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

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Motivation

- The total fertility rate is alarmingly low in many high-income countries ●
    - 1.8 in the US, 1.6 in Germany, 1.4 in Japan, 1.3 in Spain

- Why?
    - Barriers to combine labor market participation and family life – Feyrer, Sacerdote, and Stern (2008)
    - Long-lasting effects of children on gender gaps in earnings - Kleven et al (2019), De Quinto, Hospido and Sanz (2020)

- Countries are implementing a wide range of family-friendly policies
    - Childcare subsidies, parental leave, work hours flexibility, etc. – Petrongolo and Olivetti (2017)

- A growing literature in the effects of such arrangements on female labor supply and fertility

- What is the role of 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."*

- Yet, firms are missing in the literature!

- **Build a search and matching model to study the effects of family-friendly policies on fertility**
  - Economy has temporary and permanent jobs.
  - Jobs also differ in how costly they are for women to have children – flexible vs. non-flexible jobs
  - Firms post vacancies, hire and fire workers
  - Firms also decide on promotions from temporary to permanent contracts.
  - Women build human capital as they work, and decide how many children to have and when to have them
- Focus on Spain, a country with low fertility and dual labor markets
  - Rich administative data (MCVL)
- Model as a laboratory to evaluate family-friendly policies

- Large literature that studies how policies affect fertility decisions, but abstracts from firms:
    - Adda, Dustmann and Stevens (2017)
    - Guner, Kaya and Sanchez-Marcos (2020)

- Recent papers that build search and matching models to study gender wage gap, but abstract from fertility:
    - Morchio and Moser (2019)
    - Xiao (2020)

Literature

- Fertility decisions within search and matching models, without from labor market duality:
  - Erosa, Fuster and Restuccia (2010)

- Gender gaps and inflexibility:
  - Flabbi and Moro (2012)
  - Goldin (2014)
  - Cortes and Pan (2016, 2017)
  - Cubas, Juhn and Silos (2019)

- Interactions between households and firm decisions:
  - Albanesi and Olivetti (2009)
  - Fernandez-Kranz and Rodrigues-Planas (2020)

1999 Law to Promote Reconciliation of Work and Family

- Passed on November 5, 1999

- Every parent with a child up to 6 years old has a right to ask for work-week reduction load by 1/3 to 1/2

- During work-week reduction period due to family responsibilities parents cannot be dismissed or laid off

- In 2007 the maximum age of child increased to 8, in 2012 - to 12

- Analyzed by Fernandez-Kranz and Rodrigues-Planas (2020)
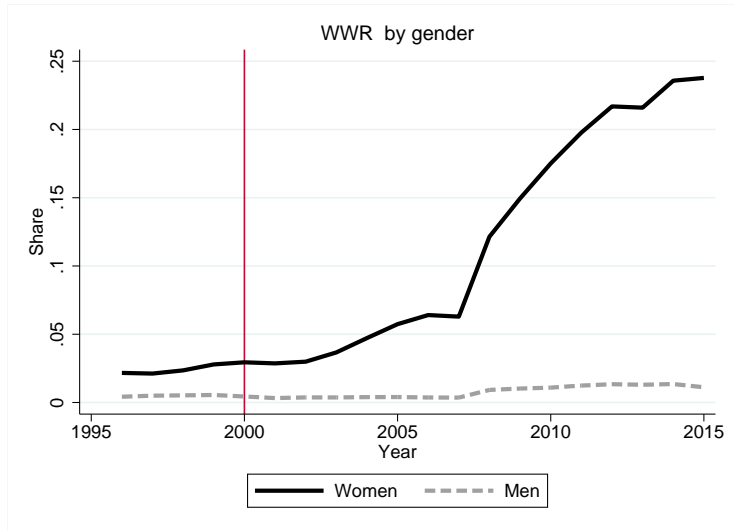
Data: Sample of Continuous Work Histories

- Spanish administrative data set (4%), 2005-2015 years of extraction

- Information on sample individuals is traceable back to 1980 or to their first employment $\implies$ PANEL dataset

- Complete working histories of the individuals that are employed or receive SS benefits in the year of extraction

- 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 of Inhabitants (Padrón): nationality, education, household composition (birth dates of children)

- Sample:
    - 1996-2015 (before 1996 contract type is not reliable)
    - Quarterly data
    - Age 25-45
    - Natives born in Spain
    - Drop self-employed and special regimes

- We follow Cortes and Pan 2019 (JLE) to build the measure of industry flexibility

- 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

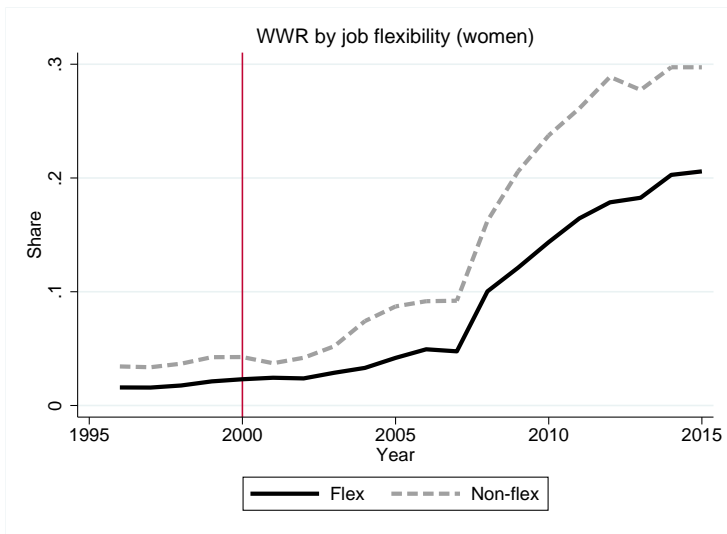- We get a measure of job flexibility for each industry in Spain ●

