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

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- Low total fertility rates
  - 1.8 in the US, 1.6 in Germany, 1.4 in Japan, 1.3 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 2019)
- 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

- Low fertility rate (1.3 births x women)
- 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 FTCs to OECs
    - Exploit marginal effect of policy to *estimate* the model

- 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
    - 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

- Study other policies on employment protection, hiring subsidies, child subsidies, .....
- Across policies, a trade-off emerges: policies that increase fertility tend to lower lifetime earnings for women.
- A single contract with lower firing costs and promotion subsidies for women emerge as winners in terms of welfare gains

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 2023)

- Infinitely-lived agents, facing a constant probability of death, $\rho_d$
  - They discount the future at a rate $\widetilde{\rho}$
  - Let $\rho = \widetilde{\rho}(1 - \rho^d)$
- 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 $n \in \mathcal{N} := [0, 1, 2, ...]$
  - Human capital, $h \in \mathcal{H} := \{\underline{h}, .., h_i, .., \bar{h}\}$
- 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 $\chi_t$ jobs start as temporary
- Each period a temporary contract can be converted into a permanent one
  - Exogenous probability of forced conversion vs. dismissal, $\pi_t$
- Job separation, $w$: exogenously ($\delta_w^c$ for $c = t, p$) + endogenously
- Job separation, $m$: exogenously ($\delta_m$)
- Destruction of FTCs comes at no cost. Destruction of OECs 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, $\kappa_n$
- Each period, children leave home with probability $\rho_n$
- Utility from children
  - $\gamma_e$ if employed
  - $\gamma_u$ if not working

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

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

- Contact probability for workers:

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

- Contact probability for firms:

$$\phi_v = \frac{m(u,v)}{v}$$

- Per period cost of keeping vacancies for the firm $\kappa_v > 0$

- Output is produced by worker-firm pairs

- Once in contact, the worker and firm draw
  - a productivity level $z$ from $\Lambda(z)$, uniform on $[0, 1]$
  - a flexibility degree $j = 1, 2$, with probability $\chi$ of a type-1 occupation

  and decide whether to form a match.

- Once a match is formed, each period with probability, $\varphi_z$, there is a new draw from $\Lambda(z)$

- Production of match $(z, j)$ with men

$$y_m = A$$

- Production of match $(z, j)$ with women $(h, n)$

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

where $\omega_w$ denotes is an exogenous gender wage penalty

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

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

- $\pi_w^e(j, n)$ 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, $\iota$% 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

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

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

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

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

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

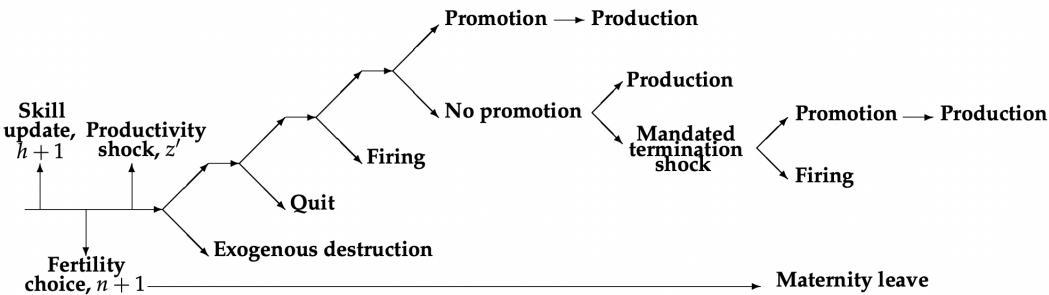
$$w_w^c(z, h, n) = (1 - \beta)[b_w + (\gamma_e - \gamma_u)n] + \beta[(1 - \omega_g)Azh]$$

