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

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Family, Fertility and Human Development Initiative

May 19, 2025

- Low total fertility rates in 2022
  - 1.66 in the US, 1.46 in Germany, 1.26 in Japan, 1.16 in Spain
- Barriers to combine labor market participation and family life (Doepke et al 2023)
- Long-lasting scarring effects of children on women's earnings (Kleven et al 2020)
- Wide range of family-friendly policies in high-income countries
  - Childcare subsidies, parental leave, work hours flexibility, ...
- A growing literature studies the effects of such policies on female labor supply and fertility – Petrongolo and Olivetti (2017), Albanesi, Petrongolo, Olivetti (2023)
- Mostly missing in this literature - **Firms**!

- Goldin (2014): *"As women have increased their productivity-enhancing characteristics and as they "look" more like men, the human capital part of the wage difference has been squeezed out. What remains is largely how firms reward individuals who differ in their desire for various amenities."*

- Olivetti and Petrongolo (2017): *"family policies may feed into labor demand decisions. [...] insofar as part of the costs of these arrangements directly or indirectly trickles down on employers, the demand for female labor (and especially for women of child-bearing age) would be negatively affected."*

Focus on Spain

- Very low fertility rate
- Rigid labor market
- Strong labor market duality:
  - more than one-third of employed women (ages 25-54) has a temporary contract (more than 50% around age 25)
  - women account for 86% of all temporary contracts
- Work and Family Reconciliation Act (Law 39/1999)
  - Every parent with a child up to 6 years old has the right to ask for a work-week reduction (WWR), part-time work
  - During WWR, parents *cannot be fired*
  - High take up, from 0 to 25%, women in permanent contracts
  - Analyzed by Fernandez-Kranz and Rodrigues-Planas (2021)
    - Strong negative effects on promotions from temporary (FT) to permanent (OE) contracts
    - Exploit marginal effect of policy to *estimate* the model

What we do

- Build a search and matching model to study the effects of family-friendly policies on fertility
- Effect of Work and Family Reconciliation Act:
  - Strong firm reaction
    - lower hiring rate & lower promotion rate
  - Strong women reaction
    - Higher fertility
    - Decline in employment and lifetime earnings
  - Despite higher fertility, welfare for women decline after the reform
  - If you ignore firms' reactions, significant welfare gains for women

- Study other policies on employment protection, hiring subsidies, child subsidies, ...
- A trade-off emerges: policies that increase fertility tend to lower lifetime earnings for women.
- A promotion subsidy (transfers to firms when they promote women from temporary to permanent contracts) emerges as the winner in terms of welfare gains and archives both higher fertility and higher lifetime earnings.

Literature

Four model building blocks:

- Search and matching frictions in the labor market (Diamond-Mortensen-Pissarides)
- Dual labor market: temporary and permanent contracts (Bentolila, Cahuc, Dolado, Le Barbanchon 2012)
- Fertility decisions (Erosa, Fuster and Restuccia 2010)
- Job flexibility and gender gap (Flabbi and Moro, 2010, Xiao 2024)

- Infinitely-lived agents, facing a constant probability of death, ρ_d
- Individuals differ by gender g, men (m) or women (w)
- Men are all identical and receive utility only from consumption
- Women are heterogeneous - number of children (n) and human capital (a)
- Women receive utility from consumption, having children, and leisure

- Workers can be in one of three labor market states: *employed with a temporary/fixed-term job*, (t) *employed with a permanent/open-ended job* (p), *unemployed/non-employed* (u)
- Only unemployed individuals get job offers (no on-the-job search)
- A share of χ_t jobs start as temporary
- Each period a temporary contract can be converted into a permanent one
  - Exogenous probability of forced conversion vs. dismissal, π_t
- Job separation, w: exogenously (δ_w^c for $c = t, p$) + endogenously
- Job separation, m: exogenously (δ_m)
- Destruction of temporary contracts comes at no cost.
- Destruction of permanent ones implies firing cost f_p
- Workers can quit their jobs at no cost to the firm
- Unemployed individuals get an unemployment benefit b_g

- Each period a woman has an opportunity to have a birth, $\sigma(n)$
- A new birth has a one-time monetary cost, κ_n
- Each period, children leave home with probability ρ^c
- Utility from children
  - γ_e if employed
  - γ_u if not working

- The number of new contacts between searchers u and vacancy v equal to:

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

- Output is produced by worker-firm pairs
- Once in contact, the worker and firm draw productivity (z) and flexibility ($j = 1, 2$), and decide whether to form a match.
- Once a match is formed, each period with probability, φ_z, there is a new draw of z
- Production of match (z, j) with men

$$y_m = A$$

- Production of match (z, j) with women a

$$y_w(z, h) = (1 - \omega_w)Aza$$

where ω_w denotes is an exogenous gender wage penalty

- Human capital, $a \in \mathcal{A}$, drawn at entry from a log-normal c.d.f., $\Gamma^0(a) = \log\mathcal{N}\left(-\frac{(\alpha_w^a)^2}{2}, \alpha_w^a\right)$,
- If a woman is employed (t or p), evolves according to a Markov process, $\Gamma^e(a'|a, j, n)$
- Employed women face a one-step jump forward in skills

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

- $\pi_w^e(j, n)$ differ by flexibility of occupations (j) and number of children (n)

- All employed women with newborns take mandatory maternity leave
  - average length of 4 months, ι% of pre-maternity wage
  - financed by lump-sum taxes on all workers

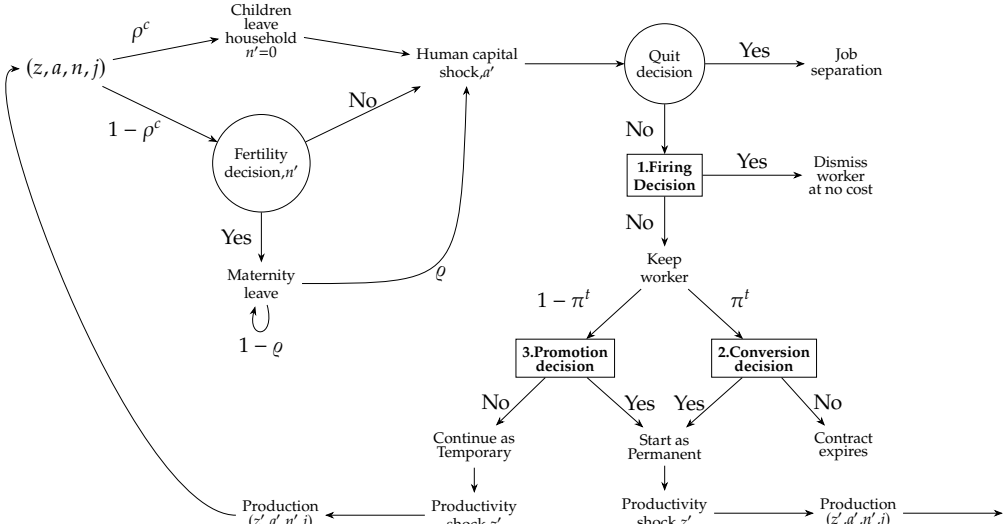
- Women with permanent contracts and children can also take work-week reduction
- Enjoy an extra utility with their children, $\gamma_e + \gamma_r$
- Workers under workweek reductions can not be fired
- Production function for a worker who is in reduced hours is given by

$$y_w^r(z, h) = \omega_r(1 - \omega_w)Aza$$

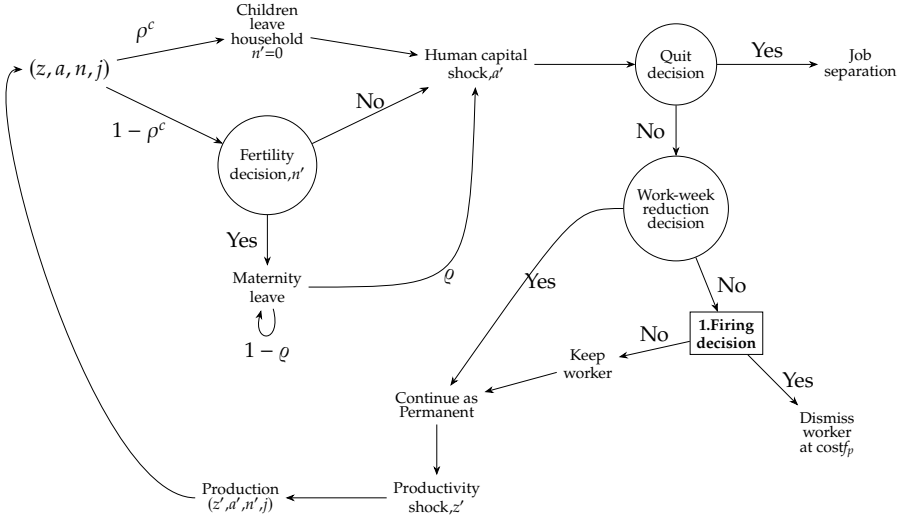
where $\omega_r < 1$ determines the amount of forgone production

Wages

Timing of job in temporary contract



Timing of a job in permanent contract



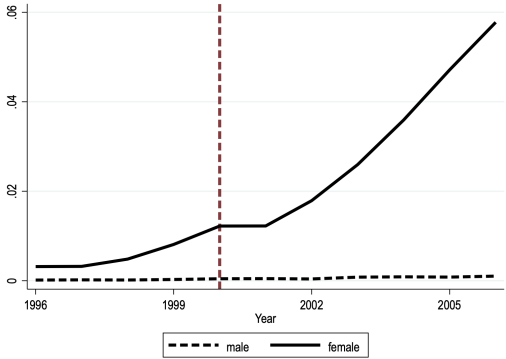
Continuous Sample of Employment Histories