Work-Week Reduction Take-Up

- WWR is used by women only

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Work-Week Reduction Take-Up

- Job flexibility affects WWR take-up

WWR by job flexibility (women)

Share of Permanent Contracts

- Men's share of permanent contracts increases faster than women's

Share of permanent jobs by sex

- Fertility seem to increase a bit in recent years

Fertility Rate in Spain (births per woman)
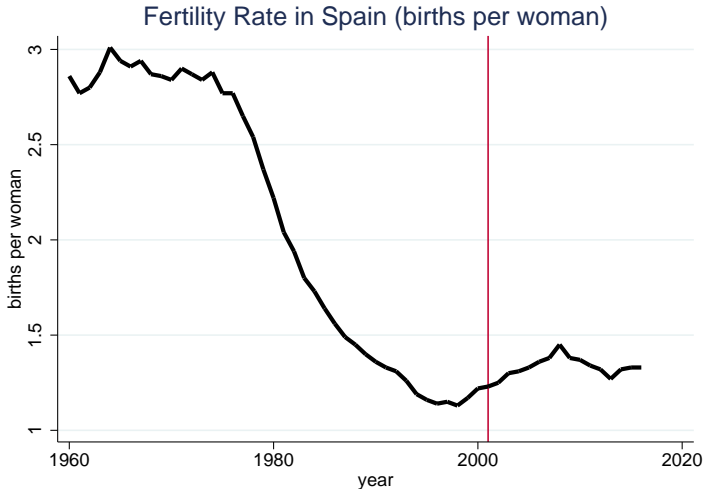
Fertility by Contract Type and Job Flexibility

- Fertility differs by contract type and by flexibility arrangments

Share of women giving a birth

Empirical Model
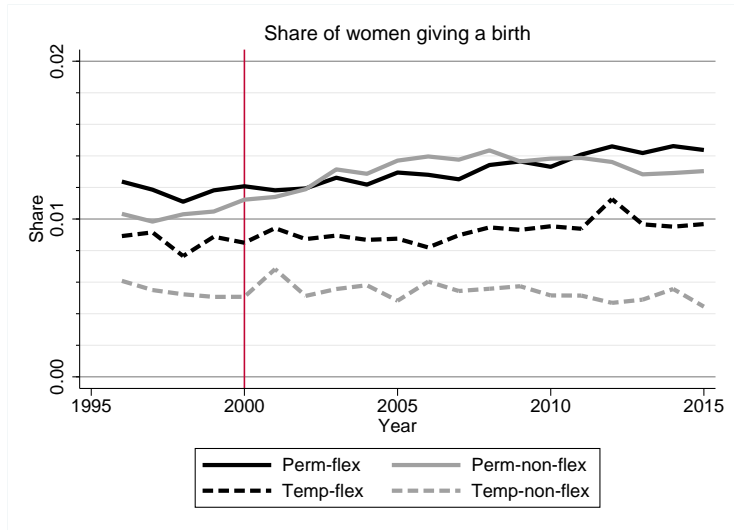
- Correlated random-effect probit model for the likelihood of being in a permanent contract and the probability of having a newborn for women (Card and Hyslop 2005)

$$p_{it} = \Phi(\mu_r \mathbf{1}_t^{WWR} + \phi_p p_{it-1} + \beta_p \mathbf{1}_t^{WWR} p_{it-1} + x_{it}\delta_p + \eta_i + \varepsilon_{it})$$
$$b_{it} = \Phi(\mu_b \mathbf{1}_t^{WWR} + \phi_b p_{it-1} + \beta_b \mathbf{1}_t^{WWR} p_{it-1} + x_{it}\delta_b + \alpha_i + \epsilon_{it})$$

- The structure of unobserved heterogeneity (Wooldridge 2005):

$$\eta_i = \theta_p B_{i0} + \theta_p P_{i0} + \psi p_{i0} + \zeta_{it}$$
$$\alpha_i = \theta_b B_{i0} + \theta_b P_{i0} + \xi_{it},$$

where $\mathbf{1}_t^{WWR}$ – indicator of the reform, p_{it-1} –permanent status in previous period, x_{it}–set of controls (skill level, dummies for children of different age, age, sector, quadrature of the trend), B_{i0} – initial number of children, P_{i0} – initial number of years/share of years in permanent contracts, p_{i0} – initial permanent status.