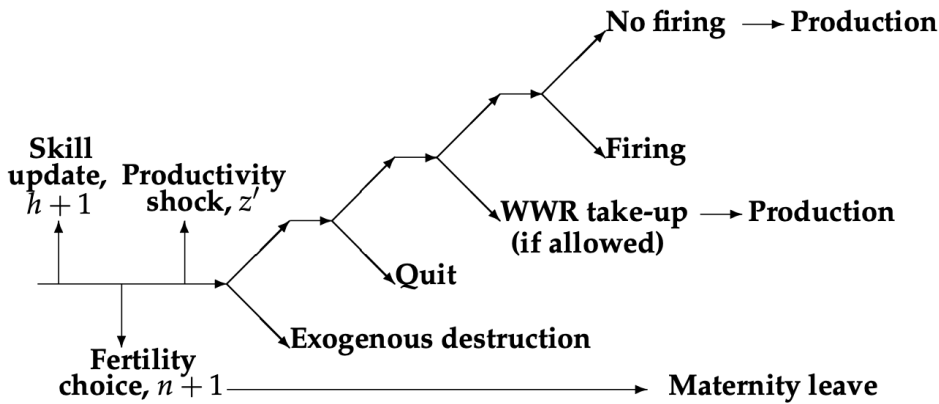
- Wages for fertile women in WWR

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

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

## Timing of women employed in FTCs




No firing
Production
Firing
Skill update, $h+1$
Productivity shock, $z'$
WWR take-up (if allowed)
Production
Quit
Exogenous destruction
Fertility choice, $n+1$
Maternity leave

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

VF numerical solution

## Continuous Sample of Employment Histories

- Spanish administrative data set (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, sex, province), employment information (contract type, dates of each employment spell, work-week reduction coefficient, industry, wages, sector, firm size, skill level)
- Municipal Registry (Padrón): nationality, education, household composition (birth dates of children)
- Sample:
  - 1996-2007 (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 FTCs to OECs
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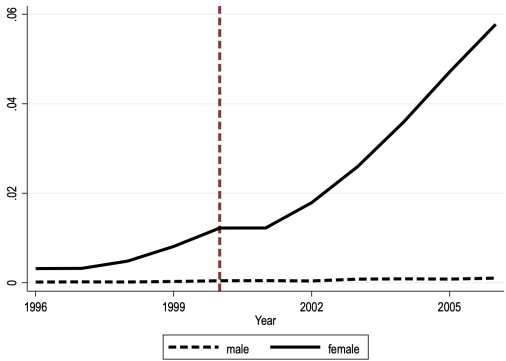
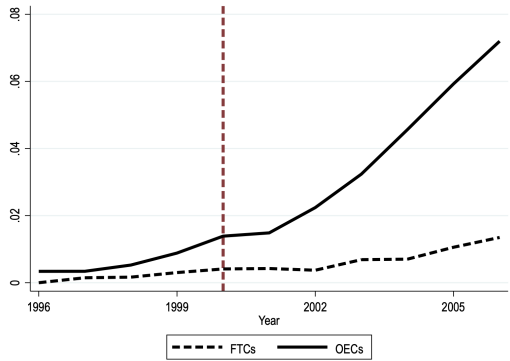
## Work-Week Reduction Take-Up




(a) By gender




(b) By contract

## Promotions from temporary to permanent contracts

- Linear probability model on contract conversion:

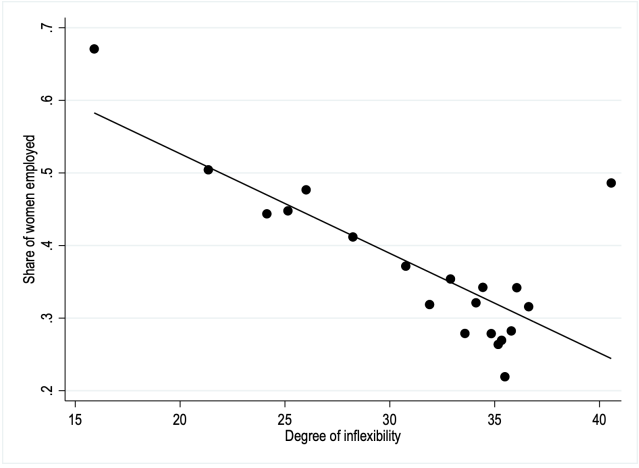
$$y_{it} = \alpha_0 + \alpha_1 \text{post-1999}_t \times \text{female}_i + \alpha_2 X_{it} + \mu_i + \mu_t + \epsilon_{it}$$

| | Overall | | Within firm | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| post-1999$_t$ × 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 |
| Individual FE | ✓ | ✓ | ✓ | ✓ |
| Year-quarter FE | ✓ | ✓ | ✓ | ✓ |
| Controls | | ✓ | | ✓ |

- We follow Cortes and Pan 2019 (JLE) 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