- Spanish social security records (4% samples), 2005-2015 years of extraction
- Complete working histories of individuals that are employed or receive UI or retirement benefits in the year of extraction (traceable back to 1980 or to their first employment)
- Data: demography (age, gender, province), employment information (contract type, dates of each employment spell, work-week reduction coefficient, industry, wages, sector, firm size, skill level)
- Linked to Municipal Registry: nationality, education, household composition (birth dates of children)
- Sample:
  - 1996-2006 (before 1996 contract type is not reliable)
  - Construct a quarterly panel
  - Age 25-45
  - Natives born in Spain
  - Drop self-employed and others in not-SS regimes (some public servants)

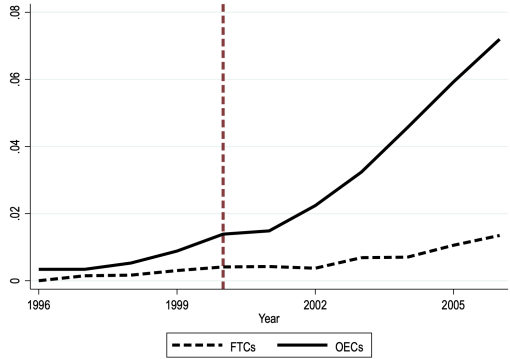
Work and Family Reconciliation Act

- Introduced in 1999
- Every parent with a child up to 6 years old has the right to ask for a work-week reduction (WWR), part-time work
- During WWR, parents *cannot be fired*
- High take up
- Analyzed by Fernandez-Kranz and Rodrigues-Planas (2021)
  - Strong negative effects on promotions from temporary to permanent contracts
  - Exploit marginal effect of policy to *estimate* the model
- Reforms in 2007 and 2012 increased the age for eligible children first to 8 and then 12
- After the 2008 Great Recession, WWR participation increased sharply
- Restrict the analysis to the first phase of the reform between 2000-2006

Work-Week Reduction Take-Up



(a) By gender



(b) By contract

- Who works with reduced hours: women in permanent contracts

- Linear probability model on contract conversion:

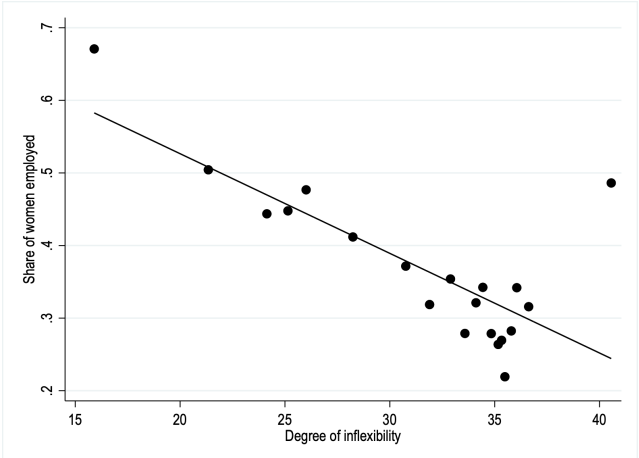
$$y_{it} = \alpha_0 + \alpha_1 \text{post-1999}_t \times \text{female}_i + \alpha_2 X_{it} + \mu_i + \mu_t + \epsilon_{it}$$

	(1)	(2)	(3)	(4)
post-1999$_t$ × female$_i$	-0.0045***	-0.0122***	**-0.0120*** **	-0.0141***
	(0.001)	(0.001)	(0.001)	(0.002)
N.Obs	2296771	1266785	1787809	983173
R-squared	0.18	0.21	0.20	0.23
Individual FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Controls			✓	✓
Within-firm		✓		✓

- The quarterly promotion rate for women declines by 1.2 pp (rate is 0.0573 after reform)

- We follow Cortes and Pan (2017) to build a measure of flexibility for each industry
- Flexibility=share of males in the occupation that work more than 50 hours
- BLS data for industry-occupation matrix. We calculate flexibility at industry level as $\sum_i flexibility_i * share_{ij}$, where i is occupation and j is industry
- We use the crosswalk of industry classification in the US and Spain
- We get a measure of job flexibility for each industry in Spain
- Share of women exceeds 50% in more flexible industries, such as education, but falls below 20% in less flexible sectors like certain manufacturing activities, such as printing

