Family-Friendly Policies and Fertility: What Firms Got to Do With It?*

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PRELIMINARY

Abstract

Family-friendly policies aim to help women balance work and family life and to encourage them to enter and stay in the labor market. Implicitly or explicitly, such policies also encourage fertility since having a child makes the balancing act much harder for working women. How effective are such policies in increasing fertility? We answer this question using a search model of the labor market where firms make hiring, promotion, and firing decisions, taking into account how these decisions affect their workers' fertility incentives. Workers, on the other hand, make labor force participation and fertility decisions, again understanding how these decisions affect their labor market prospects. We calibrate the model using administrative data from Spain, a country with very low fertility and a highly regulated labor market. We use the quantitative model to study family-friendly policies and show that firms' reactions generate a trade-off: policies that increase fertility reduce women's participation in the labor market and depress lifetime earnings.

Keywords: Family-Friendly Policies, Fertility, Flexibility, Search and Matching, Human Capital Accumulation, Gender Gaps, Welfare

JEL Codes: J08, J13, J18

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1 Introduction

Fertility rates in high-income countries have fallen to alarmingly low levels, with averages such as 1.8 in the U.S., 1.6 in Germany, and 1.3 in Spain. This demographic trend has sparked widespread concern due to its potential socioeconomic consequences, including aging populations and declining workforces. While a variety of factors contribute to low fertility, barriers to balancing labor market participation and family life are increasingly recognized as pivotal. Research has also shown that having children imposes significant, long-term scarring effects on women's earnings and limits their career progression.

To address these challenges, high-income countries have implemented a wide range of family-friendly policies, e.g., childcare subsidies, parental leave, and flexible working hours. These policies have been studied extensively for their effects on female labor supply, gender wage gap, and fertility, yielding valuable insights. However, an important piece of the puzzle remains largely unexplored: the role of firms. Firms play a crucial role in shaping the effectiveness of family-friendly policies and their broader implications for fertility, labor market outcomes, and women's welfare. On the one hand, such policies can increase firms' labor costs, potentially reducing demand for female workers, particularly mothers (Olivetti and Petrongolo, 2017). On the other hand, as the pre-labor-market human capital of men and women converges, the occupational choices of women become key to understanding the persistent gender wage gap (Goldin, 2014), and family-friendly policies can significantly influence these choices.

This paper builds and estimates a search and matching model to study how family-friendly policies affect fertility. The economy is populated by male and female workers. The model economy has four building blocks. First, workers experience employment and non-employment spells, building human capital while working. Second, jobs differ how fast women can accumulate human capital. In some jobs, which, following Goldin (2014), are labeled as non-flexible, women accumulate human capital at a lower rate and more so if they have children. Third, labor markets have a dual structure; jobs start as temporary (or fixed-term) with low firing costs and high separation rates, and firms make a promotion decision whether to make them permanent (or open-ended) with higher firing costs and lower separations. Finally, female workers decide how many children to have and when to have them.

In the model, firms make hiring, firing, and promotion decisions, understanding how these affect their workers' choices on fertility and participation. On the other hand, female workers' decisions on fertility understand how these choices affect their hiring, promotion, and firing probabilities.

The model economy is estimated using Spain as a case study. Spain's labor market provides an ideal set-up for this investigation, with a high prevalence of temporary contracts, especially among women—and its low fertility rate. Spain also presents a unique family-friendly policy, which we exploit to discipline model parameters. The 1999 Work and Family Reconciliation Act allows parents with a child up to age 6 to ask for part-time work (which we call a workweek reduction). The firms are obliged to grant such requests and, more importantly, are not allowed to fire workers as long as they are in workweek reduction. While this might not be a constraint for temporary contracts, which typically have short durations, the regulation provides flexibility and job protection for women with young children who work with a permanent contract.

The benchmark economy is estimated with data for the 2005-2015 period. Hence, workers in the benchmark can opt for a workweek reduction. They also enjoy existing parental leave policies, which entitle mothers to 80% of their contracted wages for 4 months following the birth of a newborn. The main data source for the quantitative analysis is the 2005-2015 Continuous Sample of Working Lives (Muestra Continua de Vidas Laborales con Datos Fiscales, MCVL). The MCVL is a 4% random sample of individuals registered to the Spanish Social Security during a reference year. Starting from a reference year, e.g., 2015, and going back, the MCVL traces the social security records of individuals up to their first employment, allowing us to construct a panel. The MCVL is also matched with the municipality records, which provide additional information, such as education for the reference person, and basic information on other household members, including gender and date of birth.

The model does an excellent job of generating a life-cycle profile of the share of women in temporary jobs, the gender wage gap, and fertility that we observe in the data. It also matches employment and wage growth in inflexible and nonflexible jobs. In the data, we characterize flexible and nonflexible jobs as those where men work less or more than 50 hours per week, following Cortés and Pan (2019). The model captures well the share of women who choose a workweek reduction. Finally, when we compare the model economy with and without the workweek reduction policy, we find that in an economy with workweek reduction, firms promote women from temporary to permanent contracts at a lower rate. This is consistent with available empirical evidence that exploits this policy to conduct a difference-in-difference analysis to estimate the causal negative effect of the policy on the promotions of women (Fernández-Kranz and Rodríguez-Planas, 2021). Furthermore, we choose our parameters so that the model matches the elasticity of promotion with respect to the workweek reduction policy that we estimate in the data.

We use the model economy as a quantitative laboratory to study a range of policies to understand how they affect female earnings and fertility. The policies we study can be grouped into three categories. The first group pertains to policies that affect dual labor markets, such as the introduction of a unique contract or higher or lower firing costs for permanent contracts. In the second group, we examine the effects of maternity leave and workweek reduction. Finally, we also study policies that provide direct financial incentives to workers or firms, such as child subsidies for mothers or subsidies for hiring and promoting women for firms.

We find that across different policies, a trade-off emerges: policies that increase fertility tend to lower lifetime earnings for women. For example, by eliminating fixed-term contracts so that all contracts have a relatively higher firing cost, the government can increase the total fertility rate from 1.70 to 2.20. This happens as more women enjoy job security provided by permanent contracts. However, this policy would lower the employment of mothers and their lifetime earnings by 14.41 p.p. and 17.37%, respectively. As firms are much less willing to hire women, so they spend a larger share of their lives as non-employed and do not buy as much human capital as in the benchmark economy. In contrast, by eliminating the existing workweek reduction policy, the government can increase female employment and lifetime earnings by 4.38 p.p. and 7.84%. Yet the fertility rate would decline from 1.70 to 1.66. Now, hiring and promoting a woman is less costly for firms. But, having children is less attractive for women since they lose the option of working part-time.

2 Model

The model economy has four key components. First, there are labor market frictions captured by a matching function, and workers move between employment and non-employment, gaining human capital while working and losing it otherwise. Second, some jobs are non-flexible and offer lower human capital accumulation for women, especially those with children. Third, the labor market has a dual structure: jobs begin as temporary with low firing costs and high turnover, and firms later decide whether to make them permanent, increasing job security. Finally, female workers choose the timing and number of children, balancing these decisions with their employment prospects. Firms, in turn, make hiring, firing, and promotion decisions, considering their impact on workers' fertility and participation choices, while female workers weigh these employment factors in their fertility decisions.

2.1 Demographics

Consider an economy populated by an equal number of women, indexed by w, and men, indexed by m. Time is discrete, and individuals potentially live forever, but in each period, they face a constant probability ρ^d of death. They discount the future at rate $\widetilde{\rho}$. Let $\rho = \widetilde{\rho}(1 - \rho^d)$ denote the effective discount factor.

Women are heterogeneous: they differ in their human capital level, or abilities, $a \in$

$\mathcal{A} := \{\underline{a}, .., a_i, .., \bar{a}\}$, and in the number of children living in the household, $n \in \mathcal{N} = [0, 1, 2, 3, ...]$. Men are homogeneous: they possess the same level of human capital, which is normalized to one, and have no child attached to them. Furthermore, as explained below, men and women search for jobs in the labor market and can be employed or non-employed. Finally, while men only value consumption, women get utility from having children, equal to $\gamma_e n$ when employed, and $\gamma_u n$ when they are not employed.

2.2 Fertility

Every period, women have the opportunity of having a new child with a probability $\sigma(n)$, which differs by the number of children already in the house. Conditional on this opportunity, women decide whether to have another child or not. Having a newborn entails a one-time fixed cost, κ_n. Each period, children in the household become teenagers and leave the house with probability ρ^n, and upon this event, women become childless again.

2.3 Jobs and Human Capital Accumulation

Jobs for women can be under temporary or permanent contracts. A share χ_p of new jobs starts as temporary, and the rest starts as permanent. For men, all contracts start as permanent. Each period, firms decide whether to convert a temporary job to a permanent one. If a firm decides not to promote a worker, they might still be forced to convert a temporary contract to a permanent one or dismiss the worker, with an exogenous probability π^t.

Jobs, permanent or temporary, can be terminated by firms. Termination of a temporary job comes at no cost. Termination of a permanent job comes at a cost: there are red-tape firing costs, denoted by f_p. Jobs get also destroyed exogenously with probabilities, δ_w^t and δ_w^p. Permanent jobs held by men are exogenously destroyed with probability δ_m^p.

Jobs can be flexible or non-flexible, indexed by $j \in \{0, 1\}$. Non-flexibility jobs, $j = 0$, result in lower human capital accumulation, as women have a harder time combining work and family responsibilities. The share of flexible jobs is given by χ_f.

Each woman enters the labor market with an initial level of human capital, a_0, drawn from a distribution $\Gamma_w^0(a)$. We assume that the initial cumulative distribution is log-normal, given by,

$$\Gamma_w^0(a) = \log\mathcal{N}\left(-\frac{\alpha_a^2}{2}, \alpha_a\right).$$

After the initial draw, women's human capital changes endogenously during employment. We assume employed women face a one-step jump forward in human capital with probability $\pi^e_w(j,n)$, which depends on the type of job and the number of children. The function $\Gamma^e_w(a'|a,j,n)$ is parametrized as follows:

$$a' = \begin{cases} a + \Delta, & \text{with probability} \quad \pi^e_w(j,n), \\ a, & \text{otherwise,} \end{cases}$$

where jump magnitude is independent of h and equal to a fixed predetermined value, $\Delta > 0$. It is assumed that the jump probability is higher for flexible jobs, i.e., $\pi^e_w(1,n) > \pi^e_w(0,n)$ when $n > 0$.

2.4 Labor Market Frictions

The labor market is subject to search and matching frictions. To hire workers, firms need to post vacancies, which costs κ_v. To find a job, workers need to search. The search is random, and only the non-employed can search. Let u be the measure of non-employed workers and v be the aggregate measure of job openings. The number of new contacts between workers and firms each period is equal to

$$m(u,v) = \eta\sqrt{Uv},$$

where $\eta > 0$ governs the matching efficiency. This function implies a job contact rate for workers given by

$$\phi_u = \frac{m(u,v)}{v} = \eta\sqrt{\theta^{-1}},$$

and a worker contact rate for firms given by

$$\phi_u = \frac{m(u,v)}{u} = \eta\sqrt{\theta},$$

where $\theta = v/U$ is the equilibrium labor market tightness.

Hence, men and women search in the same market and enter the same pool of non-employed individuals. Let $\psi^u_w(a,n)$ be the distribution of non-employed woman workers with characteristics (a,n) respectively. Let $\mu^u_w = \int\int \psi^u_w(a,n)dadn$ be the shares of women who are non-employed. Similarly, let μ^u_m be the share of non-employed men. If a firm gets in contact with a worker, the worker will be a woman of type-(a,n) with probability $0.5\mu^u_w\psi^u_w(a,n)$, and a man with probability $0.5\mu^u_m$.

Individuals who fail to form a match sustain themselves by means of a benefit, b_m and b_f, which is allowed to differ between men and women.

2.5 Production

Output is produced by worker-firm pairs. Once firms and workers get in contact, they draw a productivity level z from $\Lambda(z)$, which is set to be uniform over the unit interval, and decide whether to form a match. We assume that each period firms draw a new z from $\Lambda(z)$, with probability φ_z. A faction χ_f of worker-firm pairs operate in flexible jobs, with $j = 1$, while the rest are non-flexible. Unlike z, the index j of a match does not change over time.

Production of men-firm pairs does not depend on productivity level. The output produced by a match between a firm and a man, y_m, is constant and equal to an aggregate shifter A, i.e.,

$$y_m = A$$

Consider a woman with human capital a and n children matched with a type$-j$ firm with productivity z. This match produces $y_w(z, a, n)$ units of final output, equal to:

$$y_w(z, a, n) = (1 - \omega_g)Aza$$

where the parameter ω_g captures an exogenous gender gap. Finally, production requires a fixed cost of operation, specific to the nature of the contract, c^t and c^p.

2.6 Wages

Wages are determined as the solution of a bargaining protocol as in Binmore et al. (1986) and Hall and Milgrom (2008). In this protocol, threats of permanent suspension of negotiations are not credible: even with a breakdown, the firm will wish to resume negotiations with the same worker in the subsequent period. Temporary disruption of production due to a delayed agreement is the only credible threat in the negotiation. Since wages are renegotiated every period, the effective surplus is the marginal flow surplus.