## Inflexible jobs and women employment

- Women stay away from inflexible jobs



- Women in OECs are more likely to take up WWR in inflexible jobs

| | (1) | (2) |
|---|---|---|
| Non-flexible job | - | 0.0476*** |
| | - | (0.0015) |
| Constant | 0.0660*** | 0.0442*** |
| | (0.0008) | (0.0010) |
| N.Obs. | 107576 | 106953 |
| R-squared | 0.00 | 0.01 |

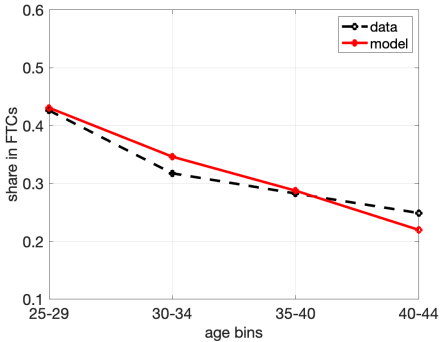
## Wage growth penalty of inflexible jobs

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

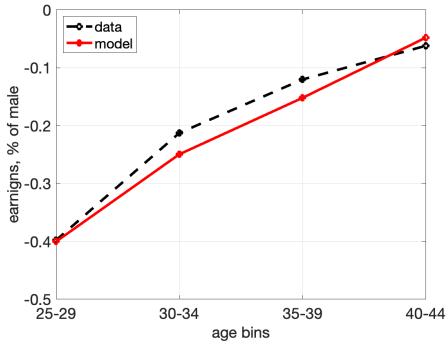
| | Overall | Childless | With children | Childless | 1 child | ≥2 children |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Non-flexible job | - | -0.0065*** | -0.0091*** | -0.0065*** | -0.0083** | -0.0115*** |
| | - | (0.002) | (0.002) | (0.002) | (0.003) | (0.004) |
| Constant | 0.0167*** | 0.0234*** | 0.0154*** | 0.0234*** | 0.0153*** | 0.0158*** |
| | (0.0001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.002) |
| N.Obs. | 2086072 | 1194413 | 876670 | 1194413 | 522677 | 352641 |
| R-squared | 0.00 | 0.13 | 0.12 | 0.13 | 0.13 | 0.11 |
| Individual FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Year-quarter FE | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Controls | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

- Model set up:
  - Baseline period: 2001-2007
  - Benchmark has WWR
  - Model period is a month
  - Occupations: flexible vs. non-flexible (based on the median value)

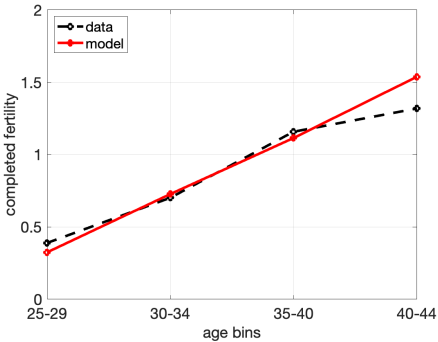
- 9 parameters calibrated outside the model
- 28 parameters calibrated to match a list of 44 worker-level targets



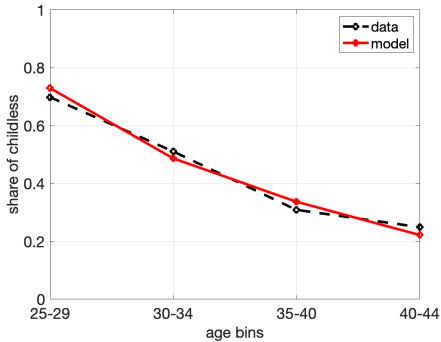

(a) Share of FTCs




(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 |
| **Annual reduction in FTCs to OECs quarterly rate w/ WWR** | **-0.0322** | **-0.0300** |

## Targeted moments IV

| Moment | Data | Model |
|---|---|---|
| **Women** | | |
| *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 |
| 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 |

- Per period human capital jump probabilities
  - 0.11 in flexible jobs, 0.07 in inflexible jobs without children, and 0.05 for inflexible jobs with 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