Inflexible jobs and women employment



- Women stay away from inflexible jobs

	(1)	(2)
Overall	**0.0660*** **	
	(0.0008)	
Flexible jobs		**0.0476*** **
		(0.0015)
Non-flexible jobs		**0.0918*** **
		(0.0010)
N.Obs.	107576	106953

- Women in OECs are more likely to take up WWR in inflexible jobs
- WWR is more valuable for women in inflexible jobs

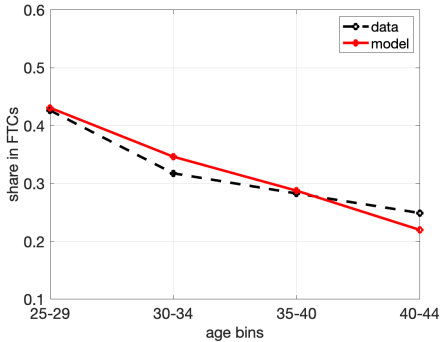
Wage growth penalty of inflexible jobs

			With children	
	All women	Childless	1 child	≥2 children
	(1)	(2)	(3)	(4)
Non-flexible job	-0.0071***	**-0.0065*** **	**-0.0083** **	**-0.0115*** **
	(0.0012)	(0.002)	(0.003)	(0.004)
Constant	0.0198***	0.0234***	0.0153***	0.0158***
	(0.0006)	(0.001)	(0.002)	(0.002)
N.Obs.	2073522	1194413	522677	352641
R-squared	0.12	0.13	0.13	0.11
Individual FE	✓	✓	✓	✓
Time FE	✓	✓	✓	✓
Controls	✓	✓	✓	✓

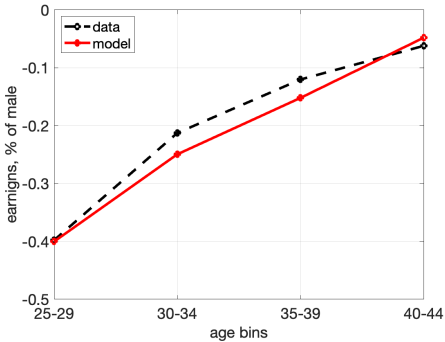
- Inflexible jobs penalize wage growth for women
- More if they have children

- Model set up:
  - Focus on stationary equilibrium
  - Baseline period: 2000-2006
  - Benchmark has WWR
  - Model period is a month
  - Occupations: flexible vs. non-flexible (based on the median value)

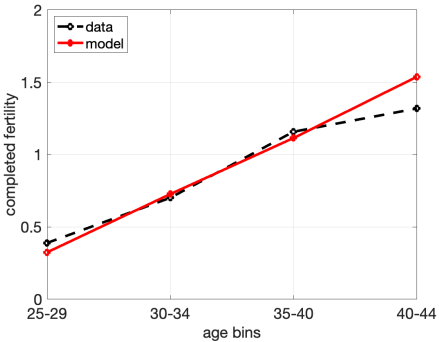
- 9 parameters calibrated outside the model
- 28 parameters calibrated to match a list of 44 worker-level targets



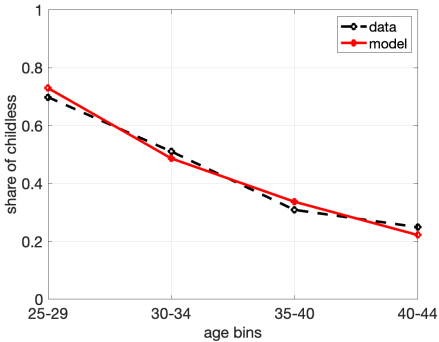
(a) Share of FTCs



(b) Gender wage gap



(a) Completed fertility



(b) Share of childless

Targeted moments III

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
Decline in promotions rate w/ WWR	**-0.012**	**-0.012**

Targeted moments IV

Moment	Data	Model
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**
Avg. wage growth flexible jobs, quarterly	**0.0198**	**0.0189**
Wage growth penalty ($j = 0, n = 0$)	**-0.0065**	**-0.0062**
Wage growth penalty ($j = 0, n = 1$)	**-0.0083**	**-0.0083**
Wage growth penalty ($j = 0, n \geq 2$)	**-0.0115**	**-0.0113**
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
Women with 4+ children at 25 y.o.	0.0012	0.0001
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
Women with 4+ children at 45 y.o.	0.0322	0.0664

Workweek Reduction as a Family-Friendly Policy

- In the benchmark, women with children and permanent contracts and children can choose to work reduced hours
- Enjoy higher utility from children
- Job security while working reduced hours
- Costly for firms - disruptions in production
- Consider an economy where women can choose reduced hours but without job protection (no one chooses it)

