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ABSTRACT

Labor Market Frictions and Lowest Low Fertility*

The total fertility rate is well below its replacement level of 2.1 children in high- income countries. Why do women choose such low fertility levels? We study how labor market frictions affect the fertility of college-educated women. We focus on two frictions: uncertainty created by dual labor markets (the coexistence of jobs with temporary and open-ended contracts) and inflexibility of work schedules. Using rich administrative data from the Spanish Social Security records, we show that women are less likely to be promoted to permanent jobs than men. Temporary contracts are also associated with a lower probability of first birth. With Time Use data, we also show that women with children are less likely to work in jobs with split-shift schedules, which come with a fixed time cost. We then build a life-cycle model in which married women decide whether to work or not, how many children to have, and when to have them. In the model, women face a trade-off between having children early and waiting and building their careers. We show that reforms that reduce the labor market duality and eliminate split-shift schedules increase the completed fertility of college-educated from 1.52 to 1.88. These reforms enable women to have more children and have them early in their life-cycle. They also increase the labor force participation of women and eliminate the employment gap between mothers and non-mothers.

JEL Classification: E24, J13, J21, J22

Keywords: fertility, labor market frictions, temporary contracts, split-shift schedules

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1 Introduction

The total fertility rates (TFR) have been falling everywhere in the world. Today the TFR is 1.8 in the US, 1.6 in Germany, and 1.4 in Japan; well below the replacement rate of 2.1 children per woman.[1] The TFR in some European countries, such as Greece, Italy, Portugal, and Spain, is even lower. It is around 1.3 children, a situation that demographers call *lowest-low fertility* (Kohler, Billari and Ortega 2002).

The low fertility rates are closely associated with delayed transition into motherhood. The mean age at first birth is 32 in Italy and Spain (the highest among the European countries) and 31 in Greece and Portugal. With delays in first births, the interval in which women can have children narrows. As a result, fertility delays lower the number of children women can have, even if they wanted to have more. Indeed, the desired number of children is close to 2 in Italy and Spain, even among young, between ages 15 and 39, women.

Population aging, low fertility coupled with higher life expectancy, has been associated with a host of economic woes: low interest rates, low economic growth, and growing deficits of social security systems around the world (see, among others, De Nardi, İmrohoroğlu and Sargent 1999; Krueger and Ludwig 2007; Aksoy, Basso, Smith, and Grasl 2019, and Jones 2019). Hence, it is essential to understand why women choose such low fertility rates and whether and how public policy can affect their decisions.

An extensive empirical literature points to economic *uncertainty* as a potential culprit. The emerging consensus from this literature is that factors that restrict women's ability to start and establish stable labor market careers result in delayed, and as a result, lower fertility. High unemployment is associated with low fertility, both across and within countries (Adsera 2011, Ahn and Mira 2001 and Currie and Schwandt 2014). Del Bono, Weber and Winter-Ebmer (2012, 2015) exploit plant closings in Austria to show that job displacement reduces fertility, and the most affected women are the ones with career concerns.[2]

In many European countries, dual labor markets contribute significantly to economic uncertainty for women in their childbearing years. In a dual labor market, young workers hold temporary jobs that can last up to a couple of years, and move from one temporary job to another until they settle on an open-ended (permanent) contract. Fertility is negatively associated with the fraction of women who work with a temporary job across countries (Figure 1). Micro evidence from different countries also shows that temporary jobs reduce fertility (see De La Rica and Iza 2005 for Spain, Auer and Danzer 2016 for Germany, Landaud 2019 for France, and Lopes 2019 for Portugal).

[1] OECD Family Database, Tables SF2.1.A, SF2.3.B, SF2.2.A, http://www.oecd.org/els/family/database.htm.

[2] Wars, which are marked by heightened economic uncertainty, also lead to postponement of fertility (Vandenbroucke 2014, Chabe-Ferret and Gobbi 2018). Indeed, during the last two recessions in the US, fertility started to fall several quarters before economic downturns (Buckles, Hungerman, and Lugauer 2019). Coskun and Dalgic (2019) show that procyclical fertility can be explained by cyclical properties of different industries in which men and women specialize.

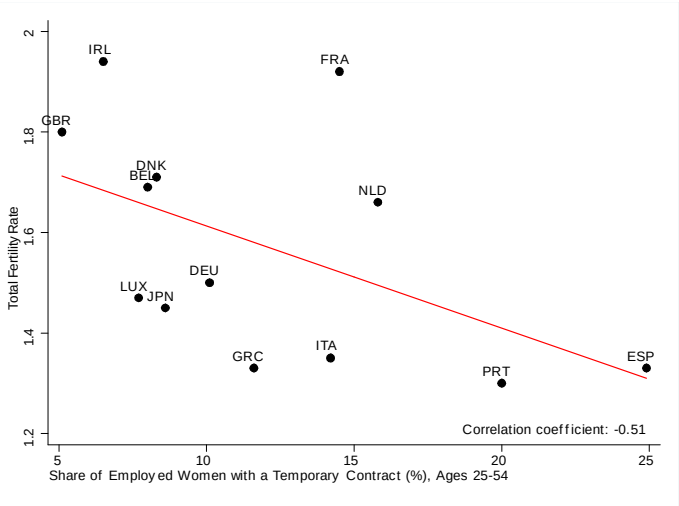

Figure 1. Temporary Contracts and the TFR

Source: OECD Employment Database, https://stats.oecd.org/viewhtml.aspx?datasetcode=TEMP_I&lang=en (accessed on 04/02/2019), and OECD Family Database, Table SF2.1 http://www.oecd.org/social/family/database.htm (accessed on 04/02/2019).