# Counterfactuals. Allow Worker Dismissal under WWR

| | 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. |

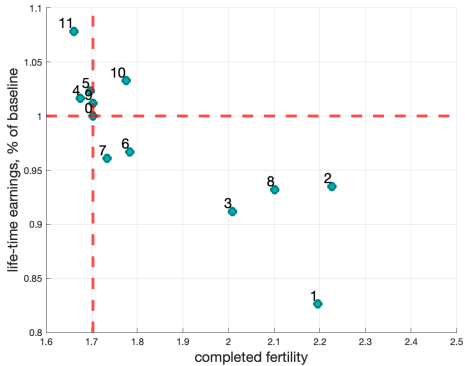
## Counterfactuals. Allow Worker Dismissal under WWR

| | Counterfactual (pre-1999) (1) | Baseline (post-1999) (2) | Change (3) |
|---|---|---|---|
| Cost of dismissal during WWR (euros) | 22064.83 | Not allowed | - |
| *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% |
| Completed fertility of the employed, 44 y.o. | 1.5341 | 1.5375 | 0.22% |
| Completed fertility of the non-employed, 44 y.o. | 1.8192 | 1.8746 | 3.05% |
| *Aggregate Outcomes* | | | |
| Life-time earnings | 1 | 0.9682 | -3.18% |
| Income | 1 | 0.9879 | -1.21% |
| Welfare | 1 | 0.9694 | -3.06% |

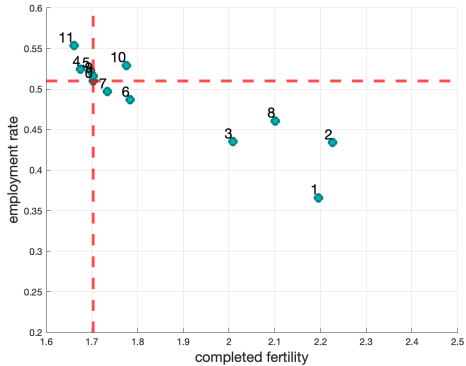
- Duality
  - (1) No FTCs
  - (2) Unique contract with lower firing costs (-50%)
  - (3) Lower conversion rate (1 year)
  - (4) Higher conversion rate (8 years)
  - (5) Lower firing cost (-10%)
  - (6) Higher firing costs (+10%)
- Leave
  - (7) Longer maternity leave (12 months)
  - (11) No work-week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