Allow Worker Dismissal under WWR

	Counterfactual (pre-1999) (1)	Benchmark (post-1999) (2)	Change (3)=(2)-(1)
Cost of dismissal during WWR (euros)	22064.83	Not allowed	
Labor Market Outcomes			
Emp. rate, of labor force	0.5537	0.5099	-4.37 p.p.
Emp. in perm., of employment	0.7121	0.6687	-4.34 p.p.
Non-Emp. to Emp.	0.1725	0.1546	-1.79 p.p.
Promotion, temp. to perm.	0.0816	0.0696	-1.20 p.p.
Emp. to Non-Emp.	0.1152	0.1225	+0.73 p.p.
Labor Earnings			
Avg. earnings, quarterly	1	1.0022	+0.22 %
Avg. earnings growth, b/w 25 and 44 y.o.	0.4845	0.4223	-6.22 p.p.
Fertility Outcomes			
Completed fertility, age 44 y.o.	1.6292	1.6654	**+2.22%**
Yearly prob. of extra child	0.0828	0.0847	**+0.19 p.p.**
Aggregate Outcomes			
Life-time earnings	1	0.9273	**-7.27%**
Welfare	1	0.9711	**-2.89%**

Allow Worker Dismissal under WWR, but firms do not react

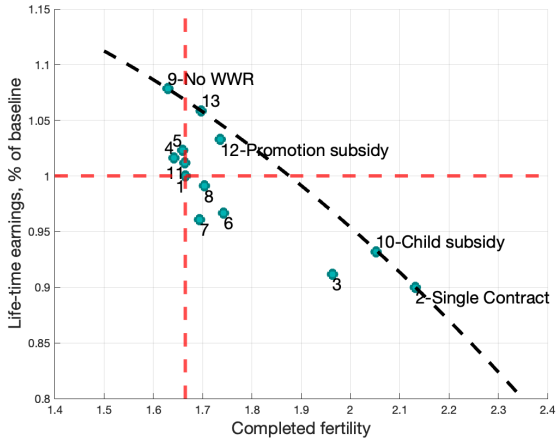
	Counterfactual (pre-1999) (1)	Benchmark (post-1999 & no firms) (2)	Change (3)=(2)-(1)
Cost of dismissal during WWR (euros)	22064.83	Not allowed	-
Labor Market Outcomes			
Emp. rate, of labor force	0.5537	0.5475	-0.62 p.p.
Emp. in OEC, of employment	0.7121	0.7074	-0.47 p.p.
Non-Emp. to Emp.	0.1725	0.1695	-0.30 p.p.
Promotion, temp. to perm.	0.0816	0.0818	+0.02 p.p.
Emp. to Non-Emp.	0.1152	0.1167	+0.15 p.p.
Labor Earnings			
Avg. earnings, quarterly	1	0.9888	-1.12%
Avg. earnings growth, b/w 25 and 44 y.o.	0.4845	0.4536	-3.09 p.p.
Fertility Outcomes			
Completed fertility, age 44 y.o.	1.6292	1.7976	**+10.34%**
Yearly prob. of extra child	0.0828	0.0916	**+0.87 p.p.**
Aggregate Outcomes			
Life-time earnings	1	0.9738	**-2.62%**
Welfare	1	1.0223	**+2.23%**

Family-Friendly Policies

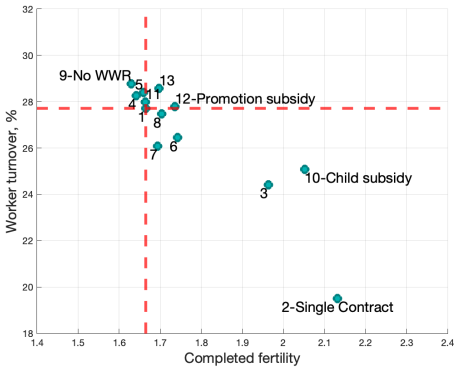
- (1) Benchmark Economy
- Duality
  - (2) Unique contract with lower firing costs (-50%)
  - (3) Lower conversion rate (1 year)
  - (4) Higher conversion rate (8 years)
  - (5) Lower firing cost (-10%)
  - (6) Higher firing costs (+10%)
- Leave
  - (7) Longer maternity leave (12 months)
  - (8) Higher maternity replacement rate (100%)
  - (9) No work-week reduction
- Subsidies
  - (10) Child subsidy (50 euros x month)
  - (11) Hiring subsidy (100% of hiring cost)
  - (12) Promotion subsidy (100% of hiring cost)