Changes in likelihood of permanent contract

	(1)	(2)
Temporary*Before	0.3531***	0.3734***
	(0.0038)	(0.0039)
Temporary*After	0.3287***[d]	0.3458***[d]
	(0.0019)	(0.0019)
Permanent*Before	0.8970***	0.8837***
	(0.0019)	(0.0021)
Permanent*After	0.9567***[d]	0.9549***[d]
	(0.00042)	(0.0004)

- Temporary workers are 2.4 p.p. less likely to be promoted
- [d] –difference after-before is significant at 1%

Changes in likelihood of having a newborn

	(1)	(2)
Temporary*Before	0.0319***	0.0300***
	(0.0011)	(0.0011)
Temporary*After	0.0307***	0.0299***
	(0.0004)	(0.0003)
Permanent*Before	0.0481***	0.0495***
	(0.0013)	(0.0013)
Permanent*After	0.0514***[d]	0.0517***[d]
	(0.00028)	(0.00028)

- Fertility of permanent workers increased by 6.8%
- [d] –difference after-before is significant at 1%

Gender

Model structure

Four model building blocks:

- Search and matching frictions in the labor market (Mortensen and Pissarides 1994)

- Dual labor market: temporary and permanent contracts (Bentolila et al 2012)

- Fertility decision (Erosa, Fuster and Restuccia 2010)

- Job flexibility and gender gap (Flabbi and Moro, 2010)

Demographics

- Stochastic life-cycle with constant probability of death ρ^d.

- Individuals differ by gender g: men (m) or women (w)

- Women differ by their fecundity: fertile (w_1) or infertile (w_0). Men are all infertile

- Men and infertile women care about consumption (they are not allow to save or borrow)

- Fertile women receive utility from having children

- Women heterogeneity, men are all alike:
  - utility from staying home $d \in \mathcal{D}$, drawn at entry from $\Omega(d)$
  - human capital, $h \in \mathcal{H}$, drawn at entry from $\Gamma_g^e(h)$, and evolving according to a Markov process, $\Gamma_g(h'|h)$ if employed
  - number of children $n \in [0, 1, 2, ...]$ for fertile women

- If unemployed, women enjoy utility of children $d(1 + n)$

- If employed, women enjoy utility of children $\nu d(1 + n)$, $\nu \in (0, 1)$

- If fertile, women with n children have an opportunity to have another child with probability $\sigma(n)$

- Stochastic childhood with probability of becoming a teenager ρ^c: teenagers do not give any utility to parents.

- Stochastic fecundity with probability of becoming infertile ρ^i

- Workers can be in one of three labor market states: *employed with a temporary job*, (t) *employed with a permanent job* (p), *unemployed* (u)
- Only unemployed individuals get job offers. No on-the-job search
- All new jobs start as temporary
- Each period a temporary contract can be converted into a permanent
  - conversion by law after 4 years (on average)
- Job separation: exogenously (δ_g) + endogenous
- Destruction of a temporary job comes at no cost. Destruction of a permanent job implies firing cost c_f
- Workers can quit their job at no cost for the firm
- Unemployed individuals get an unemployment benefit b_g

Search and matching

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

$$m(u,v) = \frac{uv}{(u^\eta + v^\eta)^{\frac{1}{\eta}}}, \quad \eta > 0$$

- Contact rate for workers:

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

- Contact rate for firms:

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

- Once in contact, workers and firm draw a flexibility degree $j \in \mathcal{J}$ from the distribution $\Upsilon(j)$ and a productivity level z from $\Lambda(z)$ and decide whether to form a match.

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

Production

- Output is produced by worker-firm pairs
- Each worker-firm pair is characterized a match-specific time-varying productivity $z \sim \Lambda(z'|z)$ and flexibility degree j
- Production of match (z, j) with men

$$y_m(z, h) = A - c_0,$$

where A denotes aggregate shifter and c_o – fixed production cost
- Production of match (z, j) with infertile women (h, d)

$$y_{w_0}(z, h, d, j) = (1 - \omega_g)Azh - c_o,$$

where ω_g denotes gender wage penalty
- Production of match (z, j) with fertile women (h, n, d)

$$y_{w_1}(z, h, d, n, j) = (1 - \omega_g)(1 - \omega_j(n))Azh - c_o$$

where $\omega_j(n)$ denotes inflexibility wage penalty, depends on number of children n

- Only women with permanent contracts and children can take a work-week reduction (i.e. they can work lower number of hours)

- After reform, during the workweek reductions workers can not be fired

- Production function for a worker who is in reduced hours is given by

$$y_g^r(z, h, d, n, j) = (1 - \omega_g)(\omega_r - \omega_j(n))Azh - c_o,$$

where ω_r determines the amount of forgone production

- WWR provides extra utility from children: $\xi d(1 + n)$

- Wages are the solution of bargaining problem as in Binmore et al. (1986) with zero payoff 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 infertile women

    $$w_{w_0}^t(z,h,d,j) = (1-\beta)[b_{w_0} + d] + \beta Azh$$
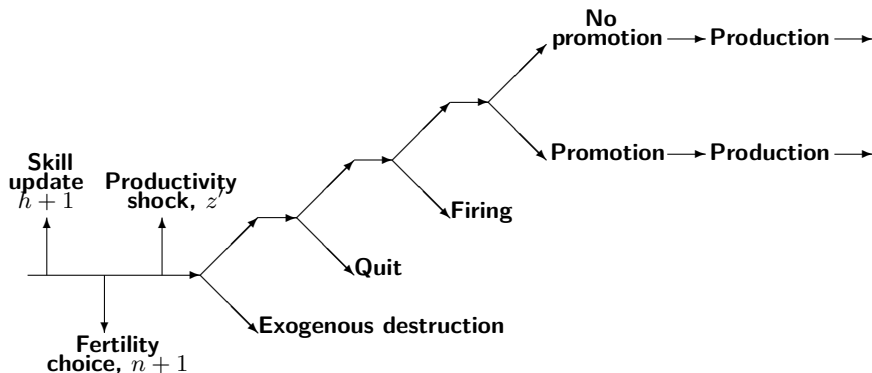
    - Wages for fertile women