Bargaining problem for men. Consider now the bargaining problem of a firm with a man. The sharing rule reads as follows:

$$\beta[A - w_m] = (1 - \beta)[w_m - b_m],$$

which leads to the following wage solution:

$$w_m = (1 - \beta)b_m + \beta A.$$

Bargaining problem for women. Consider the bargaining problem of a woman with skill a, and n children, matched under temporary contract with match productivity z. The sharing rule is given by

$$\beta[(1-\omega_g)Aza - w_w^t(z,a,n)] = (1-\beta)[w_w^t(z,a,n) - (b_w + (\gamma_e - \gamma_e)n)],$$

where $\beta \in (0,1)$ denotes the worker's bargaining power. The term $b_w + (\gamma_e - \gamma_u)n$ denotes the flow value of non-employment, which sums benefits b_w, and the net monetary utility of children, $(\gamma_e - \gamma_u)n$. This rule implies the following wage schedule:

$$w_w^t(z,a,n) = (1-\beta)[b_w + (\gamma_u - \gamma_e)n] + \beta[(1-\omega_g)Aza].$$

Following the same protocol solution as above, the wage for a woman employed under a permanent contract takes the same functional form, i.e.,

$$w_w^p(z,a,n) = w_w^t(z,a,n)$$

Notice that when $n = 0$, the wage schedule reduces to:

$$w_w^p(z,a) = w_w^t(z,a) = (1-\beta)b_w + \beta(1-\omega_g)Aza.$$

2.7 Maternity Leave

Employed women are assumed to take maternity leave after childbearing. Maternity leave ends stochastically with probability ϱ and provides women ι fraction of their contracted wage, i.e.,

$$w_w^l(z,a,n) = \iota w_w^c(z,a,n), \quad \forall c \in \{t,p\}.$$

During maternity leave, women do not work and enjoy utility from children as if they are not working, given by $\gamma_u n$. Their human capital stays intact.

2.8 Workweek Reduction

Women who are employed with a permanent contract and have children in the household are also entitled to a work-week reduction (WWR, henceforth). Under WWR, they work a lower number of hours and are protected from being fired.

Compared to women who are working full time, women in WWR enjoy a higher level of utility from children, given by $\gamma_e + \gamma_r$, where the second term is a utility bonus from WWR. This bonus captures then the fact that mothers on WWR can spend more time with their children. On the other hand, their production is reduced by an amount

$\omega_r \in (0,1)$,

$$y_w^r(z,a,n) = (1-\omega_g)\omega_r Aza.$$

Because they work a reduced number of hours, women under workweek reduction receive a wage equal to

$$w_w^r(z,a,n) = \bar{\omega}_r w_w^p(z,a,n),$$

where $\bar{\omega}_r \in (0,1)$ is a parameter governing the wage penalty from working reduced hours.

Finally, it is also assumed that women in WWR accumulate human capital at a lower rate. For a worker in job j with n children, it is assumed that the probability of a human capital jump is given by $\bar{\omega}_r \pi_w^e(j,n)$.

3 Decisions by Workers and Firms

3.1 The Problem of a Woman

Value of being employed with a temporary contract. Consider a woman with skill a and $n \geq 0$ children, matched to a job in occupation j and productivity z. Consider first the case when $n = 0$. The value of being employed under a temporary contract denoted is given by

$$\begin{aligned} V_w^{e,t}(z,a,0,j) = {} & w_w^t(z,a,0) \\ & + \rho\sigma(0) \sum_{a' \in \mathcal{A}} \max\{\bar{V}_w^{e,t}(z,a',0,j), \bar{V}_w^{l,t}(z,a',1,j) - \kappa_n\} \Gamma_w^e(a'|a,j,0) \\ & + \rho(1-\sigma(0)) \sum_{a' \in \mathcal{H}} \bar{V}_w^{e,t}(z,a',0,j) \Gamma_w^e(a'|h,j,0), \end{aligned}$$

where the first term is her current wage, and the next two lines indicate what can happen in the future. Next period, with probability $\sigma(0)$, she has the opportunity to have a child and compares the values of having 0 or 1 child next period, which is captured by the max operator. If she decides to have a child, she needs to pay the one-time cost of having a child, κ_n, and start the next period in maternity leave with a start-of-the-period value function $\bar{V}_w^{l,t}(z,a',n,j)$. If she does not have this fertility opportunity, then she starts her life as someone who is employed at the start of the next period with a temporary job, with an associated value function given by $\bar{V}_w^{e,t}(z,a',0,j)$. In both cases, she starts the next period with a human capital level a', and her human capital accumulation depends on her job j and the number of children, n, captured by the law of motion $\Gamma_w^e(a'|a,j,0)$.

The problem of women with $n > 0$ children in a temporary contract is given by

$$\begin{aligned}
V_w^{e,t}(z,a,n,j) &= w_w^t(z,a,n) + \gamma_e n \\
&+ \rho\rho^n \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,t}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\
&+ \rho(1-\rho^n)(1-\sigma(n)) \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,t}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\
&+ \rho(1-\rho^n)\sigma(n) \sum_{a' \in \mathcal{A}} \max\{\bar{V}_w^{e,t}(z,a',n,j), \bar{V}_w^{l,t}(z,a',n+1,j) - \kappa_n\}\Gamma_w^e(a'|a,j,n).
\end{aligned}$$

There are two differences between this value function and the previous one. First, a working woman with children enjoys the extra utility of $\gamma_e n$ from having children. Second, with probability ρ^n, her children can leave the house, and she can become childless. This is captured in the second line.

Next, we define the start-of-the-period value functions. $\bar{V}_w^{e,t}(z,a,n,j)$ is the continuation value of being employed under a temporary contract, given by,

$$\begin{aligned}
\bar{V}_w^{e,t}(z,a,n,j) &= [\delta_w^t + (1-\delta_w^t)\mathbf{1}_w^{f,t}(z,a,n,j)]V_w^u(a,n) \\
&+ (1-\delta_w^t)(1-\mathbf{1}_w^{f,t}(z,a,n,j)) \max\{\mathrm{E}V_w^{e,t}(z,a,n,j), V_w^u(a,n)\}.
\end{aligned}$$

If her job is destroyed, which happens with probability δ_w^t, or if she is fired, indicated by her firm´s decision $\mathbf{1}_w^{f,t}(z,a,n,j)$, then she will be non-employed next period and enjoy $V_w^u(a,n)$, which is defined below. Otherwise, she keeps her job but can choose to quit, which is captured with the max operator in the second line. If she decides to keep her job, several things can happen which are captured by the $\mathrm{E}V_w^{e,t}(z,a,n,j)$ term,

$$\begin{aligned}
\mathrm{E}V_w^{e,t}(z,a,n,j) &= \pi^t \mathbf{1}_w^{c,t}(z,a,n,j) \sum_{z' \in \mathcal{Z}} V_w^{e,p}(z',a,n,j)\Lambda(z'|z) \\
&+ \pi^t(1-\mathbf{1}_w^{c,t}(z,a,n,j))V_w^u(a,n) \\
&+ (1-\pi^t)\mathbf{1}_w^{p,t}(z,a,n,j) \sum_{z' \in \mathcal{Z}} V_w^{e,p}(z',a,n,j)\Lambda(z'|z) \\
&+ (1-\pi^t)(1-\mathbf{1}_w^{p,t}(z,a,n,j)) \sum_{z' \in \mathcal{Z}} V_w^{e,t}(z',a,n,j)\Lambda(z'|z).
\end{aligned}$$

With probability π^t, the firm is forced to convert her temporary contract to a permanent one or fire her. The indicator function $\mathbf{1}_w^{c,t}(z,a,n,j)$ represents the conversion decision of her firm. If her contract becomes permanent, she enjoys $V_w^{e,p}(z',a,n,j)$, which is defined below. Otherwise, she becomes non-employed, which is the second line in the equation. If the firm is not forced to make a conversion decision, it can still choose to promote her to a permanent job, indicated by $\mathbf{1}_w^{p,t}(z,a,n,j)$. Whenever she stays employed as a temporary or permanent worker, there is a new draw of math productivity, given by $\Lambda(z'|z)$.

Note that the value of starting the next period with a temporary contact in a given firm depends on what firms will decide about firings, conversions and promotions, captured by the indicators functions $\mathbf{1}_w^{f,t}(z,a,n,j)$, $\mathbf{1}_w^{c,t}(z,a,n,j)$ and $\mathbf{1}_w^{p,t}(z,a,n,j)$. Hence, women take her firm's decisions as given and decide on their actions. These indicators will result from firms' optimal decisions, which will, in turn, take the optimal decisions of women as given.

The start-of-the-period value of being on maternity leave for a woman in a temporary contract is given by

$$\bar{V}_w^{l,t}(z,a,n,j) = w_w^l(z,a,n) + \gamma_u n + \rho[(1-\varrho)\bar{V}_w^{l,t}(z,a,n,j) + \varrho\bar{V}_w^{e,t}(z,a,n,j)],$$

where the first term captures her current utility. She received an ι fraction of her wage and enjoys having children at home captured by γ_n term. Next period with probability ϱ, her maternity leave continues. Otherwise, she start the next period as someone with a temporary job at hand.

These value functions defined two indicator functions for women employed in a temporary contract. First, women decide to have a new baby whenever its value is higher, i.e.,

$$\mathbf{1}_w^{n,t}(z,a,n,j) = \begin{cases} 1 & \text{if} \quad \bar{V}_w^{l,t}(z,a,n+1,j) \geq \bar{V}_w^{e,t}(z,a,n,j) + \kappa_n, \\ 0 & \text{otherwise.} \end{cases}$$

Second, women have the option to quit their jobs if their value of being non-employed is higher, i.e.,

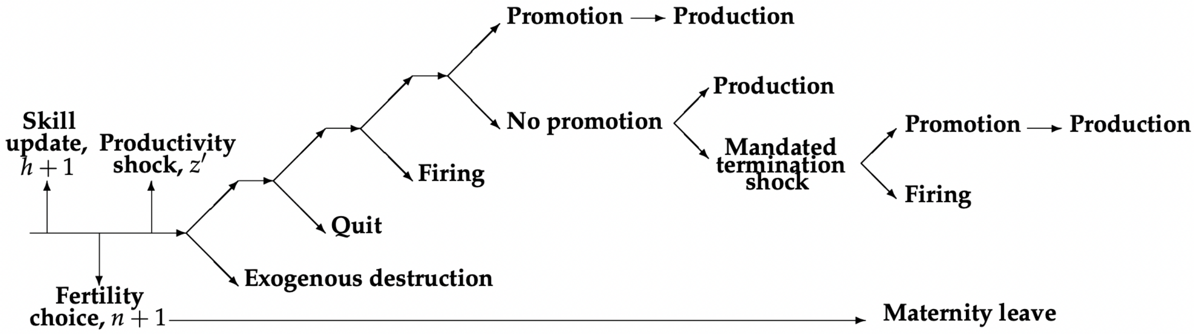
$$\mathbf{1}_w^{q,t}(z,a,n,j) = \begin{cases} 1 & \text{if} \quad V_w^u(a,n) \geq \mathrm{E}V_w^{e,t}(z,a,n,j), \\ 0 & \text{otherwise.} \end{cases}$$

Figure 1 summarizes the timing of events and decisions for a woman employed in fixed-term contracts.

Value of being employed with a permanent contract. Next, we turn to the problem of a woman who is employed with a permanent contract. The problem looks similar to the one faced by a woman with a temporary contract. One difference is that the firm has no decision on whether or not to convert the contract or promote it to a permanent one. The other difference is that a woman with a permanent contract has the option of being in WWR.

The values of being employed under permanent contracts in occupation j and productivity z for women with skill a and either 0 or $n > 0$ children, denoted by $V_w^{e,p}(z,a,0,j)$

Figure 1: Timing of women employed in FTCs



Notes: This figure displays the timing of the events and decisions for a women employed in fixed-term contract (FTC).

and $V_w^{e,p}(z,a,n,j)$, are equal to:

$$
\begin{aligned}
V_w^{e,p}(z,a,0,j) &= w_w^p(z,a,0) \\
&\quad + \rho(1-\sigma(0)) \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,0) \\
&\quad + \rho\sigma(0) \sum_{a' \in \mathcal{A}} \max\{\bar{V}_w^{e,p}(z,a',0,j), \bar{V}_w^{l,p}(z,a',1,j) - \kappa_n\}\Gamma_w^e(a'|a,j,0),
\end{aligned}
$$

and

$$
\begin{aligned}
V_w^{e,p}(z,a,n,j) &= w_w^p(z,a,n) + \gamma_e n \\
&\quad + \rho\rho^n \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\
&\quad + \rho(1-\rho^c)(1-\sigma(n)) \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\
&\quad + \rho(1-\rho^c)\sigma(n) \sum_{a' \in \mathcal{A}} \max\{\bar{V}_w^{e,o}(z,a',n,j), \bar{V}_w^{l,p}(z,a',n+1,j) - \kappa_n\}\Gamma_w^e(a'|a,j,n).
\end{aligned}
$$

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There are, again, several state-of-the-period values that characterize what happens next period. The value of being on maternity leave for a woman in a permanent contract is given by

$$
\bar{V}_w^{l,p}(z,a,n,j) = w_w^l(z,a,n) + \gamma_u n + \rho[(1-\varrho)\bar{V}_w^{l,p}(z,a,n,j) + \varrho\bar{V}_w^{e,o}(z,a,n,j)].
$$

When a woman with children is not on maternity leave, she has the option of choosing to work full-time or with reduced hours. This choice is determined by

$$
\bar{V}_w^{e,o}(z,a,n,j) = \max\{\bar{V}_w^{e,p}(z,a,n,j), \bar{V}_w^{e,r}(z,a,n,j)\}.
$$

The value of starting the next period with a permanent contract and working full-time is determined by

$$
\begin{aligned}
\bar{V}_w^{e,p}(z,a,n,j) = & \, [\delta_w^p + (1-\delta_w^p)\mathbf{1}_w^{f,p}(z,a,n,j)V_w^u(a,n)] \\
& + (1-\delta_w^p)(1-\mathbf{1}_w^{f,p}(z,a,n,j))\max\{\mathrm{E}V_w^{e,p}(z,a,n,j), V_w^u(a,n)\},
\end{aligned}
$$

where, again, a woman can lose her job as a result of exogenous job destruction or firing (the first line), and if that does not happen, she can decide to quit (the second line). The expected value operator in the second line captures uncertainty with respect to z, i.e.,

$$
\mathrm{E}V_w^{e,p}(z,a,n,j) = \sum_{z' \in \mathcal{Z}} V_w^{e,p}(z',a,n,j)\Lambda(z'|z).
$$