Another factor behind low fertility can be the difficulty of women to combine work with childbearing. Following Goldin (2014), there is a growing focus on labor market *inflexibility*, measured as requirements to work long and particular hours, and its impact on female labor supply and the gender-wage gap. Occupations with long working hours are associated with higher gender wage and employment gaps (Cortes and Pan 2016, 2017). Cubas, Juhn and Silos (2019) also show that the gender-wage gaps are higher in occupations that require coordinated working hours, measured by bunching of working hours in particular hours of the day. Evidence from surveys and experiments suggest that women have a stronger preference for greater work flexibility and job stability (Mas and Pallais 2017, Wiswall and Zafar 2018).

One way women can cope with inflexible labor market arrangements is to have fewer children. Figure 2 shows that across the OECD countries, higher flexibility is associated with higher fertility. The TFR is lower in countries where a larger fraction of women indicate that their working hours are entirely set by their company (left panel). In contrast, it is higher in countries where a larger fraction of women can adjust (partly or fully) their working hours (right panel). Along these lines, Billari, Giuntella and Stella (2019) document that access to high-speed internet in Germany had a positive effect on the fertility of highly-educated women by increasing the share of them who work from home or part-time.

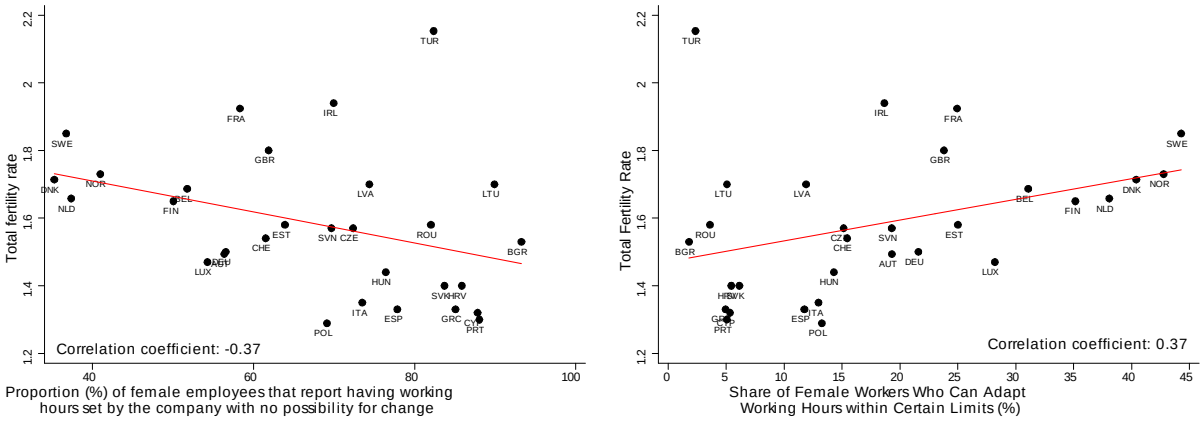

Figure 2. Flexibility and the TFR

Source: OECD Family Database, Tables LMF2.4 Family-friendly workplace practices and SF2.1 Fertility rates, http://www.oecd.org/social/family/database.htm (accessed on 04/02/2019)

In this paper, we study how labor market uncertainty and inflexibility affect the fertility behavior of college-educated women in Spain. Several factors make Spain an ideal case to study the lowest-low fertility. First, a striking feature of fertility in Spain is the very low fertility rate of college-educated women. Figure 3 shows the TFR by the educational attainment in Spain and Europe.[3] Spain's TFR for women with less than a college education is comparable to other countries (around 1.8). The TFR for college-educated women, on the other hand, is much lower. Women with a college degree have about one child in Spain, while they have around 1.5 children in other European countries.

[3]In Figure 3, the 1997 International Standard Classification of Education (ISCED) codes 0-2 cover educational attainments up to lower secondary education, 3-4 up to tertiary education, and 5-6 up to the second stage of tertiary education. The average number for Europe is based on 14 countries with available data.