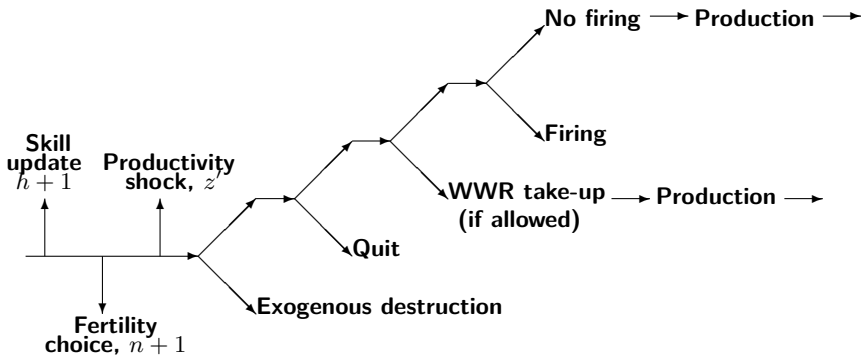 $$w_{w_1}^p(z,h,d,n,j) = (1-\beta)[b_{w_1} + (1-\nu)d(1+n)] + \beta[(1-\omega_g)(1-\omega_j(n))Azh]$$

    - Wages for fertile women in WWR

    $$w_{w_1}^r(z,h,d,n,j) = \omega_r w_{w_1}^p(z,h,d,n,j)$$

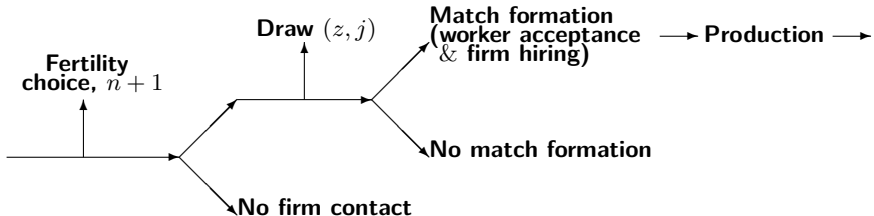**Temporary worker** (h, n, z, j)

Skill update $h+1$

Productivity shock, z'

Fertility choice, $n+1$

Exogenous destruction

Quit

Firing

No promotion → Production →

Promotion → Production →

Model timing

Permanent worker (h, n, z, j)

Skill update $h + 1$ **Productivity shock,** z'

Fertility choice, $n + 1$

Quit

Exogenous destruction

No firing → **Production** →

Firing

WWR take-up (if allowed) → **Production** →

Unemployed worker (h, n)

Match formation
(worker acceptance $\longrightarrow$ **Production** $\longrightarrow$
& firm hiring)

Draw (z, j)

Fertility
choice, $n + 1$

No match formation

**No firm contact**

Calibration

- Model set up:
    - Baseline period: 2001-2015
    - Occupations: 2 (flexible, non-flexible)

- Assumption: the economy is in steady state ●

- Functional form:
    - matching functions ●
    - distribution of home values ●
    - productivity shocks ●
    - distribution of occupations ●
    - human capital accumulation ●

- 8 parameters estimated outside the model ●

- 30 parameters that are estimated to match a list of 122 worker-level targets. ●

Some estimated parameters

| Parameter	Description	Value
	Wage/production penalties	
ω_g	Gender wage penalty	0.0866
ω_r	WWR production penalty	0.1708
	Fertility/utility	
$\sigma(n=0)$	Fertility opportunity if $n=0$	1.5390%
$\sigma(n=1)$	Fertility opportunity if $n=1$	1.4173%
$\sigma(n=2) = \sigma(n=3)$	Fertility opportunity if $n \in \{2,3\}$	0.2047%
d	Value staying home if unemployed (euros)	1381.51
νd	Value staying home if employed (euros)	696.79
$\xi d + \nu d$	Extra value staying home under WWR (euros)	236.02+696.79=932.81

Estimation fit
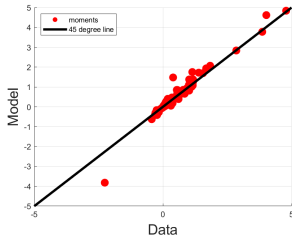
Employment shares
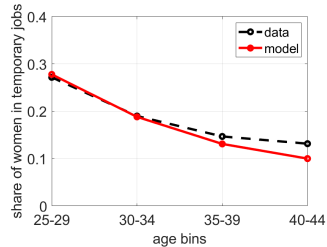
Wage profiles
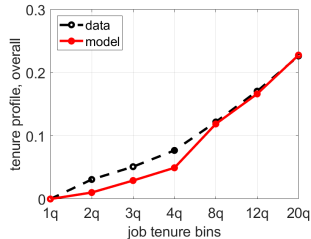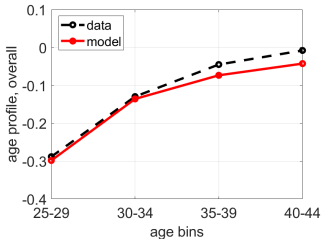
Completed Fertility
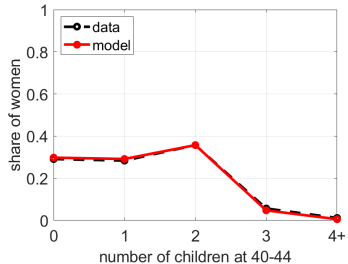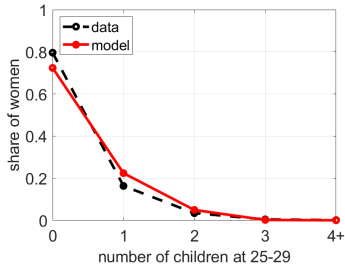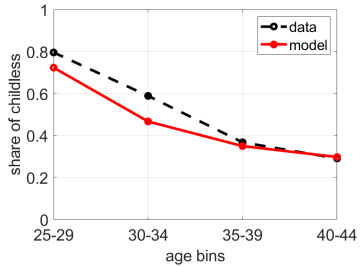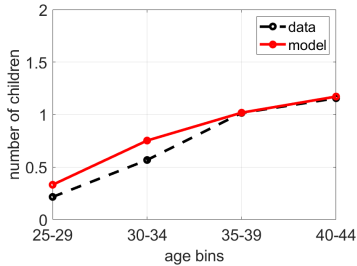
- Remove job protection under WWR
- Effects of labor market duality:
  - Reduction of period for temporary contract (2 years)
  - Extension of period for temporary contract (6 years)
  - No duality (all contracts are permanent with possibility of dismissal at $1/2$ cost)
- Effect of employment protection
  - Cost of dismissal $= 0$
  - Cost of dismissal $= *2$
- Effect of subsidies:
  - Child benefits 50 euros monthly
  - Women hiring subsidies 5% of wage bill