On the other hand, if a woman starts the next period in WWR, she can't be fired. Hence, as long as she has a child at home and her job is not destroyed, she can be in WWR if she prefers to do so. Therefore, the function $\bar{V}_w^{e,r}(z,a,n,j)$ is given by

$$
\bar{V}_w^{e,r}(z,a,n,j) = \delta_w^r V_w^u(a,n) + (1-\delta_w^r)\max\{\mathrm{E}V_w^{e,r}(z,a,n,j), V_w^u(a,n)\}
$$

where

$$
\mathrm{E}V_w^{e,r}(z,a,n,j) = \sum_{z' \in \mathcal{Z}} V_w^{e,r}(z',a,n,j)\Lambda(z'|z).
$$

and

$$
\begin{aligned}
V_w^{e,r}(z,a,n,j) = & w_w^r(z,a,n,j) + (\gamma_e + \gamma_r)n \\
& + \rho\rho^c \sum_{a' \in \mathcal{A}} \bar{V}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\
& + \rho(1-\rho^c)(1-\sigma(n)) \sum_{a' \in \mathcal{A}} \tilde{V}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\
& + \rho(1-\rho^c)\sigma(n) \sum_{a' \in \mathcal{A}} \max\{\bar{V}_w^{e,o}(z,a',n,j), \bar{V}_w^{e,o}(z,a',n+1,j)\}\Gamma_w^e(a'|a,j,n).
\end{aligned}
$$

In the last equation, a woman in WWR receives $w_w^r(z,a,n,j)$ as wage and enjoys $\gamma_e + \gamma_r)n$ from having children. Note that if her children become teenagers, which happens with a probability ρ^c, she will start the next period with a permanent contract. Otherwise, she decides whether to stay in WWR or go back to full-time work, which is captured by $\bar{V}_w^{e,o}(z,a,n,j)$

The solutions to these problems define a birth indicator for women employed in a permanent contract without and with children, i.e.,

$$\mathbf{1}_{w}^{n,p}(z,a,0,j)=\begin{cases}1 & \text{if} \quad \bar{V}_{w}^{l,p}(z,a,1,j)\geq \bar{V}_{w}^{e,p}(z,a,0,j)\\ 0 & \text{otherwise}\end{cases}$$

and

$$\mathbf{1}_{w}^{n,o}(z,h,n,j)=\begin{cases}1 & \text{if} \quad \bar{V}_{w}^{l,p}(z,a,n+1,j)\geq \bar{V}_{w}^{e,o}(z,a,n,j)\\ 0 & \text{otherwise}\end{cases}$$

They also define indicator function for WWR take-up for women with children, given by,

$$\mathbf{1}_{w}^{e,r}(z,a,n,j)=\begin{cases}1 & \text{if} \quad \bar{V}_{w}^{e,r}(z,a,n,j)\geq \bar{V}_{w}^{e,p}(z,a,n,j)\\ 0 & \text{otherwise}\end{cases}$$

and, finally, an indicator function for quitting under WWR and not, given by,

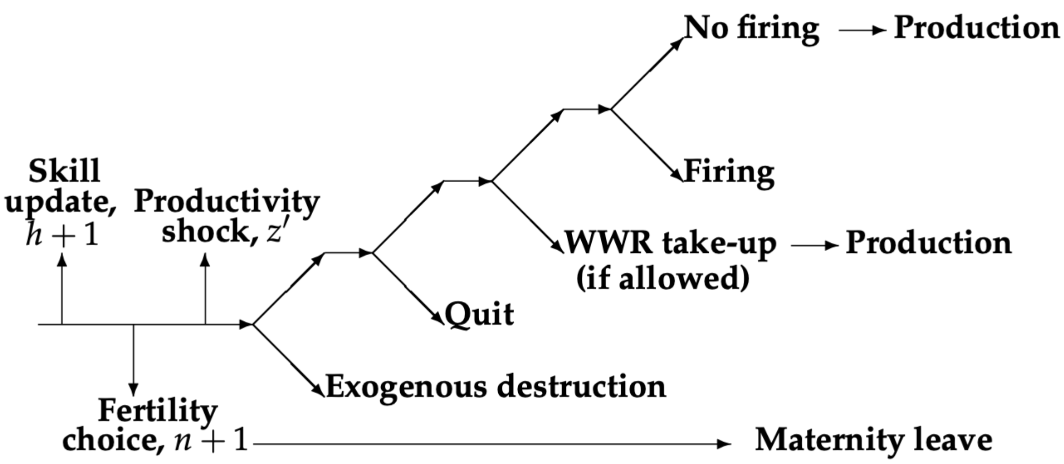
$$\mathbf{1}_{w}^{q,p}(z,a,n,j)=\begin{cases}1 & \text{if} \quad V_{w}(a,n)\geq \mathrm{E}V_{w}^{e,p}(z,a,n,j)\\ 0 & \text{otherwise}\end{cases}$$

and

$$\mathbf{1}_{w}^{q,r}(z,a,n,j)=\begin{cases}1 & \text{if} \quad V_{w}(a,n)\geq \mathrm{E}V_{w}^{e,r}(z,a,n,j)\\ 0 & \text{otherwise}\end{cases}$$

Figure 2 reports the sequence of events and decisions taken by women employed in an open-ended contract.

Figure 2: Timing of women employed in OECs



Notes: This figure displays the timing of the events and decisions for a women employed in open-ended contract (OEC).

Value of being non-employed. The value of being non-employed for a woman with skill a and either 0 or n children, denoted by $V^u_{w_1}(a,0)$ and $V^u_{w_1}(a,n)$ respectively, are equal to:

$$\begin{aligned} V^u_w(a,0) = b_w &+ \rho(1-\sigma(0))\bar{V}^u_w(a,n) \\ &+ \rho\sigma(0)\max\{\bar{V}^u_w(a,0), \bar{V}^u_w(a,1) - \kappa_n\}] \end{aligned}$$

and

$$\begin{aligned} V^u_w(a,n) = b_w + \gamma_u n + \rho\rho^n \bar{V}^u_w(h,0) \\ &+ \rho(1-\rho^n)(1-\sigma(n))\bar{V}^u_w(a,n) \\ &+ \rho(1-\rho^n)\sigma(n)\max\{\bar{V}^u_w(a,n), \bar{V}^u_w(a,n+1) - \kappa_n\}] \end{aligned}$$

where $\bar{V}^u_w(a,n)$ is the continuation value of non-employment for a women with n kids, equal to:

$$\begin{aligned} \bar{V}^u_w(a,n) = V^u_w(a,n) + \\ &\phi_u \chi_p \sum_{z\in\mathcal{Z}} \mathbf{1}^{h,t}_w(z,a,n,1)\max\{0, V^{e,t}_w(z,a,n,1) - V^u_w(a,n)\}\Lambda(z) \\ &\phi_u(1-\chi_p) \sum_{z\in\mathcal{Z}} \mathbf{1}^{h,p}_w(z,a,n,0)\max\{0, V^{e,p}_w(z,a,n,0) - V^u_w(a,n)\}\Lambda(z). \end{aligned}$$

In the last expression, ϕ_u is the job-finding rate for workers. Upon matching a firm, the firm-worker pair draws a productivity z from $\Lambda(z)$. With probability χ_p, the job is flexible, $j = 1$, and with the remaining probability, it is non-flexible, $j = 0$. The functions $\mathbf{1}^{h,t}_w(z,a,n,0)$ and $\mathbf{1}^{h,p}_w(z,a,n,0)$ indicate whether the match is acceptance to the firm. In each case, the worker decides whether to accept the job, represented by the max operators. A solution to these problems is a birth indicator for women who are non-employed, $\mathbf{1}^{n,u}_w(a,n)$, defined as follows:

$$\mathbf{1}^{n,u}_w(a,n) = \begin{cases} 1 & \text{if} \quad \bar{V}^u_w(a,n+1) > \bar{V}^u_w(a,n) + \kappa_n \\ 0 & \text{otherwise} \end{cases}$$

and an indicator for job acceptance $\mathbf{1}^{u,t}_w(z,a,n,j)$ defined as follows:

$$\mathbf{1}^{u,t}_w(z,a,n,j) = \begin{cases} 1 & \text{if} \quad V^{e,t}_w(z,a,n,j) - V^u_w(a,n) \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

3.2 The Problem of a Firm

Job value of having a woman worker under a temporary contract. We again start with the value of a worker-firm pair with a temporary contract. First, consider the value for the firm of being matched with a worker without any children, denoted by $J_w^{e,t}(z,a,0,j)$, and given by

$$\begin{aligned} J_w^{e,t}(z,a,0,j) = & \ y_w(z,a,0) - w_w^t(z,a,0) - c^t \\ & + \rho(1-\sigma(0)) \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,t}(z,a',0,j)\Gamma_w^e(a'|a,j,0) \\ & + \rho\sigma(0) \sum_{a' \in \mathcal{A}} (1 - \mathbf{1}_w^{n,t}(z,a',0,j))\bar{J}_w^{e,t}(z,a',0,j)\Gamma_w^e(a'|a,j,0) + \\ & + \rho\sigma(0) \sum_{a' \in \mathcal{A}} \mathbf{1}_w^{n,t}(z,a',0,j)\bar{J}_w^{l,t}(z,a',1,j)\Gamma_w^e(a'|a,j,0). \end{aligned}$$

The first line gives the firm´s profits, output minutes, wages, and the fixed cost of operation. If the worker does not have the opportunity to have a child period, the start-of-the-period value is given by $\bar{J}_w^{e,t}(z,a',0,j)$, where a' denotes worker's human capital next period. If the worker has an opportunity to have a child but chooses not to do so, the problem is the same (the third line). Otherwise, women will have a child and be on maternity leave with the implied start-of-the-period value of $\bar{J}_w^{l,t}(z,a',1,j)$ (the fourth line). Note that the fertility decisions, captured by the indicator function $\mathbf{1}_w^{n,t}(z,a',0,j)$, are defined by the problem of a woman worker in equation X, which firm takes as given.

What about a firm that has a woman worker with children? The problem, denoted by $J_w^{e,t}(z,a,n,j)$, is very similar, with the additional contingency that captures the possibility of children becoming teenagers:

$$\begin{aligned} J_w^{e,t}(z,a,n,j) = & \ y_w(z,a,n) - w_w^t(z,a,n) - c^t \\ & + \rho\rho^n \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,t}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^n)(1-\sigma(n)) \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,t}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^n)\sigma(n) \sum_{a' \in \mathcal{A}} (1 - \mathbf{1}_w^{n,t}(z,a',n,j))\bar{J}_w^{e,t}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^n)\sigma(n) \sum_{a' \in \mathcal{A}} \mathbf{1}_w^{n,t}(z,a',n,j)\bar{J}_w^{l,t}(z,a',n+1,j)\Gamma_w^e(a'|a,j,n). \end{aligned}$$

As we did for workers, we can define the start-of-the-period value functions that summarize what can happen to a firm that starts the next period with a particular worker. Let's start with $\bar{J}_w^{e,t}(z,a,n,j)$, the continuation value of being matched under a temporary contract with a woman who is not on maternity leave. It is given by

$$\bar{J}_w^{e,t}(z,a,n,j) = (1-\delta_w^t)(1-\mathbf{1}_w^{q,t}(z,a,n,j))\max\{0, \mathrm{E}J_w^{e,t}(z,a,n,j)\}.$$

If the match is not destroyed exogenously, which happens with probably δ_w^t, and the worker decides not to quit, captures by $[1-\mathbf{1}_w^{q,t}(z,a,n,j))]$, the firm decides whether to keep the worker. The quit decision of the worker is denied by equation X and taken as given by the firm. The value of keeping the worker is given by,

$$\begin{aligned}\mathrm{E}J_w^{e,t}(z,a,n,j) = \pi^t \max&\left\{0, \sum_{z'\in\mathcal{Z}} J_w^{e,p}(z',a,n,j)\Lambda(z'|z)\right\} \\ &+ (1-\pi^t)\max\left\{\sum_{z'\in\mathcal{Z}} J_w^{e,p}(z',a,n,j)\Lambda(z'|z), \sum_{z'\in\mathcal{Z}} J_w^{e,t}(z',a,n,j)\Lambda(z'|z)\right\}.\end{aligned}$$

With probability π^t, the firm is forced to decide whether to promote the worker or end the contract (the first line). Recall that firing a temporary contract does not imply any cost for the firm. If the firm is not forced to convert the contract to a permanent one (the second line), it can still choose to promote if the value of having the worker with a permanent contact dominates the value of keeping her as a temporary worker.

The solution to this problem defines an indicator function for the firing of a temporary worker, defined as

$$\mathbf{1}_w^{f,t}(z,a,n,j) = \begin{cases} 1 & \text{if} \quad \mathrm{E}J_w^{e,t}(z,a,n,j)) \geq 0 \\ 0 & \text{otherwise} \end{cases}.$$

It also defines an indicator function for promotion decision from temporary to permanent contract, defined as

$$\mathbf{1}_w^{p,t}(a,n,j) = \begin{cases} 1 & \text{if} \quad \sum_{z'\in\mathcal{Z}} J_w^{e,p}(z',a,n,j)\Lambda(z'|z) \geq \sum_{z'\in\mathcal{Z}} J_w^{e,t}(z',a,n,j)\Lambda(z'|z) \\ 0 & \text{otherwise} \end{cases},$$

and an indicator function for contract conversion equal to

$$\mathbf{1}_w^{c,t}(a,n,j) = \begin{cases} 1 & \sum_{z'\in\mathcal{Z}} J_w^{e,p}(z',a,n,j)\Lambda(z'|z) \geq 0 \\ 0 & \text{otherwise} \end{cases}.$$

Given $\bar{J}_w^{e,t}(z,a,n,j)$, the continuation value of having a worker with a temporary contract who is on maternity leave, is given by

$$\bar{J}_w^{l,t}(z,a,n,j) = [(1-\varrho)\bar{J}_w^{l,t}(z,a,n,j) + \varrho\bar{J}_w^{e,t}(z,a,n,j)],$$

where ϱ is the probability that the worker stays on parental leave.