- Focus on fertility vs. labor market outcomes

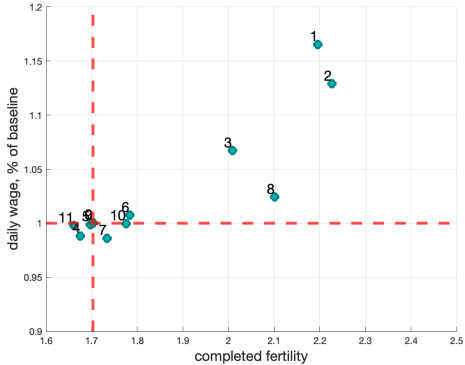
# Policy possibility frontier



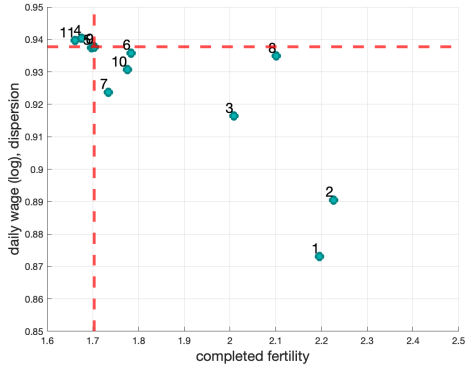

(a) Lifetime earnings vs fertility




(b) Employment vs fertility

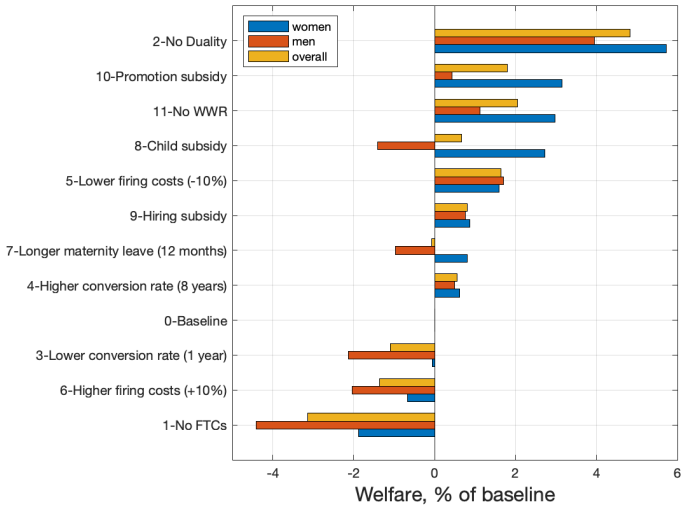



(a) Average wage vs fertility

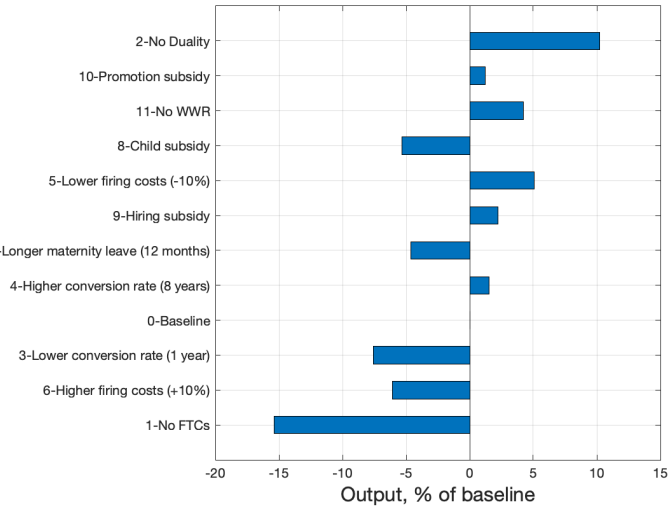



(b) Wage dispersion vs fertility

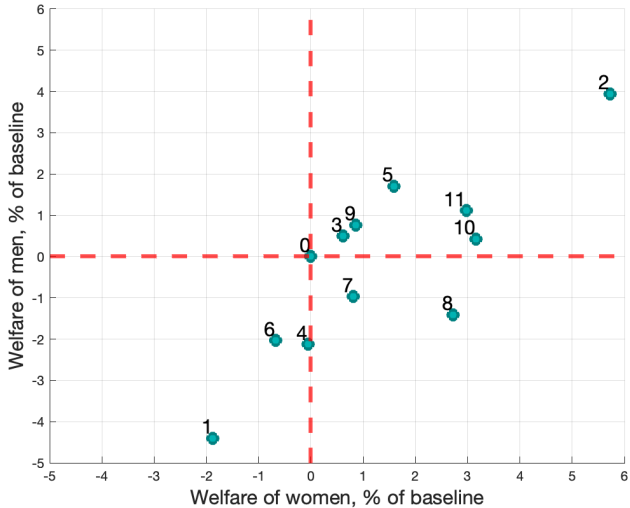
# Gains and losses



# Output costs



# Welfare trade-offs: Men vs Women



- Job protection under work-week reduction leads to lower fertility for women in temporary contracts but higher for those in permanent contracts.
- Strong firm reaction:
  - lower promotion rate
  - lower hiring rate
- Despite firms' reaction, welfare for women increased after the reform

- Trade-off between lifetime earnings and probability of having a newborn across policies
  - Hiring subsidies: small positive effect on fertility, positive effect on earnings
  - Only permanent contracts: positive effect on fertility, very large negative effect on earnings
  - Single contract: very large positive effect on fertility, small negative effect on earnings
- Welfare gains? Largest for single contract economy, followed by promotion subsidies

## 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 (2020)

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

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

## Bargaining problem back

- 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

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

## Value of being employed in a temporary contract

back

$$V_w^{e,t}(z,h,n,j) = w_w^t(z,h,n,j) + \gamma_e n + \rho[\mathbf{1}_{n\geq 1}]\rho_n \sum_{h'\in\mathcal{H}} \bar{V}_w^{e,t}(z,h',0,j)\Gamma_w^e(h'|h,j,n)$$
$$+ \rho(1-[\mathbf{1}_{n\geq 1}]\rho_n)(1-\sigma) \sum_{h'\in\mathcal{H}} \bar{V}_w^{e,t}(z,h',n,j)\Gamma_w^e(h'|h)$$
$$+ \rho(1-[\mathbf{1}_{n\geq 1}]\rho_n)\sigma \sum_{h'\in\mathcal{H}} \max\{\bar{V}_w^{e,t}(z,h',n,j), \bar{V}_w^{e,t}(z,h',n+1,j) - \kappa_n\}\Gamma_w^e(h'|h,j,n),$$