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Counterfactuals. Allow Worker Dismissal under WWR

	Counterfactual	Baseline	Change
Cost of dismissal during WWR (euros)	5165.69	Not allowed	-
Labor Market Outcomes			
Women in permanent contracts under WWR, 25-44 y.o. %	0	14.64	-
Temporary to permanent contract, rate 25-44 y.o. %	12.55	11.40	-1.16 p.p.
Permanent to permanent contract, rate 25-44 y.o. %	95.18	95.34	+0.16 p.p.
Non-employed women, 25-44 y.o. %	40.50	42.30	-1.80 p.p.
Women in temporary contracts, 25-44 y.o. %	17.54	18.27	0.73 p.p.
Women in permanent contracts, 25-44 y.o. %	41.95	39.43	-2.52 p.p.
Women in flexible occupations, 25-44 y.o. %	69.46	68.38	-1.08 p.p.
Avg. wage, 25-44 y.o.	63.19	60.79	-3.81%
Avg. wage growth, 25-44 y.o. %	5.04	4.84	-3.99%
Avg. wage growth, no children 25-44 y.o. %	5.44	5.46	0.44%
Avg. wage growth, 1 child 25-44 y.o. %	5.14	4.62	-10.19%
Avg. wage growth, 2+ children 25-44 y.o. %	4.10	3.78	-7.91%

Counterfactuals. Allow Worker Dismissal under WWR

	Counterfactual	Baseline	Change
Cost of dismissal during WWR (euros)	5165.69	Not allowed	-
Fertility Outcomes			
Probability of extra kid, non-employed women 25-44 y.o. %	1.26	1.20	-4.47%
Probability of extra kid, employed women 25-44 y.o. %	0.85	0.88	+2.87%
Probability of extra kid, women in temporary contracts 25-44 y.o. %	2.90	2.78	-4.22%
Probability of extra kid, women in permanent contracts 25-44 y.o. %	1.21	1.29	+6.16%

Counterfactuals. Effects of Labor Market Duality

	Baseline		Counterfactual	
Cost of dismissal during WWR (euros)	Not allowed	Not allowed	Not allowed	Not allowed
Mandated length of temporary contracts	4 years	2 years	6 years	No duality
Cost of dismissal, permanent contracts (euros)	5165.69	5165.69	5165.69	2582.84
Labor Market Outcomes				
Temporary to permanent contract, rate 25-44 y.o. %	11.40	17.84	8.96	-
Permanent to permanent contract, rate 25-44 y.o. %	95.34	95.24	95.34	95.38
Non-employed women, 25-44 y.o. %	42.30	44.34	41.49	47.66
Women in temporary contracts, 25-44 y.o. %	18.27	12.73	21.63	-
Women in permanent contracts, 25-44 y.o. %	39.43	42.93	36.89	52.34
Avg. wage, 25-44 y.o.	60.79	59.19	61.73	56.35
Fertility Outcomes				
Probability of extra kid, non-employed women 25-44 y.o. %	1.20	1.14	1.22	1.07
Probability of extra kid, employed women 25-44 y.o. %	0.88	0.91	0.87	0.97
Probability of extra kid, women in temporary contracts 25-44 y.o. %	2.78	3.97	2.34	-
Probability of extra kid, women in permanent contracts 25-44 y.o. %	1.29	1.18	1.37	-

Counterfactuals. Effect of Employment Protection

	Baseline	Counterfactual	
Cost of dismissal during WWR (euros)	Not allowed	Not allowed	Not allowed
Mandated length of temporary contracts	4 years	4 years	4 years
Cost of dismissal, permanent contracts (euros)	5165.69	0	10331.38
Labor Market Outcomes			
Temporary to permanent contract, rate 25-44 y.o. %	11.40	11.72	11.41
Permanent to permanent contract, rate 25-44 y.o. %	95.34	95.25	95.30
Non-employed women, 25-44 y.o. %	42.30	40.05	45.38
Women in temporary contracts, 25-44 y.o. %	18.27	18.42	17.55
Women in permanent contracts, 25-44 y.o. %	39.43	41.54	37.07
Avg. wage, 25-44 y.o.	60.79	61.16	60.18
Fertility Outcomes			
Probability of extra kid, non-employed women 25-44 y.o. %	1.20	1.26	1.12
Probability of extra kid, employed women 25-44 y.o. %	0.88	0.84	0.93
Probability of extra kid, women in temporary contracts 25-44 y.o. %	2.78	2.75	2.89
Probability of extra kid, women in permanent contracts 25-44 y.o. %	1.29	1.22	1.37