In Appendix B, we show the value of having a woman worker employed in a permanent contract. The problem is similar to the one of having a worker with a temporary contract but with two differences. First, firing a permanent contract is costly. Second, a worker with a permanent contract and children has the option of being in WWR, and as long as the worker chooses to do so, the firm is obliged to keep the worker. In the same Appendix, we also report the value of having male workers for the firm.

Value of a vacant job. Finally, the value of creating a vacancy for a firm is denoted by J^v, and it is equal to:

$$J^v = -\kappa_v + \phi_v \mathrm{E} J^v,$$

where

$$\begin{aligned} \mathrm{E}J^v &= 0.5\mu_u^w \sum_{a\in\mathcal{A}} \sum_{z\in\mathcal{Z}} \sum_{j\in\mathcal{J}} \mathbf{1}_w^{u,t}(z,a,n,j) \max\{0, J_w^{e,t}(z,a,n,j)\} \psi_u^w(a,n) \Upsilon(j) \Lambda(z) \\ &+ 0.5\mu_u^m \mathbf{1}_m^u \max\{0, J_m^e\} \end{aligned}$$

where J_m^e and $J_w^{e,t}(z,a,n,j)$ are the values of filling a vacancy with a man and a woman, while μ_m^u and μ_w^u are the share of men and women who are non-employed in the economy, which are endogenous objects that reflect workers decisions. A solution to this problem is a hiring indicator for women and men workers, given by

$$\mathbf{1}_w^{h,t}(z,a,n,j) = \begin{cases} 1 & \text{if} \quad J_w^{e,t}(z,a,n,j) > 0 \\ 0 & \text{otherwise} \end{cases}$$

and for men

$$\mathbf{1}_m^h = \begin{cases} 1 & \text{if} \quad J_m^e > 0 \\ 0 & \text{otherwise} \end{cases}$$

3.3 Equilibrium

A stationary recursive competitive equilibrium for this economy is a set of value functions for men and women, a set of value functions for active and vacant jobs, policy functions for hiring into a temporary contract, promotion into a permanent contract, and separation from temporary and permanent contracts, policy functions for fertility decision, quit from temporary and permanent contracts and reduced work-time decisions, wage schedules for men and women under temporary and full-time permanent contracts, and for women with children under reduced time-work arrangement, job finding probabilities, measures of aggregate non-employment and aggregate vacancies, and the distribution of non-employed women across states, such that:

- *optimality 1*: the policy functions for hiring into a temporary contract, promotion into a permanent contract, and separation from temporary and permanent contracts are the solution to the firms' value functions;
- *optimality 2*: the policy functions for fertility decisions, quits from temporary and permanent contracts, and reduced work-time decisions are determined are the solution to the workers' value functions;
- *free entry*: jobs are created until the value of posting vacancy is equal to its cost;
- *bargaining*: wages are determined as the solution of the Binmore et al. (2006) type of bargaining problem;
- *consistency*: distributions of workers replicate themselves over time through the policy functions and flows across states.

In Appendix B.3 we describe the numerical algorithm used to solve this model.

4 Data

4.1 Muestra Continua de las Vidas Laborales (MCVL)

The primary data source for the quantitative analysis is the 2005-2015 Continuous Sample of Working Lives (Muestra Continua de Vidas Laborales con Datos Fiscales, MCVL). The MCVL is a 4% random sample of individuals registered with the Spanish Social Security during a reference year. Starting from a reference year, such as 2015, the MCVL traces individuals' social security records back to their first employment or up to 1980 for older cohorts. At any time, a working-age individual may have a social security record if they are employed or receiving unemployment benefits.

In the MCVL, the unit of observation is an individual labor market spell, which can be either employment with a specific contract (a job spell) or unemployment (an unemployment spell). Each spell is characterized by a start date, an end date, and a employer identifier.

For each individual spell in the sample, we observe:

- Basic demographic characteristics: age, gender, and the province of residence.
- Employment and earnings details: Contract type (temporary vs. permanent and public vs. private), base earnings for social security and income tax contributions, employer size, industry, and skill level (based on social security earnings group or "grupo de cotización").

- Additionally, the MCVL is matched with the Municipal Registry of Individuals (Padrón), which provides further information, such as education level for the reference person and basic demographic details of other household members, including gender and date of birth. We infer marital status, number of children, and new births using the age and gender information of all household members from the municipal records. Consequently, the sample of individuals referred to as married includes those legally married or cohabiting.

We combine all available waves of the MCVL (2005-2015) to create a panel of complete labor market histories starting in 1980 (or first employment) until 2006. We convert individual-job spell level data into individual-quarter data. For each individual, in each quarter, we identify the main (the longest) job she was working at. We aggregate several job spells within the same employer into one job spell, keeping track of changing characteristics of spells. Once we have a job assigned to a quarter, we use the characteristics of that job, such as contract type, industry, etc. Definitions and details of how we construct our main variables are reported in Appendix A.

4.2 American Community Survey (ACS)

We use the American Community Survey to calculate a measure of flexibility for each industry in the US. Specifically, we follow Cortés and Pan (2019) and calculate the share of men in the industry who report working more than 50 hours a week. For ease of interpretation, we subtract a national average of the share of males working more than 50 hours a week. The idea is that the higher the share of males working more than 50 hours a week in the industry, the less family-friendly the industry is.[1] We define as flexible (inflexible) those jobs in industries with a share of men working more than 50 hours a week below (above) the median share.

4.3 Family Reconciliation Act

On November 5, 1999, the Spanish Congress passed the 39/1999 Law to Promote the Reconciliation of Work and Family Life. According to this law, every parent with a child of up to 6 years old has the right to ask for a reduction of work-week load by 1/3 to 1/2, by submitting a two-week advanced written notice. During this period, parents enjoy a reduction in work week due to family responsibilities, i.e. until their child is less than 6 years old, he/she cannot be dismissed or laid off.[2] The main change

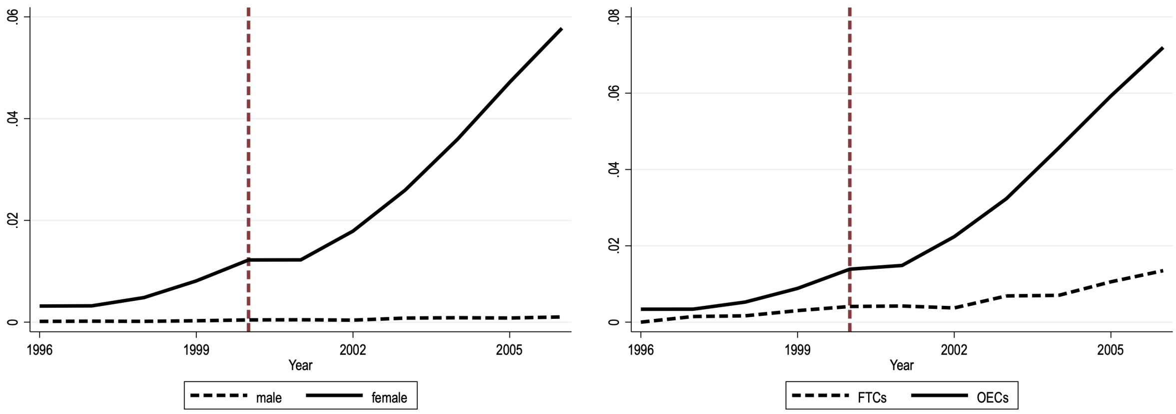
[1] We then merge ACS job flexibility measure by industry with our main MCVL dataset using the correspondence between the US industry classification (NAICS, North-American Industry Classification System, https://www.bls.gov/bls/naics.htm) and the Spanish industry classification (CNAE-2009, Clasificación Nacional de Actividades Económicas, http://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736177032&menu=ultiDatos&idp=1254735976614).

[2] In 2007 the minimum allowed work-week reduction was decreased to 1/8. The maximum age of a child was increased to 8 in 2007 and to 12 in 2012.

introduced by the law is the absence of dismissals and lay-offs for those individuals who take work-week reductions for family reasons: before 1999 parents could take a reduction of the weekly hours, but they were not protected against dismissals.

Figure 3: Work-Week Reduction Take-Up

(A) By gender **(B)** By contract type (women)



NOTES: The sample refers to native individuals (both men and women in Panel A, only women in Panel B) with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. SOURCE: MCVL 1996-2006.

Figure 3 reports the share of employed individuals choosing to work a reduced number of hours by gender (left) and by contract type (right) before and after the introduction of the Family Reconciliation Act. As opposed to men, the share of women working reduced hours increased from less than 1 percent in 1996 to to about 6 percent in 2006 (Panel A). The entire increase in work-week reduction among women was driven by those employed under open ended contracts (Panel B).

4.4 Sample Selection and Descriptive Statistics

We aggregate data at a quarterly level. We restrict our attention to the years 1996-2006. We keep native individuals between 25 and 44 years old who are continuously employed in the quarter of reference. We drop self-employed and special regimes (like household employees) and the unemployed. We also drop special working relations like internships and apprenticeships. In Table 1 we present descriptive statistics for selected variables of interest.

Within our sample of employed individuals, 42% of the observations refer to women, 23% to college educated workers, 89% to full-time employees. Workers in the sample are on average 34 years old, they have 8.6 years of labor market experience, an average tenure on the job of 4.3 years, and earn on average 60 euros per day employed, which corresponds to approximately 5500 euros quarterly.

Three major evidence emerge from our data. First, workers in the sample have on average 1.01 kids, and 40% of the observation refer to childless workers, reflecting a

Table 1: Descriptive Statistics

	Mean	SD	Min	Max	N.Obs.
female	0.42	0.49	0	1	7946291
college	0.23	0.42	0	1	7938394
spouse	0.42	0.49	0	1	7946291
full-time	0.89	0.31	0	1	6936443
# jobs	1.04	0.22	1	6	7946291
age (years)	34.1	5.56	25	44	7946291
experience (years)	8.60	5.31	0	27	7946291
tenure (years)	4.30	4.56	0	26	7946291
daily earnings	60.7	40.1	4.07	1844.7	7823534
quarterly earnings	5544.7	3660.9	369.9	167866.3	7823534
daily earnings, log	3.95	0.53	1.40	7.52	7823534
quarterly earnings, log	8.47	0.53	5.91	12.0	7823534
# kids, cumulative	1.01	1.04	0	9	7946291
childless	0.40	0.49	0	1	7946291
permanent jobs	0.69	0.46	0	1	7946291
temporary jobs	0.31	0.46	0	1	7946291
flexible jobs	0.56	0.50	0	1	7882681

NOTES: The sample refers to native individuals with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. Earnings are expressed in 2015 euros using the CPI index. Age, experience, and job tenure are expressed in years. SOURCE: MCVL 1996-2006.

very low fertility rate (Guner et al., 2024). Second, about 70% of the observation in the sample refer to workers employed under permanent contracts, indicating a very large degree of labor market duality (Garcia-Louzao et al., 2023). Finally, about 56% of the observations in the sample refer to workers employed in relative more flexible jobs.

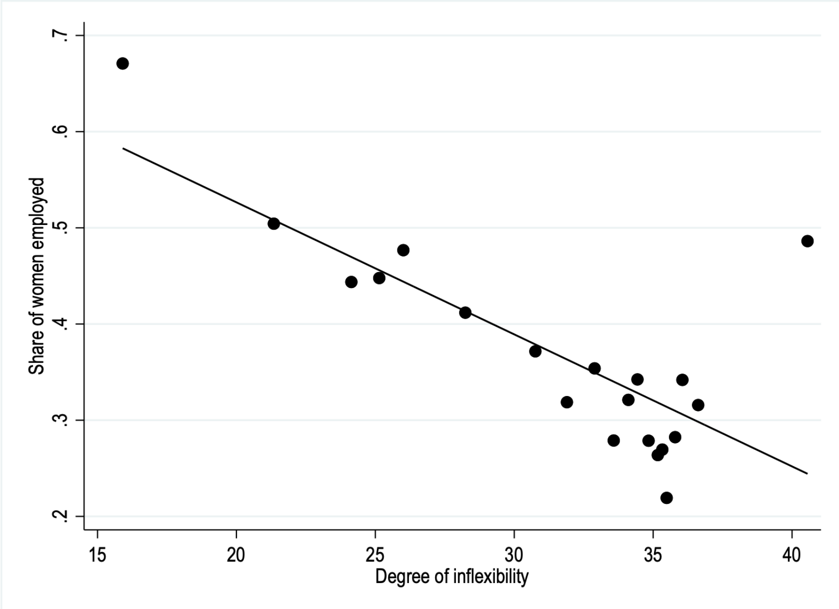
4.5 Flexibility, work-week reduction and wage growth

Job flexibility is associated with a larger employment for women. Figure 4 reports the share of women across jobs with different degrees of flexibility. Women are more likely to be employed in jobs with a low degree of inflexibility. As we move from the least to the most inflexible jobs, the share of women employed halves, from around 60% to about 30%.

Women employed in flexible or non-flexible jobs differ in workweek reduction take up and wage growth. Table 2 reports the share of women under workweek reduction who are employed in non-flexible jobs, as opposed to flexible jobs. About 4.5% of women employed in relatively more flexible jobs work a reduced number of hours. This percent is much higher among women employed in non-flexible jobs, i.e., about 9.2%.

Table 3 reports the daily wage growth between two consecutive quarters for women employed in non-flexible jobs as opposed to flexible ones. Women in non-flexible jobs face a wage growth penalty which correlates with the number of children at

Figure 4: Inflexible jobs and women employment



NOTES: The sample refers to native women with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. SOURCE: MCVL 2000-2006.

home. Specifically, the wage growth penalty from being employed in a non-flexible job amounts to 0.65% for women without children and it increases to 0.91% for women with children. This difference become more striking among women with at least 2 children at home, who face a wage growth penalty from working in non-flexible jobs of about 1.2%.