- Focus on fertility vs. labor market outcomes

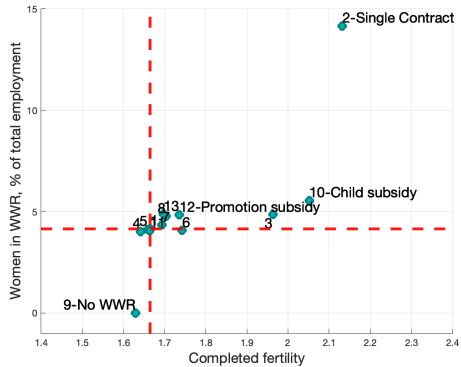
Policy possibility frontier



- Higher fertility versus lower lifetime earnings



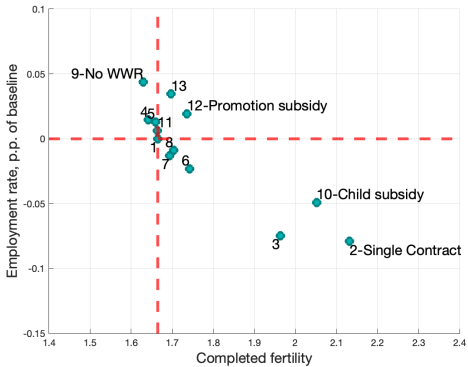
(a) Labor turnover vs fertility



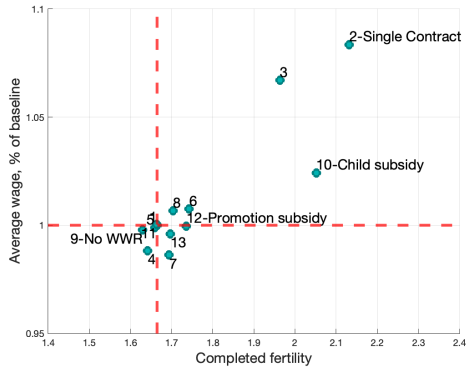
(b) WWR vs fertility

- Lower labor turnover associated with higher fertility

Employment vs. wage trade-off



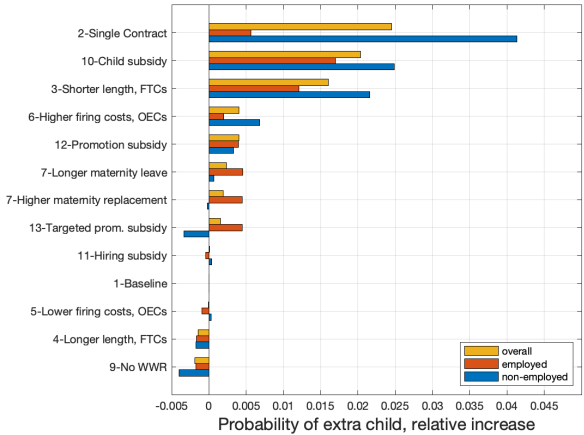
(a) Employment vs fertility



(b) Average wage vs fertility

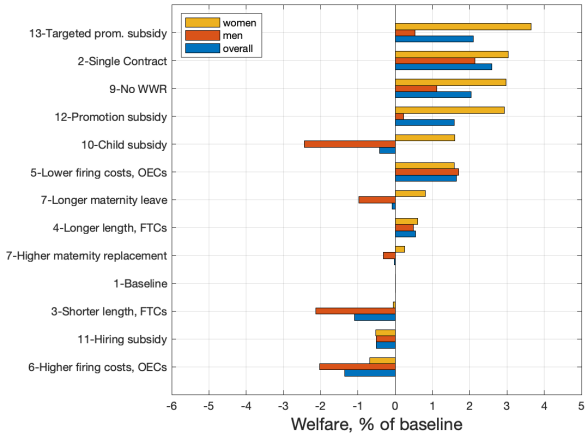
- Lower employment of women implies women who are employed are more selected

Probability of extra child: employed vs non-employed

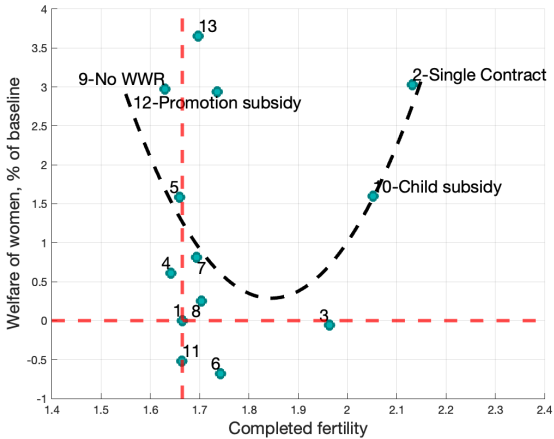


- Fertility goes up for both employed and non-employed

Welfare - Gains and losses



- Promotion subsidy as the best policy



- Higher welfare from higher earnings or higher fertility

- Trade-off between lifetime earnings and probability of having a newborn across policies
  - WWR without job protection (or other policies that make the labor market more fluid): negative but small effect on fertility, large and positive effect on earnings
  - Single Contract or Childcare subsidy (or other policies that make the labor market less fluid): large and positive effect on fertility, large and negative effect on earnings
  - Promotion subsidies: positive effect on fertility, positive effect on earnings
- Welfare gains - Largest for promotion subsidies
- Welfare gains - Policies that increase earnings or fertility can result in higher welfare
- Firms' reactions play a key role