Counterfactuals. Effect of Subsidies

|	Baseline	Counterfactual	
		Child benefits 50 euros (monthly)	Hiring subsidies 5% (wage bill)
Cost of dismissal during WWR (euros)	Not allowed	Not allowed	Not allowed
Mandated length of temporary contracts	4 years	4 years	4 years
Cost of dismissal, permanent contracts (euros)	5165.69	5165.69	5165.6878
Labor Market Outcomes			
Temporary to permanent contract, rate 25-44 y.o. %	11.40	11.43	11.60
Permanent to permanent contract, rate 25-44 y.o. %	95.34	95.34	95.29
Non-employed women, 25-44 y.o. %	42.30	42.51	37.95
Women in temporary contracts, 25-44 y.o. %	18.27	18.17	19.12
Women in permanent contracts, 25-44 y.o. %	39.43	39.32	42.94
Avg. wage, 25-44 y.o.	60.79	60.69	63.87
Fertility Outcomes			
Probability of extra kid, non-employed women 25-44 y.o. %	1.20	1.19	1.34
Probability of extra kid, employed women 25-44 y.o. %	0.88	0.88	0.82
Probability of extra kid, women in temporary contracts 25-44 y.o. %	2.78	2.80	2.66
Probability of extra kid, women in permanent contracts 25-44 y.o. %	1.29	1.29	1.18

Welfare trade-off: men vs. women

Conclusion
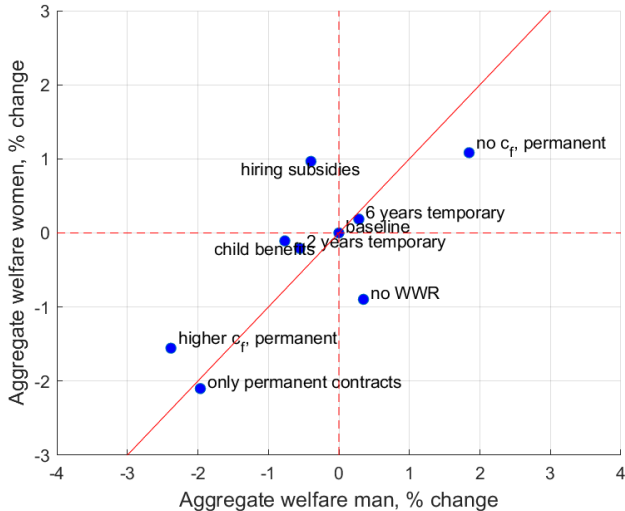
- Job protection under WWR induce higher women fertility for those in permanent contracts, decrease fertility for non-employed and in temporal contracts. Overall effect is negative.
- Strong firm reaction:
    - lower promotion rate
    - lower hiring rate
- Despite firm's reaction, welfare for women increased after the reform
- Trade-off between wage rate and probability of having a newborn across policies
    - Most negative effect on fertility but highest of wage give hiring subsidies
    - Most negative wage effect with highest fertility effect: system with only permanent contracts
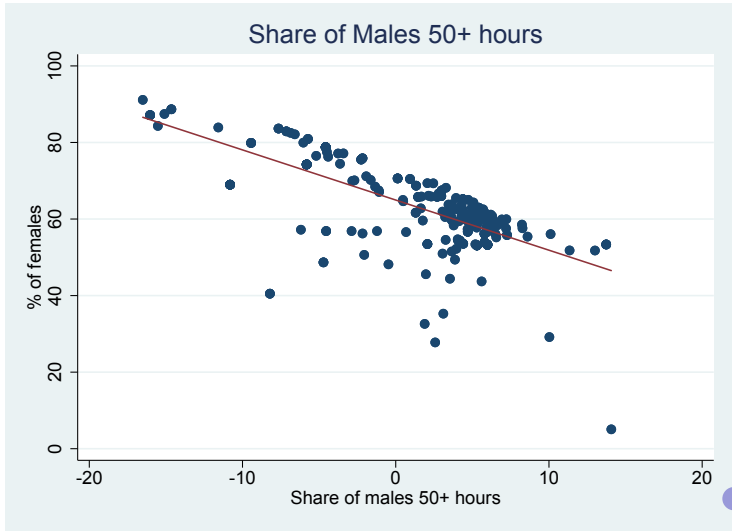   - Can we move the frontier towards positive wage effects and positive fertility effect?

Thank You!