Table 2: WWR take-up

	Pre-1999		Post-1999	
	(1)	(2)	(3)	(4)
Non-flexible job	-	0.0042	-	0.0476***
	-	(0.0005)	-	(0.0015)
Constant	0.0056	0.0037	0.0660***	0.0442***
	(0.0002)	(0.0003)	(0.0008)	(0.0010)
N.Obs.	98453	97291	107576	106953
R-squared	0.00	0.00	0.00	0.01

NOTES: The sample refers to native women with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. The outcome variable is dummy taking value 1 if a women is employed under work-week reduction. The dependent variable is a dummy taking value 1 if a women is employed in a non-flexible job in the initial quarter, 0 otherwise. Standard errors are robust. *** p<0.01, ** p<0.05, * p<0.1. SOURCE: MCVL 1996-2006.

Table 3: Wage growth penalty of women in non-flexible jobs

	All women	Childless	With children		
			Overall	1 child	≥2 children
	(1)	(2)	(3)	(4)	(5)
Non-flexible job	-	-0.0065***	-0.0091***	-0.0083**	-0.0115***
	-	(0.002)	(0.002)	(0.003)	(0.004)
Constant	0.0167***	0.0234***	0.0154***	0.0153***	0.0158***
	(0.0001)	(0.001)	(0.001)	(0.002)	(0.002)
N.Obs.	2086072	1194413	876670	522677	352641
R-squared	0.00	0.13	0.12	0.13	0.11

NOTES: The sample refers to native women with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. The outcome variable is the daily wage growth rate between two consecutive quarters. The dependent variable is a dummy taking value 1 if a women is employed in a non-flexible job in the initial quarter, 0 otherwise. Standard errors are robust. *** p<0.01, ** p<0.05, * p<0.1. SOURCE: MCVL 2000-2006.

4.6 Work-week reduction and women's career

Finally, we relate the adoption of the Family Reconciliation Act to the likelihood of contract conversion and estimate the following empirical specification:

$$y_{it} = \alpha_0 + \alpha_1 \text{post-1999}_t \times \text{female}_i + \alpha_2 X_{it} + \mu_i + \mu_t + \epsilon_{it}$$

where y_{it} is an indicator for contract conversion (from FTCs to OECs) four quarters ahead of time t, the variable post-1999_t is a dummy taking value 1 for every period starting 2000 and 0 otherwise, female_i is a gender dummy for women, the terms μ_i and μ_t denote individual and time-fixed effects, in the form of dummies for years and quarters, while X_{it} is a vector of controls, including dummies for age, occupation, and industries.

Table 4: Contract conversion

	(1)	(2)	(3)	(4)
post-$1999_t \times \text{female}_i$	-0.0116***	-0.0383***	-0.0322***	-0.0350***
	(0.001)	(0.002)	(0.002)	(0.002)
N.Obs	2116286	1292277	1644301	999024
R-squared	0.52	0.64	0.57	0.68
Controls			✓	✓
Within-firm		✓		✓

NOTES: The sample refers to native individuals (both men and women) with non-missing wages and sector, age 25-44 y.o., continuously employed in the quarter of reference. Standard errors are robust. *** p<0.01, ** p<0.05, * p<0.1. SOURCE: MCVL 1996-2006.

Table 4 reports the regression outcomes for the likelihood of being promoted from a fixed-term to an open-ended contract. Relative to men, women's likelihood of being promoted from a fixed-term contract to a permanent contract has significantly decreased after the 1999 reform. These findings replicate what has been documented in Fernández-Kranz and Rodríguez-Planas (2021).

5 Estimation

The model period is a month. As commonly done, we choose some parameters outside of the model and then estimate the others to match a set of targets using a simulated method of moments approach.

5.1 Parameters and Target

Table 5 describes the parameters calibrated that are assigned values directly from the data or the literature. The discount factor ρ is chosen to match a yearly return of 4%, while the survival probability is calibrated such that workers appear in the economy on average for 20 years, corresponding to ages 25 to 44. The probability that a child becomes a teenager is equal to 1.39%, ensuring they stay in the household for 6 years on average, the age limit for parents to be eligible to work with WWR. The workers' bargaining power is fixed at 0.5.

The net unemployment benefits for men and women are measured directly from the data and are equal to 122.68 and 107.88 euros per month, respectively. These values are calculated using data from the EU Statistics on Income and Living Conditions (EU-SILC). The number is monthly gross unemployment benefits for unemployed individuals between 24 and 44 for the period 2004-2012.[3]

The wage penalty from WWR is taken from MCVL and set equal to the observed daily wage of women in WWR as a share of the average wage. On average, women on WWR earn about 76% of women who work full-time. Finally, we follow the current maternity leave legislation in Spain and assume that women can take 4 months of paid maternity leave and receive 80% of their contracted wage.

After selecting parameters in Table 5, we are left with 32 parameters. These parameters pertain to utility from children for women in labor market states, costs of firing and operation for firms, human capital accumulation process for women, production penalties associated with women and women in WWR, fertility opportunities, and various parameters that determine labor market flows, such as the elasticity of the matching function, cost of posting vacancies, and the exogenous job destruction rates.

To estimate these parameters, we use 44 worker-level targets. The first set of targets

[3]EU-SILC provides harmonized cross-sectional and longitudinal data on income, poverty, social exclusion, and living conditions for EU countries. Using UE-SILC allows us to calculate effective unemployment benefits, including those who are unemployed but do not receive any benefits. This is not feasible in MCVL since it only covers those who receive benefits.

Table 5: Parameters calibrated outside the model

Parameter	Description	Value	Targets/Notes
		Demographics parameters	
$\widetilde{\rho}$	Discount Factor	0.9967	4% yearly return
ρ^d	Survival Probability	0.0021	# of years in labor market (25-44)
ρ^c	Prob. child leaves home	0.0139	# of years for children (0-6)
		Wage parameters	
b_m	Net unemployment benefit, men (euros)	122.68	Measured directly from data (EPA)
b_w	Net unemployment benefit, women (euros)	107.88	Measured directly from data (EPA)
ω_r	WWR wage penalty	0.7624	Measured directly from data (MCVL)
		Labor market and policies	
β	Bargaining power	0.50	Shimer (2005)
ϱ	Maternity leave, length	0.25	4 months duration
ι	Maternity leave, wage transfer	0.80	80% of contracted wage

captures how the employment, gender wage gap, and fertility evolve along the life cycle, as shown in Figure 5. As Panel A in Figure 5 shows, at the start of the life cycle at ages 25-29, more than 40% of women are with a temporary contract. The number of women with a temporary contract declines slows as women either get promoted or move to non-employment, and even at age 40-44, more than 20% of them still work with a temporary contract. The evaluation of the gender wage gap is shown in Panel B. At the start of the life cycle, there is a 40% gender-wage gap. As women work and accumulate human capital, the gap declines monotonically and almost disappears by ages 40-44. The model does a great job of capturing these patterns.

Panels C and D in Figure 5 show the life cycle patterns of fertility. The completed fertility is very low at ages 25-29, as close to 80% of women are childless. While the childless declines over time, it is still more than 20% by ages 40-44. The completed fertility increases slowly as more women choose to have children. But it only reaches 1.5 children by ages 40-44, since those who choose to have children have mostly one child.

Table 6 shows the remaining moments. The first set of moments pertains to the labor market outcomes and wages for men. The next set of moments captures the labor market stocks and flows for women. On average, 33% of women have a temporary contract, and about 60% of them work in a flexible job. Among those with a permanent contract, about 6% choose to work with WWR, and the share of women in WWR is twice as high among women in non-flexible jobs than the flexible ones.

The model also does an excellent job of capturing the transitions between different labor market states. Each quarter, about 20% of women in temporary contracts become unemployed as a result of terminations or quits. The promotion rate from temporary to permanent contracts is low, around 6%. However, once a woman obtains a permanent job, she will likely keep it. We also target the transitions from WWR to non-employment, which is about 10% per quarter in the data. Finally, we also target the effect of WWR program on promotions. As we documented in Table 4, the introduction of WWR reduced the promotion rate of women with respect to men by more than 3%. We replicate the same difference-in-difference specification with the simulated data and choose parameters so that the model generates the same decline in promotions in an economy without WWR program.

The next set of moments captures earnings and earnings growth for women. Women start their careers at a wage that is about 30% below the mean. But there is considerably rapid wage growth among those who stay in the labor market; their wages grow by 1.6% each quarter on average. However, for women in non-flexible jobs, $j = 0$, the growth rates are smaller, and much more so if they have children. The model does an excellent job of these wage dynamics.

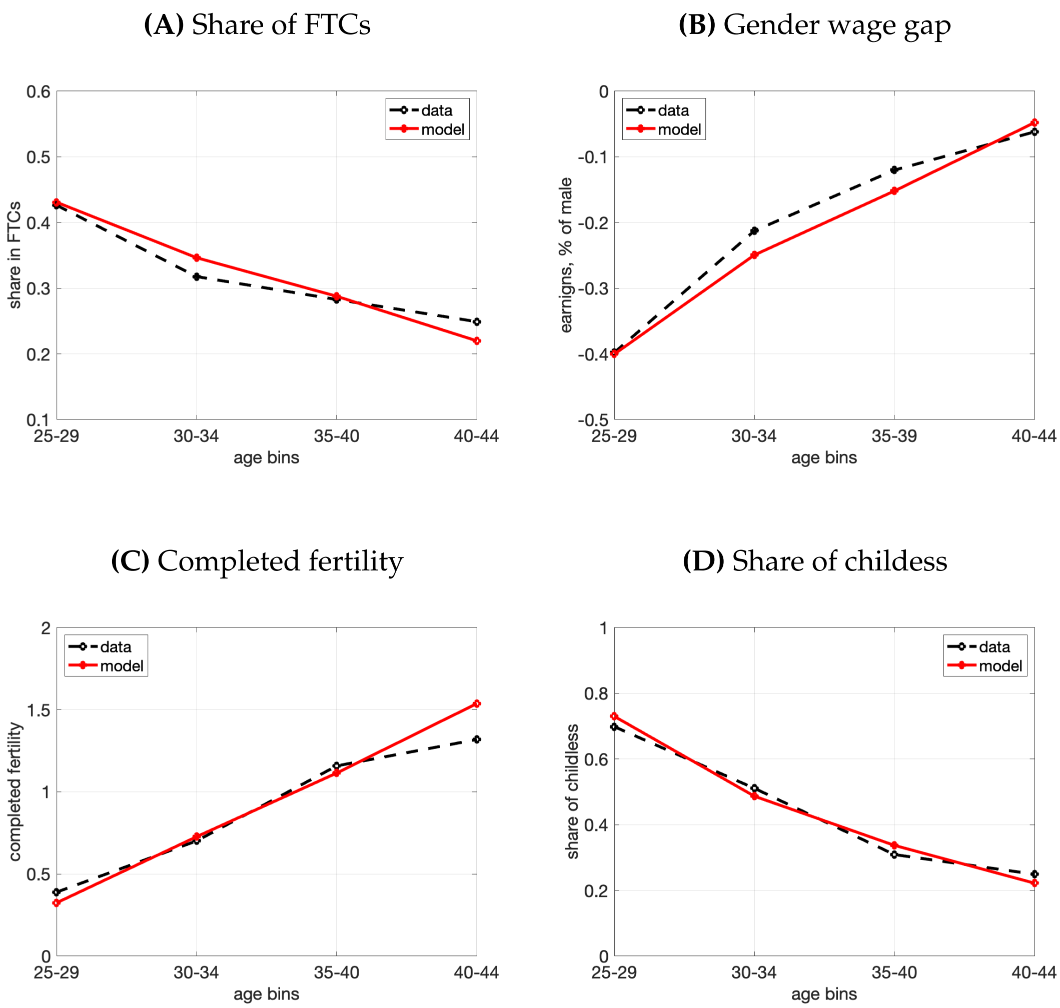
The final set of moments focuses on the distribution of fertility at ages 25 and 45. The model replicates well how many women choose to be childless at age 25 (around 80%). By age 45, the share of childless women decline to about 20%. By age 45, about 30% of women have one child, and another 30% have two children.

Table 7 reports the list of estimated parameters. While there is no exact mapping between parameters and moments, some moments play relatively key roles in identifying some parameters. The aggregate shifter, A, is chosen to match the average quarterly (log) wage of employed men, while exogenous job separation for men, δ_m, and the aggregate matching efficiency, η, map into the non-employment rate of men and their quarterly non-employment to employment transition rate.

The exogenous gender wage penalty, ω_w, is identified by the average quarterly (log) wage of employed women. We estimate a value equal to 0.163: this implies that the model attributes about two-thirds of the overall gender wage gap observed in our data to an exogenous force external to the model and captured by ω_w. The production penalty from working reduced hours, ω_r is estimated to be 0.557, i.e., under work-week reduction women contribute to about 55.7% of the match output that would be otherwise produced working full time. This parameter is identified by the annual reduction in the quarterly contract conversion from FTCs to OECs that occurred following the introduction of the Family Reconciliation Act.

Parameters pertaining to human capital are identified by the dynamics of earnings. For instance, the parameter α_a governs the distribution of human capital of women at the time of starting their working career, and is chosen to replicate their average quarterly wage at 25 y.o., relative to the overall average among women in the economy. At the same time, differences in quarterly growth of daily earnings between women employed in flexible and non-flexible jobs, with and without children, are matched by assuming a differential probability of human capital accumulation. If employed

Figure 5: Model vs Data



in flexible jobs, the probability of human capital jump $\pi_w^e(j = 1)$ is estimated to be 11.4%. If employment in non-flexible jobs, the probabilities of the human capital jump are much lower, i.e., we estimate $\pi_w^e(j = 0, n = 0)$ to be 6.7% and $\pi_w^e(j = 0, n \geq 1)$ to be 5.1%.