$$\bar{V}_w^{e,t}(h,n,j) = [\delta_w^t + (1-\delta_w^t)\mathbf{1}_w^{f,t}(z,h,n,j)]V_w^u(h,n) + (1-\delta_w^t)(1-\mathbf{1}_w^{f,t}(z,h,n,j))\max\{EV_w^{e,t}(z,h,n,j), V_w^u(h,n)\}$$

$$EV_w^{e,t}(z,h,n,j) = \pi^t \mathbf{1}_w^{c,t}(z,h,n,j) \sum_{z'\in\mathcal{Z}} V_w^{e,p}(z',h,n,j)\Lambda(z'|z) + \pi^t(1-\mathbf{1}_w^{c,t}(z,h,n,j))V_w^u(h,n)$$
$$+ (1-\pi^t)\mathbf{1}_w^{p,t}(z,h,n,j) \sum_{z'\in\mathcal{Z}} V_w^{e,p}(z',h,n,j)\Lambda(z'|z) + (1-\pi^t)(1-\mathbf{1}_w^{p,t}(z,h,n,j)) \sum_{z'\in\mathcal{Z}} V_w^{e,t}(z',h,n,j)\Lambda(z'|z)$$

## Value of being employed in a permanent contract

back

$$V_w^{e,p}(z,h,0,j) = w_w^p(z,h,0,j) + \rho(1-\sigma)\sum_{h'\in\mathcal{H}} \bar{V}_w^{e,p}(z,h',0,j)\Gamma_w^e(h'|h,j,n)$$
$$+ \rho\sigma \sum_{h'\in\mathcal{H}} \max\{\bar{V}_w^{e,p}(z,h',0,j), \bar{V}_w^{e,p}(z,h',1,j) - c_n\}\Gamma_w^e(h'|h,j,n)$$

and

$$V_w^{e,p}(z,h,n,j) = w_w^p(z,h,n,j) + \gamma_e n + \rho\rho_n \sum_{h'\in\mathcal{H}} \bar{V}_w^{e,p}(z,h',0,j)\Gamma_w^e(h'|h,j,n)$$
$$+ \rho(1-\rho_n)(1-\sigma)\sum_{h'\in\mathcal{H}} \bar{V}_w^{e,o}(z,h',n,j)\Gamma_w^e(h'|h) + \rho(1-\rho_n)\sigma \sum_{h'\in\mathcal{H}} \max\{\bar{V}_w^{e,o}(z,h',n,j), \bar{V}_w^{e,o}(z,h',n+1,j) - \kappa_n\}\Gamma_w^e(h'|h,j,n),$$

where

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

## Value of being employed in a permanent contract

back

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

where

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

## Value of being employed in a permanent contract

back

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

where

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

and

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

$$
\begin{aligned}
V_w^u(h,n) = b_w + \theta + \gamma_u n \\
&+ \rho\rho_n[\mathbf{1}_{n\geq 1}]\bar{V}_w^u(h,0) \\
&+ \rho(1-\rho_n[\mathbf{1}_{n\geq 1}])(1-\sigma)\bar{V}_w^u(h,n) \\
&+ \rho(1-\rho_n[\mathbf{1}_{n\geq 1}])\sigma\max\{\bar{V}_w^u(h,n), \bar{V}_w^u(h,n+1) - \kappa_n\}]
\end{aligned}
$$

where

$$
\begin{aligned}
\bar{V}_w^u(h,n) = V_w^u(h,n) \\
&+ \phi_u \sum_{z\in\mathcal{Z}}\sum_{j\in\mathcal{J}} \mathbf{1}_w^{h,t}(z,h,n,j)\max\{0, V_w^{e,t}(z,h,n,j) - V_w^u(h,n)\}\Upsilon(j)\Lambda(z)
\end{aligned}
$$

- 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, $\phi_v$
- Use the definition of matching functions to compute the job contact probability for unemployed workers, i.e.

