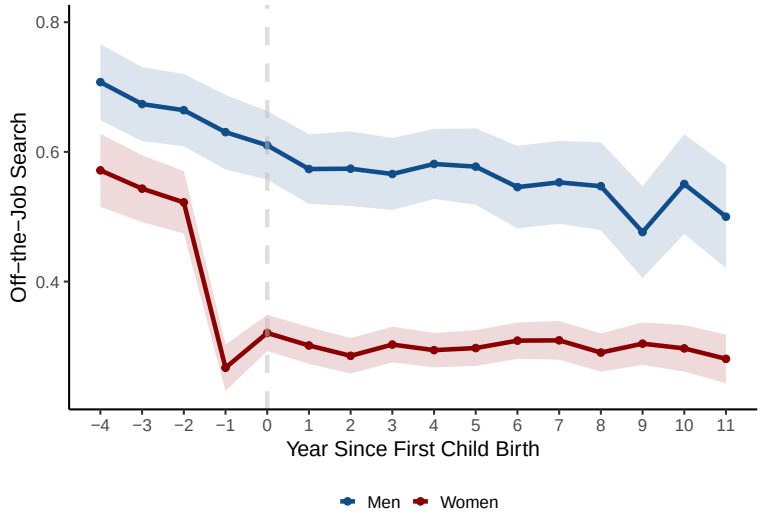
A.1 Hours, Employment and Earnings around Birth



A.2 EN and NE Transitions



A.3 Off-The-Job Search



A.4 Job-To-Job-Switching by Number of Children