5.2 The Role of Workwek Reductions

The calibration strategy exploits the decline in promotions associated with the introduction of WWR policies. To this end, we compare the benchmark economy with a counterfactual world that allows firms to dismiss women in WWR at a cost equal to the estimated firing costs for OECs, f_p. This experiment allows us to mimic the scenario observed before the reform was implemented in 1999. The policy is associated with about a 3% decline in promotions rates (Tables 4 and 6). In Table 8, we compare the benchmark economy with a counterfactual economy without WWR in greater detail. Note that the quarterly promotion rate declines by 1.2%, which corresponds to a

Table 6: Model vs Data

Moment	Data	Model
Men		
Non-employment rate	0.2872	0.2872
Non-employment to Employment, quarterly rate	0.1095	0.1095
Avg. wage (log), quarterly	7.6030	7.6030
Women		
Labor market		
Employment in FTCs	0.3300	0.3313
Employment in flexible jobs	0.6083	0.5834
Employment in WWR (out of OECs)	0.0660	0.0622
Employment in WWR and flexible jobs (out of OECs)	0.0442	0.0464
Employment in WWR and non-flexible jobs (out of OECs)	0.0918	0.0848
Transition rates		
FTCs to Non-employment, quarterly rate	0.2010	0.1915
FTCs to OECs, quarterly rate	0.0573	0.0696
OECs to Non-employment, quarterly rate	0.0845	0.0884
OECs to OECs, quarterly rate	0.9116	0.9053
WWR to Non-employment, quarterly rate	0.1061	0.1004
Annual reduction in FTCs to OECs quarterly rate w/ WWR	-0.0322	-0.0300
Earnings		
Avg. wage (log), quarterly	7.3809	7.3099
Quarterly wage at 25 y.o., relative to average	-0.2719	-0.2922
Avg. wage growth, quarterly	0.0164	0.0160
Wage growth penalty ($j = 0, n = 0$)	-0.0065	-0.0062
Wage growth penalty ($j = 0, n > 0$)	-0.0091	-0.0090
Fertility		
Childless women at 25 y.o.	0.8327	0.7892
Women with 1 child at 25 y.o.	0.1387	0.1900
Women with 2 children at 25 y.o.	0.0235	0.0185
Women with 3 children at 25 y.o.	0.0039	0.0023
Childless women at 45 y.o.	0.2164	0.2222
Women with 1 child at 45 y.o.	0.2755	0.3121
Women with 2 children at 45 y.o.	0.3526	0.2606
Women with 3 children at 45 y.o.	0.1233	0.1388

3% annual decline, which is targeted.

The introduction of the WWR policy not only makes women less likely to be promoted from temporary to permanent contracts, but firms are also less willing to hire women to start with. The quarterly transition rates from non-employment to employment

Table 7: Estimated parameters

Parameter	Description	Value
A	Aggregate shifter	3606.2
δ_m	Exogenous separation, men	0.0365
η	Matching efficiency	0.0907
	Wage/production penalties	
ω_w	Gender wage penalty	0.1633
ω_r	WWR production penalty	0.5568
	Human capital	
α_w^h	Initial distribution human capital	0.6588
$\pi_w^e(j=1)$	Human capital jump, flexible jobs	0.1137
$\pi_w^e(j=0,n=0)$	Human capital jump, inflexible job & childless	0.0671
$\pi_w^e(j=0,n\geq 1)$	Human capital jump, inflexible job with n children	0.0511
	Productivity and costs	
φ_z	Productivity persistency	0.5818
c^t	Cost of operating, FTCs (euros)	216.24
c^p	Cost of operating, OECs (euros)	599.96
κ_v	Cost of posting vacancy (euros)	1419.5
c^f	Firing costs, OECs (euros)	22065
	Labor market	
χ_f	Share of flexible jobs posted	0.5528
χ_p	Share of OECs posted	0.5809
π^t	Conversion option, from FTCs to OECs	0.0183
δ_w^t	Exogenous separation from FTCs, women	0.0445
δ_w^p	Exogenous separation from OECs, women	0.0234
δ_w^r	Exogenous separation from WWRs, women	0.0282
	Preferences	
γ_u	Value of children if unemployed (euros)	811.87
γ_e	Value of children if employed (euros)	187.89
γ_r	Extra value of children home under WWR (euros)	406.57
	Fertility	
$\Theta(n=0)$	Childless women at 25 y.o.	0.8327
$\Theta(n=1)$	Women with 1 child at 25 y.o.	0.1387
$\Theta(n=2)$	Women with 2 children at 25 y.o.	0.0235
$\Theta(n=3)$	Women with 3 children at 25 y.o.	0.0039
$\sigma(n=0)$	Fertility opportunity, childless	0.0140
$\sigma(n=1)$	Fertility opportunity, 1 child	0.0163
$\sigma(n=2)$	Fertility opportunity, 2 children	0.0082
$\sigma(n=3)$	Fertility opportunity, 3 children	0.0008
κ_n	Fixed cost of newborns (euros)	33114

decline by about 2%. At the same time, women are more likely to move from employment to non-employment each quarter. As a result of lower hiring, higher separation, and the decline in promotions, the employment rate of women declines by about 4.5%, and the share of employed women with permanent occupations by about 4.3%. Due to longer non-employment spells, women's life-cycle wage growth from age 245 to 44 declines by more than 6%, and they end up with about 3% lower lifetime earnings.

On the other hand, the policy increases fertility by providing more flexibility to women. The completed fertility at age 44 increases from 1.66 children to 1.70 children. Yet, the decline in lifetime earnings is significant, and women's welfare declines with this policy.

Table 8: Counterfactual experiment

	Counterfactual (pre-1999) (1)	Baseline (post-1999) (2)	Change (3)
Cost of dismissal during WWR (euros)	22064.83	Not allowed	-
Labor Market Outcomes			
Employment rate, % of labor force	0.5538	0.5099	-4.38 p.p
Employment in OECs, % of employment	0.7121	0.6687	-4.34 p.p
Employment in flexible jobs, % of employment	0.5768	0.5834	+0.66 p.p.
Employment in WWR, % of employment in OECs	0	0.0622	-
Employment in WWR and flexible jobs, % of employment in OECs	0	0.0462	-
Employment in WWR and non-flexible jobs, % of employment in OECs	0	0.0848	-
Labor Market Flows (quarterly)			
Non-employment to Employment rate	0.1725	0.1546	-1.79 p.p.
FTCs to OECs rate	0.0816	0.0696	-1.20 p.p.
Employment to Non-employment rate	0.1152	0.1225	+0.73 p.p.
Labor Earnings			
Avg. wage, quarterly	1	0.9978	-0.22 p.p.
Avg. wage at 25 y.o., quarterly relative to average	-0.3192	-0.2922	+2.70 p.p.
Avg. life-cycle wage growth, 44 y.o.	0.4845	0.4223	-6.22 p.p.
Fertility Outcomes			
Completed fertility, 44 y.o.	1.6614	1.7028	2.49%
Aggregate Outcomes			
Life-time earnings	1	0.9682	-3.18%
Income	1	0.9879	-1.21%
Welfare	1	0.9694	-3.06%

6 Family-Friendly Policies

We are now ready to evaluate the labor market and fertility consequences of a battery of alternative family friendly policies. In what follows, we focus on three major categories of policies.

The first category includes policies related to labor market duality. Specifically, we consider the following scenarios; 1) An economy without temporary (or fixed term) contracts where all contracts start as permanent (or open ended) with low destruction rates and high firing costs. 2) An economy with no duality where there is a single permanent contact that is subject to a low firing cost. In particular, we set the firing cost to be half of the firing cost for permanent contracts in the benchmark economy. Hence, these two economies only differ to the extent of firing cost associated to a single contract. subject to low firing costs. 3) An economies with lower (or) higher mandatory length of FTCs. In the benchmark economy, a firm can have a worker with a temporary contract up to 4 years. After that the firms must either end the contract or convert it to a permanent one. We present results when the length is shorten to one year or extended to 8. 4) Economies with lower (or higher) firing costs for OECs. In these experiments we keep the dual labor market structure, i.e., there are temporary contracts with without any firing costs and permanent ones with firing costs, and simply experiment with higher o r lower firing costs of permanent contracts,

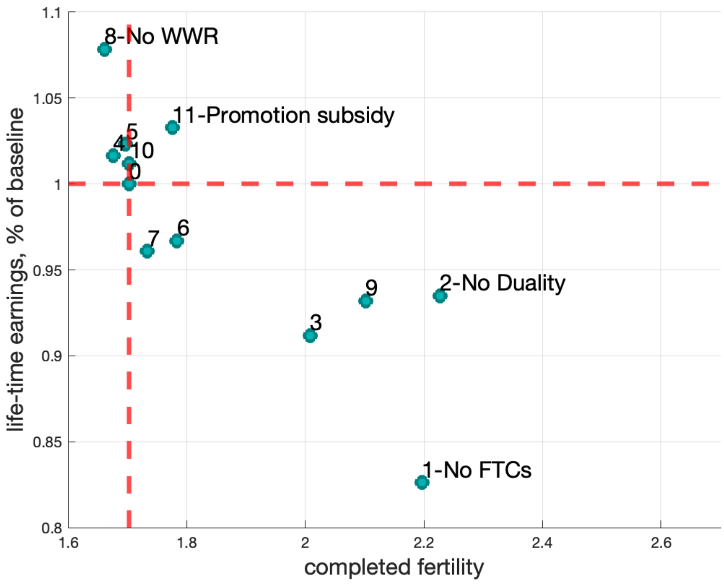
The second category includes policies related to parental leave and flexible working arrangements. In particular, we evaluate: 1) An increase in the length of maternity leave from 4 months in the benchmark economy to 8 months. 2) The elimination of job protection for work-week reductions, i.e., an economy where workers in permanent contract can choose to work reduced hours but firms can fire these workers, incurring firing costs.

The final category includes different monetary subsidies. These subsidies include: 1) A lump-sum transfer to women with a newborn. 2) Subsidies to firms who hire women, where each time a firm hires a woman, the cost of hiring (captured by the cost of posting vacancy in the model) is reimbursed to the firm. 3) Subsidies to firms who convert women's contracts from temporary to permanent, where again for each promotion the firm receives a transfer equivalent to the cost of hiring. The subsidies are financed by lunp-sum taxes on workers.

How do these policies affect fertility, women´s employment and earnings? Figure 6 shows how women's discounted lifetime earnings and completed fertility (the average number of children at age 44) changes with each of these policies. The vertical and horizontal dashed lines represent the benchmark values. Hence, the policies that are to the left of the vertical line result in a higher fertility, while those that are to he left imply a lower fertility. Similarly, the policies that are to the top of vertical line indicate higher life-time earnings while those that are below the vertical line are associated with lower life-time earnings. y.o. for each of these policies. A trade-off emerges: policies that increase lifetime earnings reduce completed fertility.

The results show that across different policies, a trade-off emerges: policies that increase fertility tend to lower lifetime earnings for women. For example, by eliminating fixed-term contracts so that all contracts have a relatively higher firing cost, the government can increase the total fertility rate from 1.70 to 2.20. This happens as more women enjoy job security provided by permanent contracts. However, this policy would lower the employment of mothers and their lifetime earnings by 14.41 p.p. and 17.37%, respectively. As firms are much less willing to hire women, so they spend a

Figure 6: Lifetime earnings vs fertility



larger share of their lives as non-employed and do not buy as much human capital as in the benchmark economy.

It is illustrative to contrast the policy where there are only permanent contracts with a policy where there is a single contact with a lower firing cost, which we label as no-duality experiment. Both policies achieve a similar increase in fertility, The first experiment, however, is much more costly for women in terms of life-time earnings, as incentives of firms to hire women are much lower.

On the other extreme consider the elimination of the existing workweek reduction policy, the government can increase female employment and lifetime earnings by 4.38 p.p. and 7.84%. Yet the fertility rate would decline from 1.70 to 1.66. Now, hiring and promoting a woman is less costly for firms. But, having children is less attractive for women since they lose the option of working part-time.

The results show that the only policy that can achieve both a higher fertility and higher life-time earnings is a promotion subsidy that transfers resources to firms when they promote a woman to a permanent job. The effects on both fertility and life-time earnings are, however, small, at least at the levels of subsides we consider.