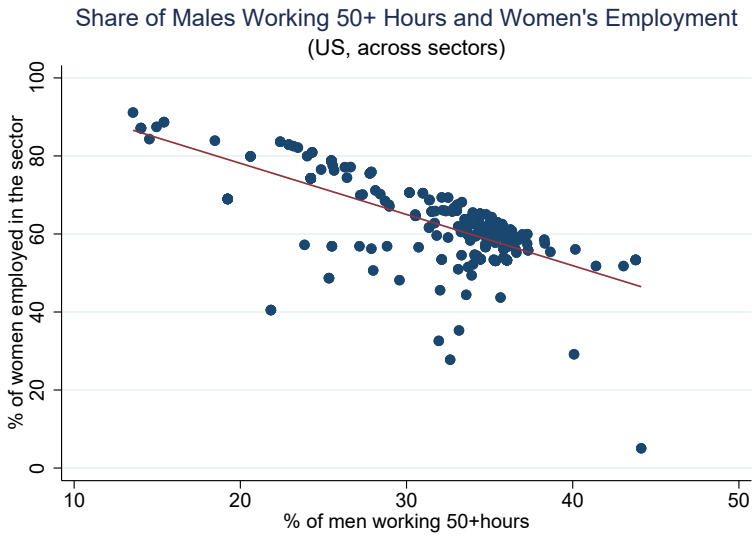
$$\phi_u = (1 - \phi_v^{\eta})^{\frac{1}{\eta}}$$

- Use $\phi_u$ 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 $\phi_v$. If the value of entry is larger than zero, increase $\phi_v$, decrease it otherwise
- Iterate until convergence

| | 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 |
| flexible jobs | 0.56 | 0.50 | 0 | 1 | 7882681 |
| permanent jobs | 0.69 | 0.46 | 0 | 1 | 7946291 |
| temporary jobs | 0.31 | 0.46 | 0 | 1 | 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 |


Share of Males Working 50+ Hours and Women's Employment
(US, across sectors)
% of women employed in the sector
0
20
40
60
80
100
10
20
30
40
50
% of men working 50+hours

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

- Activities of households as employees of domestic personnel [13.54%, women 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]

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

- Manufacture of knitwear [38.29%, women 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]

## Parameters calibrated outside the model

back

| Parameter | Description | Value | Targets/Notes |
|---|---|---|---|
| | *Demographics parameters* | | |
| $\widetilde{\rho}$ | Discount Factor | 0.9967 | 4% yearly return |
| $\rho^d$ | Survival Probability | 0.0021 | # of years in labor market (25-44) |
| $\rho^c$ | Prob. child leaves home | 0.0069 | # of years for children (0-12) |
| | *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) |
| $\omega_r$ | WWR wage penalty | 0.7624 | Measured directly from data (MCVL) |
| | *Labor market and policies* | | |
| $\beta$ | Bargaining power | 0.50 | **shimer2005cyclical** |
| $\varrho$ | Maternity leave, length | 0.25 | 4 months duration |
| $\iota$ | Maternity leave, wage transfer | 0.80 | 80% of contracted wage |

| Parameter | Description | Value |
|---|---|---|
| $A$ | Aggregate shifter | 3606.2 |
| $\delta_m$ | Exogenous separation, men | 0.0365 |
| | *Wage/production penalties* | |
| $\omega_w$ | Gender wage penalty | 0.1633 |
| $\omega_r$ | WWR production penalty | 0.5568 |
| | *Human capital* | |
| $\alpha_w^h$ | 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 |

| 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 |
| $\kappa_n$ | Fixed cost of newborns (euros) | 33114 |

| Parameter | Description | Value |
|---|---|---|
| | *Productivity and costs* | |
| $\kappa_v$ | 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 |
| $\varphi_z$ | Productivity persistency | 0.5818 |
| $c^f$ | Firing costs, OECs (euros) | 22064 |
| | *Preferences* | |
| $\gamma_u$ | Value of children if unemployed (euros) | 811.87 |
| $\gamma_e$ | Value of children if employed (euros) | 187.89 |
| $\gamma_r$ | Extra value of children home under WWR (euros) | 406.57 |

| Parameter | Description | Value |
|---|---|---|
| | *Labor market* | |
| $\eta$ | Matching efficiency | 0.0907 |
| $\chi_f$ | Share of flexible jobs posted | 0.5528 |
| $\chi_p$ | Share of OECs posted | 0.5809 |
| $\pi^t$ | Conversion option, from FTCs to OECs | 0.0183 |
| $\delta_w^t$ | Exogenous separation from FTCs, women | 0.0445 |
| $\delta_w^p$ | Exogenous separation from OECs, women | 0.0234 |
| $\delta_w^r$ | Exogenous separation from WWRs, women | 0.0282 |