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 estimate the model and quantify a novel child penalty channel: 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. A recent reform that eliminated tenure requirements for parental leave increased job switching before birth but decreased employment.

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 toghether in one framework and provide a comprehensive analysis of how their contribution to the child penalty. In particular, we examine how wages, amenities, job search, job switches and labor supply are jointly determined over women's life-cycle.

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 or two years 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. We allow the search cost to vary with age, pregnancy status, and the age of the youngest child. 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 job offers is assumed to be invariant in the woman's characteristics, except education. The distribution of jobs is important for the trade-off between wage and amenity: if many jobs are concentrated along the off-diagonal, that is, they 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 most jobs are situated along the diagonal, then job search can allow women to obtain the best of both worlds, and move to jobs with higher wages and higher amenity.

We estimate the model using the method of simulated moments, making use of the high-quality Dutch 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. It is merged with cross-sectional labor force survey data, which provides information on on-the-job and off-the-job search, and job amenities pertaining to irregular work hours or overtime work. This richness of the data on job search and switching allows us to construct relevant moments to identify key parameters in the model such as search costs of mothers. In particular, we estimate firm-specific wage and amenity attributes as firm-fixed effects, allowing us to classify jobs into four discrete types, the combinations of high and low wage and amenity.

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 life-cycle implications of a policy change in the Netherlands that eliminated a tenure requirement for parental leave. Prior to the reform in 2015, 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 became no longer tied to employer-specific tenure. We expect the law change to have had a direct positive impact on new mothers' mobility since switching employers no longer signifies losing parental leave entitlement. Indeed our simulations show that job switches of pregnant women increase by 12.6% and that they move to better jobs both in terms of wage and amenity. 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 employer, 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.

To our knowledge, this is the first paper to incorporate job search and job switching decisions within a life-cycle framework. By combining features from both search and life-cycle models, we can shed light on how women's increased cost of search and value of job amenities due to children contribute to the child penalty and dynamically affect wages over the life-cycle.[1] Although the importance of job search and mobility for individual

[1] Arcidiacono et al. (2023) incorporates preference shocks in dynamic discrete choice models into

wage growth is well-established in the search literature, they are assumed away in life-cycle models. The latter typically sets wages equal to marginal productivity and does not consider different jobs that vary in wages (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 components in order to preserve stationarity and tractability. This is particularly limiting when studying women's employment, which is strongly determined by women's own age, marriage as well as the age of children. Therefore, typical search models would not allow to accurately reproduce typical event-study graphs that depict changes in employment outcomes by time to first childbirth.[2] The search framework closest to ours is Xiao (2019), who estimates a model for men and women searching for jobs at firms of varying productivity and child-friendly amenities. Her framework incorporates firms' gender discrimination but does not feature labor supply decisions nor job search decisions.

Our analysis combines various explanations of the child-penalty in the same framework. Lower labor supply and human capital depreciation of mothers, has been studied for instance, in Francesconi (2002), Adda et al. (2017), and Wang (2023). Recent papers emphasize the role of amenities. 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.[3] 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.

continuous-time search models.

[2] such as Figures 1 and 2.

[3] 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.

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

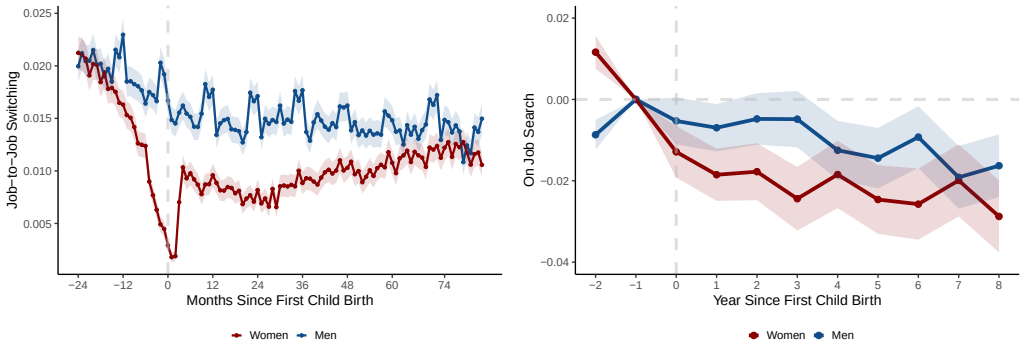
Moreover, we can identify different job types when it comes to amenity values at the firm level.