Fertility Rate

births per woman

Legend:
- ESP
- EUU
- FRA
- USA
- GBR
- GER
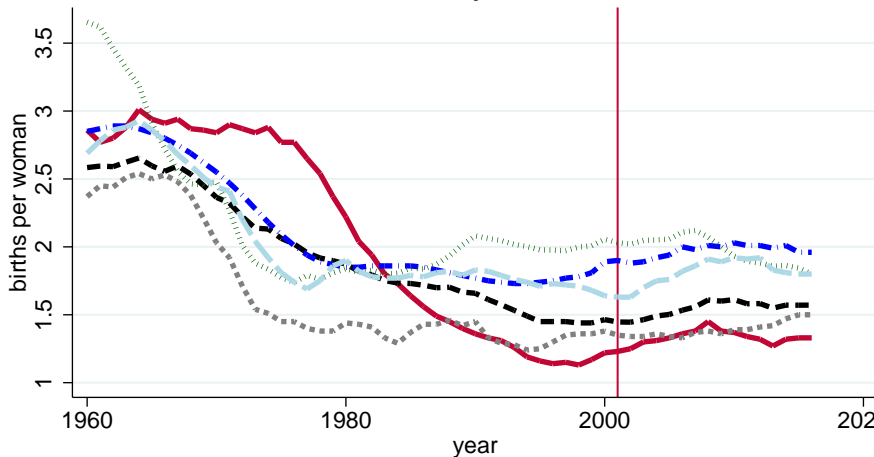
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Variable	Mean	Std. Dev.	Min.	Max.	N
Age	37.177	4.344	30	45	3812587
Females	0.443	0.497	0	1	3812587
Real daily earnings (in 2010 euros)	31.859	126.994	0	62293.305	2077390
Top- and bottom-coded real daily earnings (in 2010 euros)	27.912	130.293	0	49672.84	3799228
Full-time	0.847	0.36	0	1	3390134
Work-week reduction	0.052	0.222	0	1	905904
Newborn dummy	0.06	0.237	0	1	3812587
Promotions	0.177	0.382	0	1	814111
Reform	0.806	0.395	0	1	3812587
College+	0.229	0.42	0	1	3809120
High skill	0.22	0.415	0	1	3807470
Public	0.173	0.378	0	1	3806663
Permanent	0.695	0.46	0	1	3511585
High Flexibility Industry (<p50 O*NET score)	0.625	0.484	0	1	3704151
High Flexibility Industry (p25 vs p75)	0.662	0.473	0	1	2453530
Children below 6 until 2007 an below 8 after 2007	0.315	0.465	0	1	3812587

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

- 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]
- Installation of industrial machinery and equipment, finishing of buildings [21.84 40.50]
- Forestry and other forestry activities, logging [22.40 83.64]

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Low Flexibility Sector (high % of men working 50+ hours)

- 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]
- Beverage establishments [43.79, 53.36]
- Hunting, capture of animals and related services [44.12, 5.07]

- We include gender in previous equations ($\mathbf{1}_i^w$ - woman):

$$
\begin{aligned}
p_{it} &= \Phi(x_{it}\delta_p + \mu_p\mathbf{1}_t^{WWR} + \phi_p p_{it-1} + \beta_p\mathbf{1}_t^{WWR}p_{it-1} + \delta_p\mathbf{1}_i^w + \\
&\quad \xi_p\mathbf{1}_i^w\mathbf{1}_t^{WWR} + \pi_p\mathbf{1}_i^w p_{it-1} + \nu_p\mathbf{1}_i^w\mathbf{1}_t^{WWR}p_{it-1} + \eta_i + \varepsilon_{it}) \\
b_{it} &= \Phi(x_{it}\delta_b + \mu_b\mathbf{1}_t^{WWR} + \phi_b p_{it-1} + \beta_b\mathbf{1}_t^{WWR}p_{it-1} + \delta_b\mathbf{1}_i^w + \\
&\quad \xi_b\mathbf{1}_i^w\mathbf{1}_t^{WWR} + \pi_b\mathbf{1}_i^w p_{it-1} + \nu_b\mathbf{1}_i^w\mathbf{1}_t^{WWR}p_{it-1} + \alpha_i + \epsilon_{it})
\end{aligned}
$$

- Unobserved heterogeneity as before:

$$
\begin{aligned}
\eta_i &= \theta_p B_{i0} + \theta_p P_{i0} + \psi p_{i0} + \zeta_{it} \\
\alpha_i &= \theta_b B_{i0} + \theta_b P_{i0} + \xi_{it},
\end{aligned}
$$

where $\mathbf{1}_t^{WWR}$ – indicator of the reform, p_{it-1} –permanent status in previous period, x_{it}–set of controls (skill level, dummies for children of different age, age, sector, quadrature of the trend), B_{i0} – initial number of children, P_{i0} – initial number of years/share of years in permanent contracts, p_{i0} – initial permanent status. back

Changes in likelihood of a permanent contract

	Men	Women
Temporary*Before	0.3544***	0.3768***
	(0.0024)	(0.0032)
Temporary*After	0.3503***^{d}	0.3382***^{d}
	(0.0014)	(0.0016)
Permanent*Before	0.8612***	0.8897***
	(0.0014)	(0.0014)
Permanent*After	0.9489***^{d}	0.9535***^{d}
	(0.0004)	(0.0004)

- Both, men and women are more likely to stay in permanent contracts after the reform
- Promotion rate of men decreases by 0.6 p.p, of women - by 3.86 p.p.