Literature back

- Large literature that studies how policies affect fertility decisions
  - Adda, Dustmann and Stevens (2017)
  - Guner, Kaya and Sanchez-Marcos (2023)

- Search and matching models to study gender wage and employment gaps
  - Flabbi and Moro (2010)
  - Morchio and Moser (2019)
  - Xiao (2024)

- Fertility decisions within search and matching models
  - Erosa, Fuster and Restuccia (2010)

- Interactions between households and firm decisions
  - Albanesi and Olivetti (2009)

- Wages are the solution to the bargaining problem as in Binmore et al. (1986) with zero payoffs for firms in case of production delay
- Employee bargaining power $\beta \in (0, 1)$
- Wages for men

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

- Wages for women, $c = t, p$

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

- Wages for fertile women in WWR

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

where $\overline{\omega}_r$ is a wage adjustment

- Protocol as in Binmore et al. (1986) and Hall and Milgrom (2008)
- Threats of permanent suspension of negotiations are not credible
  - even with breakdown, the firm will wish to resume negotiations with the same worker in the subsequent period
- Breakdown is credibly associated only with a temporary disruption of production due to delayed agreement
- Since wages are renegotiated every period, the effective surplus is the marginal flow surplus
- Sharing rule

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

Value of a job in a temporary contract

back

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

where

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

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

and

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

Value of being employed in a permanent contract

back

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

where

$$
\overline{J}_w^{e,p}(z,a,0,j) = (1-\delta_w^p)(1-\mathbf{1}_w^{q,p}(z,a,0,j))\max\{-f_p, \mathrm{E}J_w^{e,p}(z,a,0,j)\}, \quad \text{with} \quad \mathrm{E}J_w^{e,p}(z,a,0,j) = \sum_{z'\in\mathcal{Z}} J_w^{e,p}(z',a,0,j)\Lambda(z'|z),
$$

and

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

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

and

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

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

Recursive stationary competitive equilibrium:

- *optimality, firms*: policy functions for hiring, promotion, and firing are determined non-cooperatively by the firm, i.e. are the solution to the firms' value functions
- *optimality, households*: policy functions for fertility, job acceptance, and quit and reduced work-time decisions are determined non-cooperatively by fertile women, i.e., are the solution to the workers' value functions
- *bargaining*: wages are determined as the solution of a bargaining problem
- *free entry*: jobs are created until the expected value of entry net cost of posting a vacancy equals zero
- *consistency*: distributions of workers and jobs replicate themselves over time through the policy functions, exogenous labor market flows, human capital accumulation, and productivity shocks

numerical solution

- Use the solution to the bargaining problem to determine the wage schedules under temporary contracts for men, fertile and infertile women, permanent full-time contracts for men, fertile and infertile women, and permanent contracts with a reduced working schedule for fertile women
- Make or update the guess for the job contact probability for firms, ϕ_v
- Use the definition of matching functions to compute the job contact probability for unemployed workers, i.e.

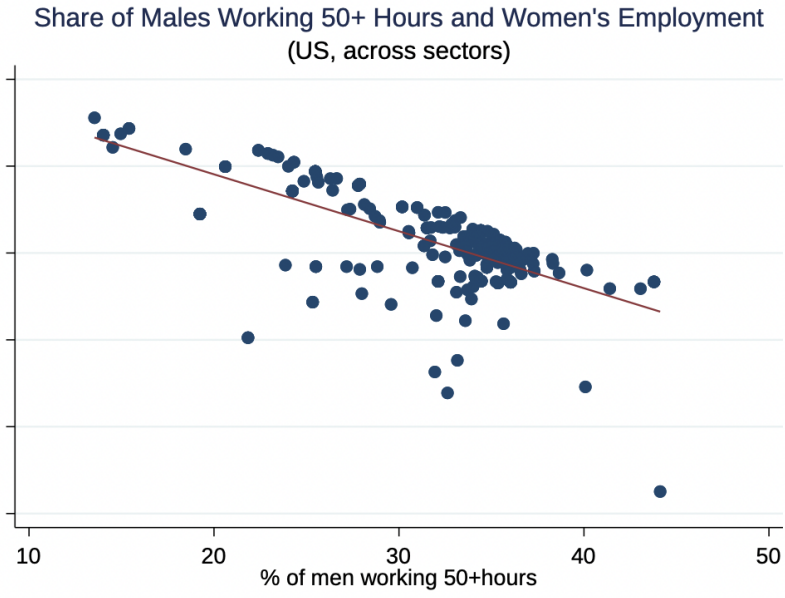
$$\phi_u = (1 - \phi_v^{\eta})^{\frac{1}{\eta}}$$

- Use ϕ_u and the wage solutions to jointly solve the problem of unemployed workers, the problem of the employed workers, and the problem of an active jobs. Store value functions and policy functions.