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, and Section 7 will conclude.

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

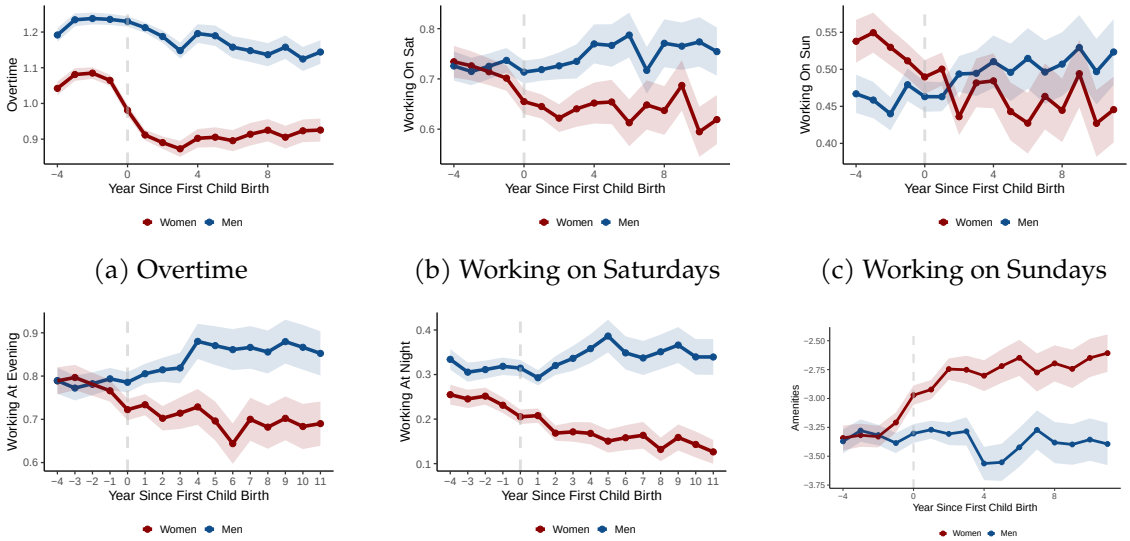
We document important empirical facts describing women's endogenous job search, switching, and amenity choices around childbirth. Figure 1 shows the changes in job search and switching rates for men and women by the time until the birth of the first child. Compared to men, expecting mothers start to 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.[4] 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