Panel A in Figure 7 shows that the reason the policies that promote fertility lower women's lie-earnings is their effects on employment. With only permanent contracts, female employment plummets from around 50% in the benchmark economy to around 35%. With no-duality, where there is a single contract with a low firing costs, the decline is less significant, from around 50% to 45%. In contrast, policies, such promotion subsidies and the elimination of WWR increase female employment. The Panel B in

Figure 7: Policy trade-off

(A) Employment vs fertility **(B)** Average wage vs fertility

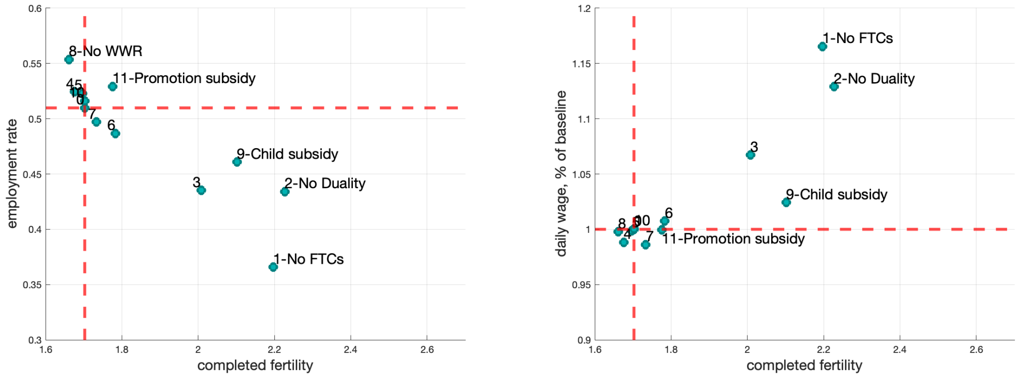
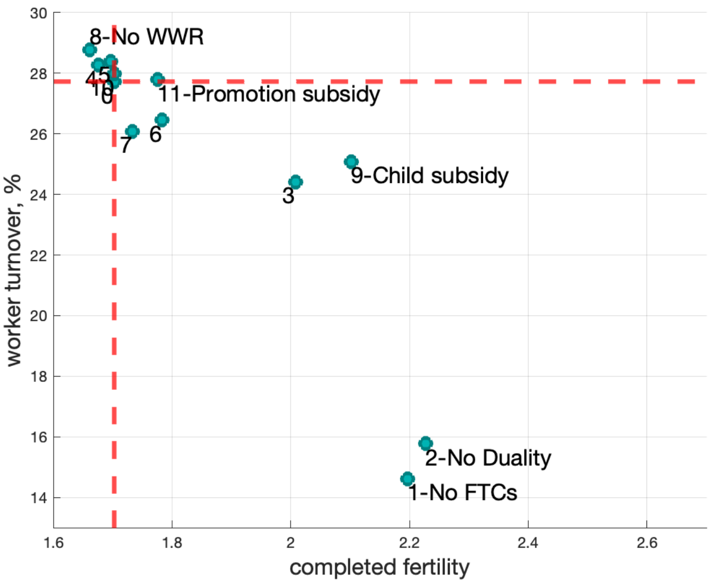


Figure 8: Job security vs fertility

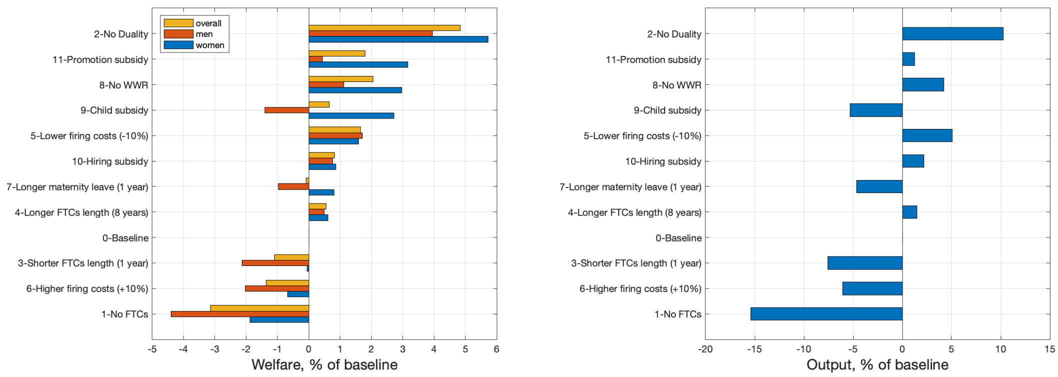


the same figure shows how wages change. Here the story is different. When firms are less likely to hire women, they end up hiring those women with higher human capital levels. This selection results in higher wages whenever a policy reduces women´s employment. Yet, the employment effect dominates and life-time earnings decline.

Panel A in Figure 8 illustrates the the trade-off between fertility and labor market outcomes from another perspective. It shows the relation between changes in fertility and labor turnover. Policies that results in higher fertility are all associated with lower turnover. The job security encourages women to have more children. However, the lower turnover make firms much more picky in their hiring policies, reducing women's employment.

Figure 9: Gains and losses

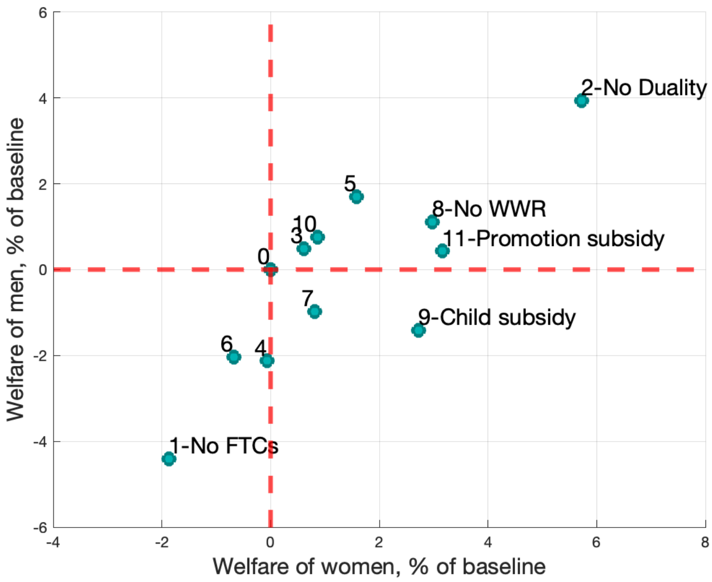
(A) Welfare **(B)** Output



What about welfare? Are women better or worse off with a higher number of children but lower lifetime earnings? Which policies increase women´s welfare? We answer this question in Figure 9. Panel A shows welfare gains and losses where the policies are ranked from the ones that provide the highest welfare gains to the ones associated with the largest welfare losses. The best policy, from a welfare point of view, is no-duality policy where there is a single contract with a low firing cost. The average welfare of women increases by more than 5%. This is followed by promotion subsidies and the elimination of WWR. On the other extreme, there is the economy with only permanent contracts with high firing costs. In such an economy, the welfare of women decline by about 2%. Hence, while both policies result in higher fertility, the decline in lifetime earnings in an economy with high firing costs dominates, resulting in a lower welfare compared to the benchmark economy. On the other hand, while lifetime earnings of women also decline an economy with a single contract that has a lower firing cost, the decline is more muted, and higher fertility results in an overall welfare gain. As Panel B shows the welfare gains and loses are closely aligned how these policies affect aggregate output.

Finally, Figure 10 compares welfare for women against welfare for men across policies. Policies that increase the former are also likely to foster the latter. In particular, in the model random search make men benefit from labor market policies that increase vacancy posting, such as promotion subsidy, as they increase their job finding rate. On the other hand, lump-sum transfers to women with a newborn or longer maternity leave are the two policies that increase welfare to women, who value having children in the model, while reducing welfare to men. The effect of labor market on welfare is illustrated in Figure 11. For men (Panel A), any policy that makes labor market more fluid by increasing the contact rate is welfare increasing. For women (Panel B), while there is an overall positive relation between contact rates and fertility the relation is

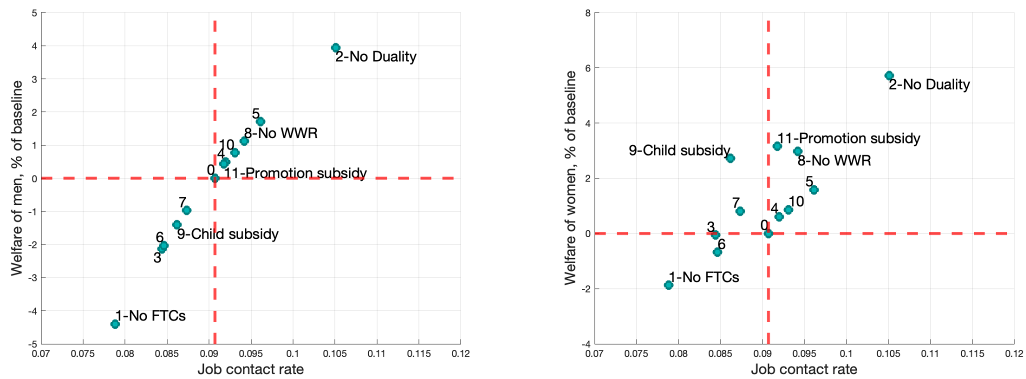
Figure 10: Welfare trade-offs: men vs women



not as monotone as it for men, due to effect of different policies on fertility.

Figure 11: Welfare determinants

(A) Men **(B)** Women



7 Conclusion

[TBC]

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A Data Appendix

A.1 Main Variables

Daily Wages. The MCVL contains social security contributions at the establishment level. Recorded contributions could be top- or bottom-coded. For each individual we calculate censored hourly wages by dividing CPI2010-adjusted monthly earnings on the main (longest) job in the quarter by the number of days worked in that quarter and by the contractual number of hours (real hours worked are not available in MCVL). Finally, we adjust the real daily earnings from the main job by part-time work and calculate the full-time equivalent real daily earnings in euros for each quarter.[4] After that we follow the procedure of top- and bottom-coding adjustment, described in section A.2.

Full-time Dummy. For each individual we observe at each point of time his contract type. We build a dummy variable of a full-time contract by looking at the name of the contract. Full-time is equal to 1 if contract type is 1, 8, 11, 20, 28, 30, 31, 35, 36, 37, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 53, 54, 55, 56, 57, 58, 60, 61, 62, 66, 67, 68, 69, 70, 71, 72, 75, 77, 78, 79, 80, 82, 85, 86, 87, 88, 91, 92, 96, 97, 100, 101, 109, 130, 131, 139, 141, 150, 151, 152, 153, 154, 155, 156, 157, 189, 401, 402, 403, 408, 410, 418, 420, 421, 430, 431, 441, 450, 451, 457. Full-time dummy is equal to zero if the contract type is 3, 4, 6, 18, 23, 24, 25, 26, 27, 34, 38, 63, 64, 65, 73, 76, 81, 83, 84, 89, 93, 94, 95, 98, 102, 181, 182, 183, 184, 185, 186, 200, 209, 230, 231, 239, 241, 250, 251, 252, 253, 254, 255, 256, 257, 289, 300, 309, 330, 350, 351, 352, 353, 354, 355, 356, 357, 500, 501, 502, 503, 508, 510, 518, 520, 530, 531, 540, 541, 550, 551, 552, 557. Those contracts, that we cannot pin down whether they are part-time or full-time (contract types 5, 9, 14, 15, 16, 17, 22, 29, 32, 33,59) or we are not able to pin down their type at all (contract types 0, 7, 10, 12, 13, 19, 39, 51, 52, 74, 331, 389, 452, 990), we treat as a missing variable. Contract type 90 is also treated as a missing variable because it does not imply a working relationship since it corresponds to receivers of unemployment benefits.

Work-Week Reduction. By the new law all wage and salary workers with children under 6 years old could take a work-week reduction of one-third to one-half of their usual full-time schedule (The child's maximum age was raised to 8 in 2007 and to 12 in 2012. The minimum work-week reduction was lowered to one-eighth in 2007). We create a dummy for work-week reduction. It is equal to zero if a worker has a full-time contract and his/her youngest child is below 6 until 2007, below 8 between 2007 and 2012, and below 12 after 2012, and his part-time coefficient is between 875 and 999 or is equal to 0, that corresponds to 100% full-time work). It is equal to one if a worker has a full-time contract but his part-time coefficient is below 875.

[4]In MCVL there is a variable ("part-time coefficient") that characterizes what fraction of full-time hours individuals work. This helps us to calculate full-time equivalent earnings.

Newborns. Dummy variable equal to one in the quarter in which we start to observe a child of age zero in the household. Otherwise, it is equal to zero.

Promotion. We consider two consecutive periods. If a person is on the temporary contract in period t and stays with a temporary contract in period t+1 this dummy is equal to zero. If a temporary in period t contract converts into a permanent contract for period t+1 the dummy is equal to 1.

Industry. The sector of economic activity is provided in MCVL and it corresponds to the year when MCVL information is extracted. To update this information for each year we use different MCVL waves. For waves between 2005 and 2008 only CNAE93 is provided; in MCVL 2009 only CNAE09 is provided (no information on CNAE93). Since MCVL 2010, both sector classifications are recorded but CNAE93 reflects the value in 2009. We use MCVL 2010 and later to create a crosswalk between 2 classifications: CNAE93 and CNAE09, and to make classification consistent, we input CNAE09 for establishments in years before 2010. In the paper, we use the letter classification.

College. We create a dummy that is equal to 1 if an individual finishes tertiary education (corresponds to the educational code bigger than 44 from the Municipal Registry of Inhabitants).

High Skills. We create a dummy for high skills. It is equal to one if a person is related to one of the following social security earnings groups ("grupo de cotización"): engineers, graduates, high mangagement, technical engineers, titled assistants, administrative and workshop heads (ingenieros, licenciados, alta dirección, ingenieros técnicos, ayudantes titulados, jefes administrativos y de taller). It is zero otherwise.

Public. Dummy for public sector is equal to 1 if the employer is considered an employee of a Ministry, Public Administration (all types), Social Security, Parliament, Foundation, Public Firm or Bank, Public Educational or Health Centres, Local Corporation, etc. Otherwise, it's equal to zero.

Permanent. Dummy for permanent contract is defined according to the name of the contract.

A.2 Top- and Bottom-Coding Adjustment

In MCVL there are two salary variables. One is coming from tax registers, but it is available only in the years of extraction of MCVL (i.e.2005-2015). Another, social security contribution base, "base de cotización", is available for the entire observation period (1990-2015). So for the beginning of our observation period, 1990-2004, we cannot use tax values as they are not available. Observed for this period social security contribution bases, however, are bottom-coded and top-coded (rather few individuals are bottom-coded, but about 6.5% are top-coded). The maximum and minimum caps vary over time (adjusted for the evolution of the minimum wage rate and inflation) and by occupation groups. To be able to make use of the entire period, 1990-2015, we are using the social security income data, and we adjust this data for top- and bottom-coding, following the procedure of Bonhomme and Hospido (2017).