Solution algorithm back

- Use the policy functions to simulate a large panel of individuals and construct the distribution of unemployed workers across individual states, the measure of unemployed workers, and the shares of fertile and infertile women
- Use the distribution of unemployed individuals, the value function for temporary jobs and the policy function for hiring to construct the value of a vacant job
- Update guesses:
  - Use the free entry condition for firms to update ϕ_v. If the value of entry is larger than zero, increase ϕ_v, decrease it otherwise
- Iterate until convergence

	Mean	SD	Min	Max	N.Obs.
age (years)	34.1	5.56	25	44	7946291
female	0.42	0.49	0	1	7946291
college	0.23	0.42	0	1	7938394
spouse present	0.42	0.49	0	1	7946291
# children	1.01	1.04	0	9	7946291
childless	0.40	0.49	0	1	7946291
full-time	0.89	0.31	0	1	6936443
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
# jobs in a quarter	1.04	0.22	1	6	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
daily earnings, log	3.95	0.53	1.40	7.52	7823534


Share of Males Working 50+ Hours and Women's Employment
(US, across sectors)
10
20
30
40
50
% of men working 50+hours

back

High Flexibility Sectors (low % of men working 50+h) back

- Activities of households as employers of domestic personnel [13.54%]
- Residential care activities [14.02%]
- Social work activities without accommodation for the elderly and disabled [14.53%]
- Hospital activities [14.96%]
- Medical and dental practice activities [15.41%]
- Other social work activities without accommodation [18.47%]
- Education [19.24%]

Low Flexibility Sectors (high % of men working 50+h) back

- Hunting, trapping and related service activities [44.12%]
- Food service activities [43.79%]
- Retail sale in non-specialised stores [43.06%]
- Retail sale of automotive fuel in specialised stores [41.40%]
- Retail sale of food, beverages and tobacco in specialised stores [40.16%]
- Fishing [40.08%]
- Manufacture of furniture [37.15%]

Parameters calibrated outside the model

back

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 (0-12)
	Wage parameters		
b_m	Net unemployment benefit, men (euros)	122.68	Data, EU-SILC
b_w	Net unemployment benefit, women (euros)	107.88	Data, EU-SILC
ω_r	WWR wage penalty	0.7576	Data, MCVL
	Labor market and policies		
β	Bargaining power	0.50	Pissarides (2009)
ϱ	Maternity leave, length	0.25	4 months duration
ι	Maternity leave, wage transfer	0.90	90% of contracted wage

Estimated parameters - Summary back

- Per period human capital jump probabilities
  - 0.11 in flexible jobs, 0.07 in inflexible jobs without children, 0.05 for inflexible jobs with 1 child, and 0.026 with 2 of more children.
- Cost of children, ≈ 33,000 euros
- Firing costs for permanent, ≈ 22,000 euros
- Cost of posting a vacant, ≈ 1,400 euros
- WWR production penalty, 56%
- Utility from children
  - ≈ 811 euros if unemployed, ≈ 190 if employed, ≈ 400 extra if on WWR

Parameter	Description	Value
A	Aggregate shifter	3606.2
δ_m	Exogenous separation, men	0.0365
	Wage/production penalties	
ω_w	Gender wage penalty	0.1633
ω_r	WWR production penalty	0.5568
	Human capital	
α_a	Initial distribution human capital	0.6588
$\pi^e_w(j=1)$	Human capital jump, flexible jobs	0.1137
$\pi^e_w(j=0, n=0)$	Human capital jump, inflexible job & childless	0.0671
$\pi^e_w(j=0, n\geq 1)$	Human capital jump, inflexible job with n children	0.0511
$\pi^e_w(j=0, n\geq 2)$	HC jump, inflexible job with ≥ 2 children	0.0256

Parameter	Description	Value
	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
$\Theta(n\geq 4)$	Women with 4+ children at 25 y.o.	0.0012
$\sigma(n=0)$	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
$\sigma(n\geq 4)$	Fertility opportunity, 4+ children	0
κ_n	Fixed cost of newborns (euros)	33114

Parameter	Description	Value
	Productivity and costs	
κ_v	Cost of posting vacancy (euros)	1419.5
c^t	Cost of operating, FTCs (euros)	216.24
c^p	Cost of operating, OECs (euros)	599.96
φ_z	Productivity persistency	0.5818
c^f	Firing costs, OECs (euros)	22064
	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

Parameter	Description	Value
	Labor market	
η	Matching efficiency	0.0907
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