[4]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

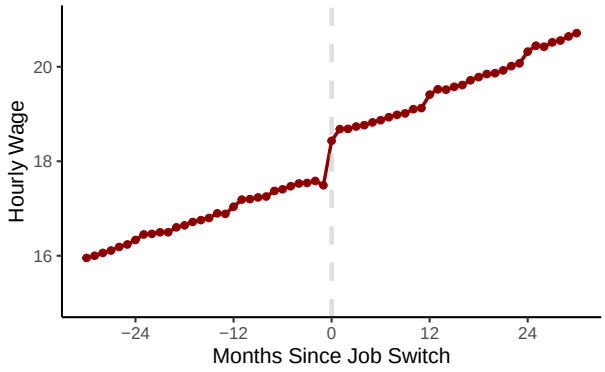


(a) Overtime (b) Working on Saturdays (c) Working on Sundays

(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

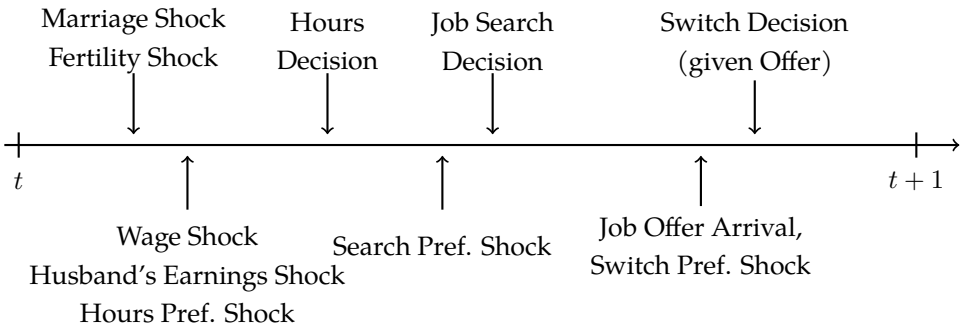


	Hourly Wage	
Switch	0.721	0.744
	(0.023)	(0.056)
t	0.069	0.064
	(0.001)	(0.002)
N	842967	842967
Indiv. FE	Yes	No

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.[5] 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.

[5] 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.[6] 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

[6] 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).[7]

[7] 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.[8]

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

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.

[8] 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.[9] 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.

[9] 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.

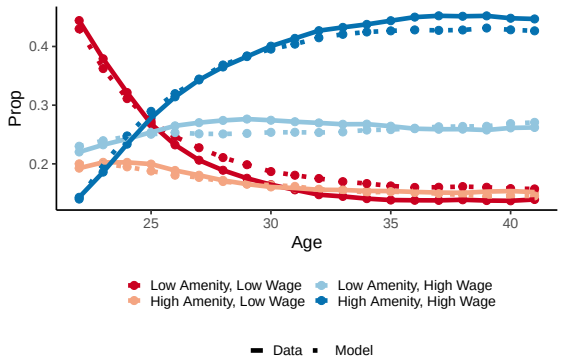
Tables 4 shows that our model can replicate the job type to job type transition rates almost perfectly, while Table 5 shows it can also generate higher transition rates for mothers and low-wage jobs just as there are in the data.

6 Counterfactual Simulation

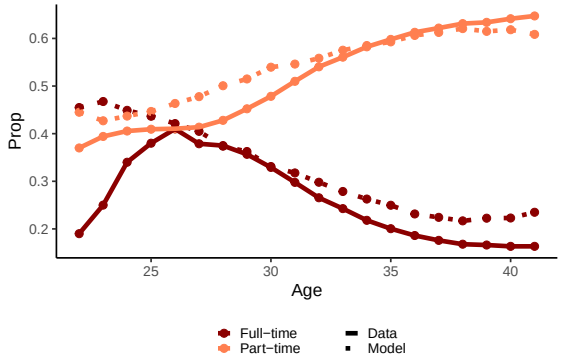
6.1 Child-Related Search Costs

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

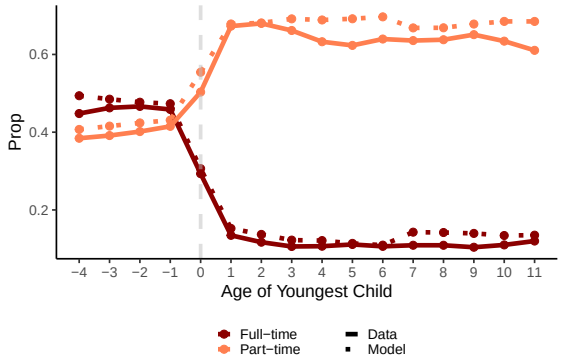
Figure 4: Model Fit



(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%.