In our analysis, we use daily wages, computed as the ratio between the quarterly contribution base and the number of days worked in that particular quarter. First, we identify top- and bottom-coded observations by comparing daily salary to minimal and maximal daily contribution base, specific for different occupations groups, and assign an observation to bottom-coded (top-coded) if it is smaller (bigger) than bottom-coded threshold + 1% (top-coded threshold - 1%). Then we use a cell-specific Tobit model to impute earnings to individuals whose earnings are censored (10 imputations per censored observation). The cells are based on three sources of heterogeneity: skills, age, and time. Skill groups are defined using the variable *occupation ("grupo de cotización")* as "high-skilled" (occupation groups 1-3), "medium-skilled" (groups 4-7), "low-skilled" (groups 8-10). *Age* is based on 5-year age groups: 25-30, 31-35, 36-40, 41-45 years. *Time* dimension contains year and quarter (from 1990 to 2015). This yields in total 3*4*104=1248 cells. For each cell, we assume log-normal distribution of daily earnings with mean μ_c and variance σ_c and estimate these parameters using maximum likelihood estimator. Denoting as Φ the standard normal cumulative distribution function, the cell-specific likelihood function looks like this:

$$\sum_{cens_i=-1} log\Phi\left(\frac{log\underline{w}_c-\mu_c}{\sigma_c}\right)+\sum_{cens_i=0}\left(-\frac{1}{2}log\sigma_c^2-\frac{1}{2\sigma_c^2}(logw_i-\mu_c)^2\right)+$$
$$\sum_{cens_i=1}\left(log(1-\Phi(\frac{log\overline{w}_c-\mu_c}{\sigma_c}))\right),$$

where $cens_i = -1$ if observation i is bottom-coded, $cens_i = 1$ if it is top-coded, and $cens_i = 0$ otherwise.

Simulating observations is simply calculating the following expressions for the bottom and top-coded observations correspondingly:

$$w_{ij}=\hat{\mu_c}+\hat{\sigma_c}\Phi^{-1}\left[u_{ij}\Phi\left(\frac{log\underline{w}_c-\hat{\mu}_c}{\hat{\sigma}_c}\right)\right]$$
$$w_{ij}=\hat{\mu_c}+\hat{\sigma_c}\Phi^{-1}\left[\Phi\left(\frac{log\overline{w}_c-\hat{\mu}_c}{\hat{\sigma}_c}\right)+u_{ij}\left(1-\Phi\left(\frac{log\overline{w}_c-\hat{\mu}_c}{\hat{\sigma}_c}\right)\right)\right],$$

where j = 1, 2, ..., 10, and u_{ij} is drawn from a standard uniform distribution. After each observation is simulated $j = 10$ times, we take the average value of this observation.

A.3 Job flexibility measure in ACS

List of sectors with the highest flexibility (lowest share of males working more than 50 hours a week). In brackets we provide the share of men working more than 50 hours a week and the share of women in the industry.

- Activities of households as employees of domestic personnel [13.54, 91.14]
- Assistance in residential establishments with health care, residential establishments for people with intellectual disabilities, mental illness, and drug dependence, residential establishments for the elderly and physically disabled, and other residential establishments [14.02, 87.14]
- Social services activities without accommodation for the elderly and disabled [14.53, 84.33]
- Hospital activities [14.96, 87.45]
- Medical and dental activities and other health activities [15.41, 88.68]
- Other social services activities without accommodation [18.47, 83.92]
- Education and activities auxiliary to education [19.24 68.98]
- Activities of business, professional and employers' organizations, trade union activities, other associative activities [20.61 79.88]
- Installation of industrial machinery and equipment, finishing of buildings [21.84 40.50]
- Forestry and other forestry activities, logging [22.40 83.64]

List of sectors with lowest flexibility (highest share of males working more than 50 hours a week). In brackets we provide the share of men working more than 50 hours a week and the share of women in the industry.

- Manufacture of knitwear [38.29, 58.55]
- Retail trade of other articles in specialized establishments [38.32, 57.60]
- Retail trade in stalls and markets [38.65, 55.41]
- Fishing [40.08, 29.17]
- Retail trade of food products, beverages and tobacco in specialized establishments [40.16, 56.07]
- Retail sale of automotive fuel in specialized establishments [41.40, 51.80]
- Retail trade in non-specialized establishments [43.06, 51.78]
- Restaurants and food stands [43.79, 53.36]

- Provision of prepared meals for events and other catering services [43.79, 53.36]
- Beverage establishments [43.79, 53.36]
- Hunting, capture of animals and related services [44.12, 5.07]

B Model Appendix

B.1 The problem of a man

The value of employment for a man in occupation $j \in \mathcal{J}$ is equal to

$$V_m^e(j) = w_m + \rho \left[\delta_m V_m^u + (1-\delta_m) V_m^e(j)\right] = \frac{w_m + \rho \delta_m V_m^u}{1-\rho(1-\delta_m)} \quad \forall j$$

while the value of non-employment for a men is equal to

$$\begin{aligned} V_m^u = b_m + \rho \left[(1-\phi_u) V_m^u + \phi_u \sum_{j \in \mathcal{J}} \max\{0, V_m^e(j)\} \Upsilon(j) \right] = \\ \frac{b_m + \rho \phi_u \sum_{j \in \mathcal{J}} \max\{0, V_m^e(j)\} \Upsilon(j)}{1-\rho(1-\phi_u)} \\ \implies V_m^u = \frac{b_m}{1-\rho(1-\phi_u)} + \frac{\rho \phi_u}{1-\rho(1-\phi_u)} \max\{0, V_m^e\} \end{aligned}$$

A solution to this problem is an indicator function for job acceptance

$$\mathbf{1}_m^u = \begin{cases} 1 & \text{if} \quad V_m^e \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

B.2 The problem of an active job

Job value of a match with a woman under OEC. The values of an active job under permanent contracts in occupation j and productivity z, filled by a women with skill a and with either 0 or $n > 0$ children, are denoted by $J_w^{e,p}(z,a,0,j)$ and $J_w^{e,p}(z,a,n,j)$, are equal respectively to:

$$\begin{aligned}J_w^{e,p}(z,a,0,j) = {} & y_w(z,a,0) - w_w^p(z,a,0) - c^p \\ & + \rho(1-\sigma(0)) \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,0) \\ & + \rho\sigma(0) \sum_{a' \in \mathcal{A}} (1 - \mathbf{1}_w^{n,p}(z,a',0,j))\bar{J}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,0) + \\ & + \rho\sigma(0) \sum_{a' \in \mathcal{A}} \mathbf{1}_w^{n,p}(z,a',0,j)\bar{J}_w^{l,p}(z,a',1,j)\Gamma_w^e(a'|a,j,0)\end{aligned}$$

and

$$\begin{aligned}J_w^{e,p}(z,a,n,j) = {} & y_w(z,a,0) - w_w^p(z,a,n) - c^p \\ & + \rho\rho^n \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^c)(1-\sigma(n)) \sum_{a' \in \mathcal{A}} \bar{J}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^c)\sigma(n) \sum_{a' \in \mathcal{A}} (1 - \mathbf{1}_w^{n,p}(z,a',n,j))\bar{J}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\ & + \rho(1-\rho^c)\sigma(n) \sum_{a' \in \mathcal{A}} \mathbf{1}_w^{n,p}(z,a',n,j)\bar{J}_w^{l,p}(z,a',n+1,j)\Gamma_w^e(a'|a,j,n),\end{aligned}$$

where $\bar{J}_w^{l,p}(z,a,n,j)$ is the continuation value of being matched under a permanent contract with a women on maternity leave, equal to

$$\bar{J}_w^{l,p}(z,a,n,j) = \rho[(1-\varrho)\bar{J}_w^{l,p}(z,a,n,j) + \varrho\bar{J}_w^{e,o}(z,a,n,j)]$$

The function $\bar{J}_w^{e,p}(z,a,n,j)$ is the continuation value of a job under permanent contract filled by a women who is not on maternity leave and does not have the option of taking a work-week reduction, which is equal to:

$$\bar{J}_w^{e,p}(z,a,n,j) = (1-\delta_w^p)(1-\mathbf{1}_w^{q,p}(z,a,n,j))\max\{-f_p, \mathrm{E}J_w^{e,p}(z,a,n,j)\}$$

where

$$\mathrm{E}J_w^{e,p}(z,a,n,j) = \sum_{z' \in \mathcal{Z}} J_w^{e,p}(z',a,n,j)\Lambda(z'|z)$$

The function $\bar{J}_w^{e,o}(z,a,n,j)$ is the continuation value of a job under a permanent contract, filled by a woman who has the option of choosing reduced work time, equal to:

$$\begin{aligned}\bar{J}_w^{e,o}(z,a,n,j) = {} & (1-\delta_w^p)(1-\mathbf{1}_w^{q,p}(z,a,n,j))(1-\mathbf{1}_w^{r,p}(z,a,n,j))\mathrm{E}J_w^{e,p}(z,a,n,j) \\ & + (1-\delta_w^p)(1-\mathbf{1}_w^{q,p}(z,a,n,j))\mathbf{1}_w^{r,p}(z,a,n,j)\mathrm{E}J_w^{r,p}(z,a,n,j)\end{aligned}$$

where

$$\mathrm{E}J_w^{r,p}(z,a,n,j) = \sum_{z'\in\mathcal{Z}} J_w^{r,p}(z',a,n,j)\Lambda(z'|z)$$

and $J_w^{r,p}(z,a,n,j)$ is the value of job filled by a women working reduced hours under permanent contract, equal to

$$\begin{aligned}
J_w^{r,p}(z,a,n,j) = {} & y_w(z,a,0) - w_w^r(z,a,n) - c^p \\
& + \rho\rho^n \sum_{a'\in\mathcal{A}} \bar{J}_w^{e,p}(z,a',0,j)\Gamma_w^e(a'|a,j,n) \\
& + \rho(1-\rho^c)(1-\sigma(n)) \sum_{a'\in\mathcal{A}} \bar{J}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\
& + \rho(1-\rho^c)\sigma(n) \sum_{a'\in\mathcal{A}} (1-\mathbf{1}_w^{n,r}(z,a',n,j))\bar{J}_w^{e,o}(z,a',n,j)\Gamma_w^e(a'|a,j,n) \\
& + \rho(1-\rho^c)\sigma(n) \sum_{a'\in\mathcal{A}} \mathbf{1}_w^{n,r}(z,a',n,j)\bar{J}_w^{l,p}(z,a',n,j)\Gamma_w^e(a'|a,j,n)
\end{aligned}$$

A solution to this problem is an indicator function for firing of permanent contract job, defined as

$$\mathbf{1}_w^{f,p}(z,a,n,j) = \begin{cases} 1 & \text{if} \quad \mathrm{E}J_w^{e,p}(z,a,n,j)) \geq -f_p \\ 0 & \text{otherwise} \end{cases},$$

Job value of a match with a man. The job value of match with a man in occupation $j \in \mathcal{J}$ is equal to

$$\begin{aligned}
J_m^e(j) = y_m - w_m + \rho(1-\delta_m)J_m^e(j) \qquad & \forall j \\
\implies J_m^e = \frac{y_m - w_m}{1-\rho(1-\delta_m)} &
\end{aligned}$$

B.3 Solution Algorithm

To solve the model we implement the following algorithm.

1. Use the solution to the bargaining problem to determine the wage for men w_m, the wage schedules for women under temporary contracts $w_w^t(z,a,n,j)$, for women under permanent full-time contracts $w_w^p(z,a,n,j)$, and for women with kids under a permanent contract with a reduced working schedule, $w_w^r(z,a,n,j)$
2. Make or update the guess for labor market tightness, θ
3. Use the definition of matching functions and the guess for the for labor market

tightness to compute the job contact probability for firms

$$\phi_v = \frac{\eta}{\sqrt{\theta}}$$

and for unemployed workers, i.e.

$$\phi_u = \phi_v \theta$$

4. Use ϕ_u and the wage solutions to jointly solve the problem of unemployed workers, the problem of employed workers, and the problem of active jobs. Store value functions and policy functions
5. Use the policy functions to simulate a large panel of individuals and construct the distribution of non-employed women across individual states, $\psi_u^w(a, n)$, and the measure of unemployed men and women, μ_m^u and μ_w^u
6. Use ϕ_v, the distribution of unemployed individuals, the value function for temporary job and the policy function for hiring to construct the value of a vacant job
7. Update guesses:
   - Use the free entry condition for firms to update θ. If the value of entry is larger than zero, increase θ, decrease it otherwise.
8. Go back to point (2) until *convergence*

C Estimation Appendix

C.1 Estimation Algorithm

In the estimation algorithm, we exploit the free entry condition, i.e.

$$\phi_v = \frac{\kappa_v}{\mathrm{E}J^v}$$

and the definition of job filling rate,

$$\phi_v = \frac{\eta}{\sqrt{\theta}}$$

to treat the market tightness, θ, as a parameter to estimate and let the cost of posting vacancy be an equilibrium object, equal to $\kappa_v = \phi_v \mathbf{E}[J^v]$. Given the functional form, θ and η are not separately identifiable. Hence, without loss of generality, we impose $\theta = 1$ in the baseline equilibrium.

To estimate the model, we follow this algorithm:

1. Guess the following parameters:

$$\vartheta = [\vartheta_0, \vartheta_1]$$

   where

$$\vartheta_0 = \{\}$$

   and

$$\vartheta_1 = \{A, \eta, \delta_m\}$$

2. Estimate parameters in ϑ_1, to match the average wage, the E-to-NE transition rate and the employment share for men. To do so:
   (a) Compute average wage for men, w_m using solution of bargaining problem
   (b) Simulate large panel of men (no need to solve the value functions for men)
   (c) Compute employment share of population and E-to-NE transition rate using simulated data and check convergence.
   (d) Update guesses as follows:
      i. increase A if simulated average wage is lower than targeted, decrease it otherwise
      ii. increase η if simulated employment share if lower than targeted, increase it otherwise
      iii. increase δ_m if simulated E-to-NE transition rate is lower than targeted, decrease it otherwise
   (e) Iterate till convergence
3. Given the estimates for A, η and δ_m, compute wage schedule for women, solve the value functions and obtain policy functions
4. Use policy functions to simulate large panel of women
5. Compute relevant moments using simulated data and evaluate the distance function:

$$D(\vartheta) = m(\vartheta)'\Sigma m(\vartheta)$$

   where Σ is positive definite matrix.

6. Update guesses in ϑ_0 and iterate to minimize the distance function

C.2 Model Fit

Figure C.1 shows the estimation fit.

Figure C.1: Model Fit