Changes in likelihood of having a newborn

	Men	Women
Temporary*Before	0.0401***	0.0294***
	(0.0008)	(0.0009)
Temporary*After	0.0388***	0.0306***[d]
	(0.0003)	(0.0003)
Permanent*Before	0.0498***	0.0435***
	(0.0007)	(0.0008)
Permanent*After	0.0487***	0.0505***[d]
	(0.0002)	(0.0002)

- Fertility of men is not affected by the reform
- Fertility of women in permanent contracts increases by 0.007 p.p with respect to men's

back

Bargaining problem

- 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, effective surplus is the marginal flow surplus
- Sharing rule

$$\beta[y - w - \omega_f] = (1 - \beta)[w - \omega_w]$$

where ω_f and ω_w are payoffs for firms and workers in case of breakdown

back

Equilibrium

Recursive stationary competitive equilibrium:

- *optimality 1*: policy functions for hiring, promotion and firing are determined non-cooperatively by the firm, i.e. are the solution to the firm value functions;

- *optimality 2*: 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.

Solution algorithm

- 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 contract with reduced working schedule for fertile women
- Make or update the guess for the job contact probability for firms, ϕ_v
- Make or update a guess for the aggregate stock of unemployment, u
- Use the definition of matching functions and the guess for the stock of unemployment to solve for the stock of vacancy v

$$\frac{m(x, v)}{v} - \phi_v = 0$$

and for job contact probability for unemployed workers, i.e.

$$\phi_u = \phi_v \frac{u}{v}$$

back

Solution algorithm

- 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

- 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 job 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
    - Update the guess for the measure of unemployment using the value obtained in the simulation

- Iterate until convergence

- Matching function b/w job seekers u, and vacancies, v:

$$m(u, v) = u^\eta v^{1-\eta} \quad \eta \in (0, 1)$$

- Degenerate distribution of home values:

$$\Omega(d) = d \quad \text{with probability} \quad 1$$

- Match productivity process $z \in \mathcal{Z} = [0, 1]$

$$\Lambda(z'|z) = \begin{cases} z & \text{with probability} \quad \varphi_z \\ z' \sim \mathcal{B}(\alpha_z, \beta_z) & \text{otherwise} \end{cases}$$

- Non-parametric distribution of occupation:

$$\Upsilon(j) = \begin{cases} \chi & \text{if} \quad j = 1 \\ 1 - \chi & \text{if} \quad j = 2 \end{cases}$$

back

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

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- Human capital accumulation:
    - We restrict the space for human capital h to be defined in discrete set $h \in \mathcal{H} := \{\underline{h}, .., h_i, .., \bar{h}\}$
    - Let π_g^c for $c = \{t, p, r\}$ be the probability of a one step-jump in human capital, i.e.

$$h' = \begin{cases} h + \Delta_h, & \text{with probability} \quad \pi_g^c \\ h, & \text{otherwise} \end{cases} .$$

    - The level of jump depends on the current h,

$$\Delta_h = \alpha_g^0 + \alpha_g^1 h + \alpha_g^2 h^2 + \alpha_g^3 h^3.$$

Calibration. Parameters calibrated outside the model

Parameter	Description	Value	Targets/Notes
	Demographics parameters		
ρ	Discount Factor	0.9967	4% yearly return
ρ^d	Survival Probability	0.0021	# of years in labor market (25-64)
ρ^c	Prob. child leaves home	0.0069	# of years for children (0-12)
	Labor market parameters		
β	Bargaining power	0.5	Taken from the literature
b_m	Net unemployment benefit, men (euros)	122.6776	Measured directly from data (EPA)
b_w	Net unemployment benefit, women (euros)	107.8751	Measured directly from data (EPA)
p^t	Exogenous promotion rate	0.020833	Average temporary contract length: 4 years
	Wage parameters		
ω_r	WWR wage penalty	0.7152	Measured directly from data (MCVL)

back

Parameter	Description	Value
A	Aggregate shifter (euros)	4014.4784
	Wage/production penalties	
ω_w	Gender wage penalty	0.0866
ω_{j0}	Children wage penalty, scalar	0.7650
ω_{j1}	Children wage penalty, linear	0.0655
ω_r	WWR production penalty	0.1708
	Human capital	
α_w^h	Initial distribution human capital	2.6573
β_w^h	Initial distribution human capital	4.6558
Δ_w^0	Human capital step size, constant	0.1568
Δ_w^1	Human capital step size, linear	-0.0491
π_w^t	Human capital jump, temporary	0.3556
π_w^p	Human capital jump, permanent	0.2256
π_w^r	Human capital jump, WWR	0.1801
π_w^u	Human capital jump, unemployed	0.0547
	Match-specific shocks	
φ_z	Shock persistency	0.6025
α_z	Shock distribution	4.8512
β_z	Shock distribution	9.8050

Parameter	Description	Value
	Fertility/utility	
$\sigma(n=0)$	Fertility opportunity if $n=0$	1.5390%
$\sigma(n=1)$	Fertility opportunity if $n=1$	1.4173%
$\sigma(n=2)=\sigma(n=3)$	Fertility opportunity if $n \in \{2,3\}$	0.2047%
d	Value staying home if unemployed (euros)	1381.51
νd	Value staying home if employed (euros)	696.79
ξd	Extra value staying home under WWR (euros)	236.02
	Costs	
c_o	Cost of operation (euros)	310.15
c_v	Cost of posting vacancy (euros)	63252.88
c_f	Firing costs (euros)	5165.69
	Labor market	
χ	Share of potential flexible jobs	0.5881
η	Elasticity of matching function	0.6214
δ_f^t	Exogenous separation from temporary contract, women	1.2162%
δ_f^p	Exogenous separation from permanent contract, women	1.0162%
δ_m	Exogenous separation, men	1.0392%

Welfare trade-off: young vs. old