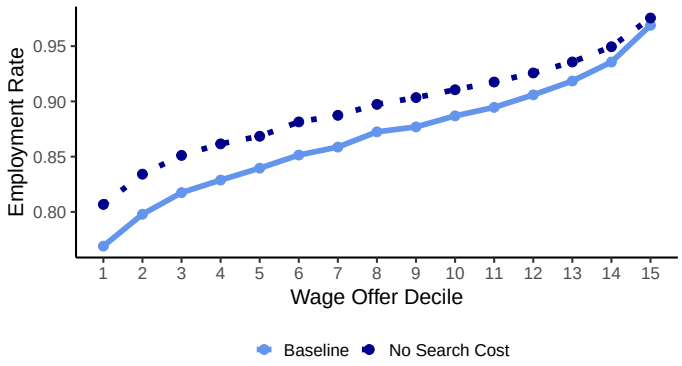
Figure 5 further illustrates how high amenity affects women's labor supply, thus discounted lifetime earnings. For any given wage offer, women are more likely to work in the counterfactual scenario with low search costs, since they are more likely to have a high amenity job and therefore face lower work 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

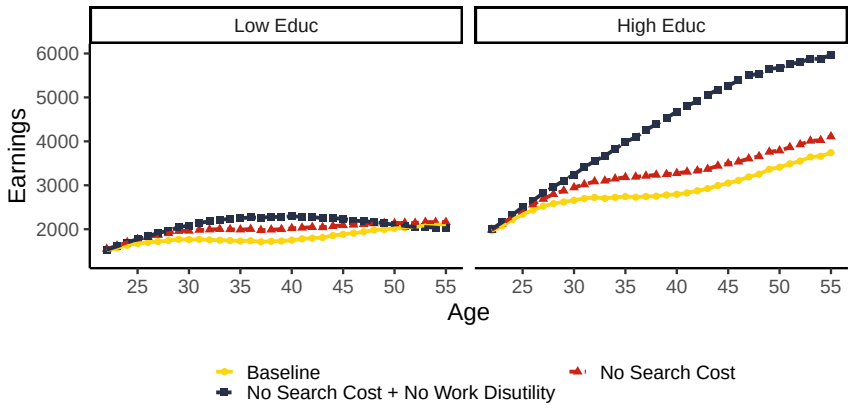


We conclude that low search costs allow many women to switch to both higher wages and higher amenity jobs on average and contribute significantly towards closing the child penalty. The wage-amenity trade-off is not very pronounced, as many women can switch along diagonal job types as opposed to along 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.[10] 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 2015 Parental Leace Tenure Reform

Now we turn to simulate the effect 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

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

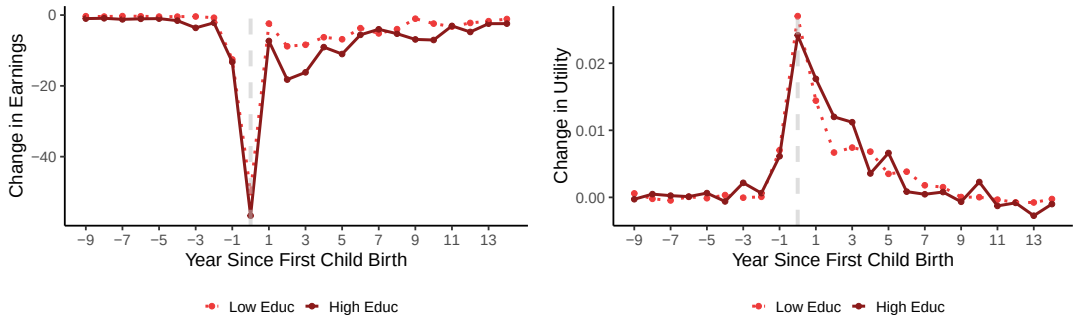
Table 7: Counterfactual Results - No Amenity Value

	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%

at least one year were eligible for unpaid 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.

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. Table 6 shows the simulated effects of this reform. Pregnant women are 2 percentage points more likely to switch jobs, since they no longer have incentive to hold one-year-long tenure prior to having a child. They are able to switch to slightly better jobs, the percentabe 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.

Figure 7: Simulation of PL Reform Effects: Changes in Earnings and Utility Around First Birth



Despite small effects on lifetime earnings, there are sizeable contemporaneous effects around the birth of the first child. Figure 7 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.

Table 8: 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 regu-

lar 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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A Appendix

A.1 Hours, Employment and Earnings around Birth