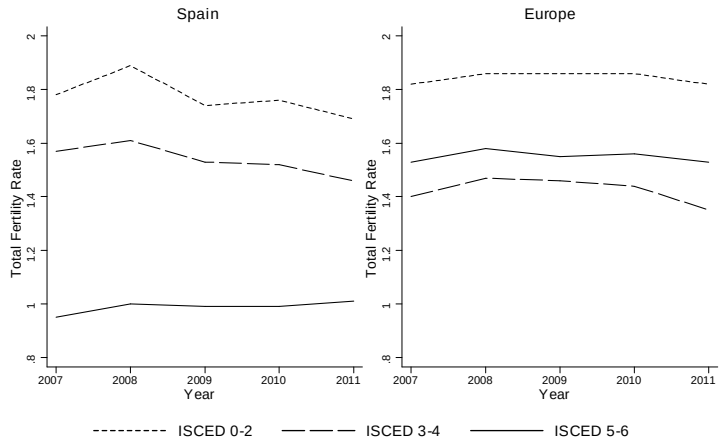

Figure 3. TFR by Education, Spain vs. Europe

Source: Lanzieri (2013, Table 6)

Second, Spain has one of the highest fraction of workers with temporary contracts in Europe (Figure 1). The temporary contracts, which have low firing costs, can last between 6 months to 3 years with compulsory conversion to a permanent contract, which has a much higher firing cost.[4] In practice, temporary contracts are often much shorter, and the conversion rate of temporary contracts to permanent ones is very low, about 6% per year.[5] As a result, a large fraction of the labor force faces very uncertain labor market prospects as they move from one temporary job to the next one.

Finally, the organization of workday in Spain unusual. Many jobs have long lunch breaks that create split-shift work schedules. Figure 4 shows the fraction of employees who are at work during different times of the day in Norway, Spain, and the UK.[6] By 6.00pm, less than 20% of workers are at work in Norway and the UK. In contrast, 50% of them are still at work in Spain. The split-shift schedules, which make combining work and childcare difficult, present a concrete example of inflexible work arrangements for women.[7]

[4] Workers with permanent contracts are entitled to severance pay of 20 days' wages per year of service (up to a maximum of 12 months' wages) in fair dismissals and 45 days' (up to a maximum of 42 months') wages in unfair dismissals. Firing costs for temporary employees is only 12 days' wages per year of service.

[5] For a quantitative analysis of dual labor markets in Spain during the Great Recession, see Bentolila, Cahuc, Dolado and Le Barbanchon (2012).

[6] The sample is restricted to 25-54 years old employees who filled the diary on an ordinary working day. The figure shows the fraction who reports employment as the main activity (main or second job and activities related to employment) at different hours of the day. The vertical lines mark 9am and 6pm.

[7] Amuedo-Dorantes and De la Rica (2009) find that most women are constrained in their work schedules, and do not find any evidence of a compensating wage differential for having a split-shift schedule.

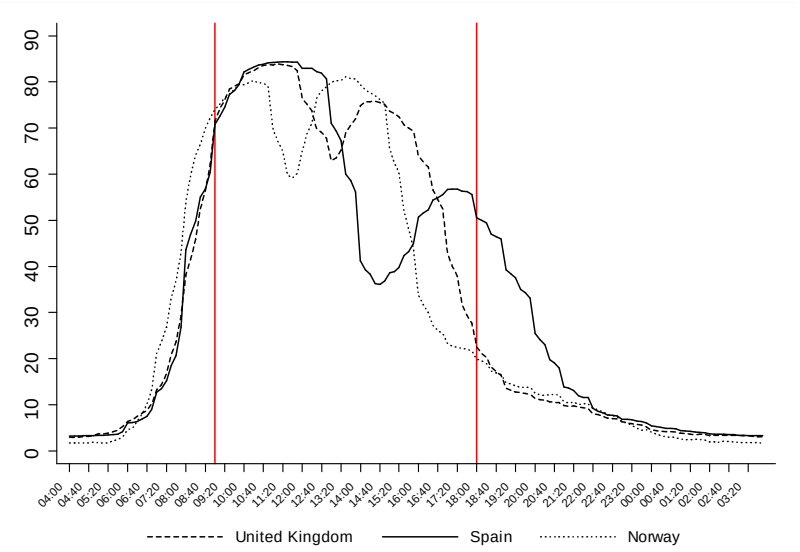

Figure 4. Fraction of People at Work

Source: Harmonised European Time Use Surveys (HETUS) database, www.tus.scb.se (accessed on 8/11/2018).

We first use administrative data from the Spanish Social Security Records, Muestra Continua de Vidas Laborales con Datos Fiscales (Continuous Sample of Working Lives), and study the relationship between temporary contracts and fertility.[8] We show that even after controlling for observables, women are 28% less likely than men to be promoted from a temporary to a permanent job. We also show that temporary jobs are associated with lower fertility. A woman who spends 50% or more of her working life with a temporary contract has 1.27 children at age 44, while the same number for a woman who spends less than 50% of her working life with a temporary contract is 1.53. Finally, using data from the Spanish Time Use Survey, we show that, after controlling for observables, women with children are about 57% less likely to work in jobs with split-shift schedules compared to men or women without children.

We then build a life-cycle model in which married women decide whether or not to participate in the labor market, how many children to have, and when to have them. They also make standard life-cycle decisions on consumption and savings. Women differ in their ability level, which is a permanent characteristic that affects their earnings. Each woman is matched with a husband. Husbands also differ in their ability levels. There is a positive correlation between the ability levels of husbands and wives. Government taxes households and provide unemployment insurance and means-tested transfers.

All jobs start as temporary, with a high separation rate, and are stochastically promoted to permanent ones, which have lower separation rates. Jobs can also have a regular or

[8] Among recent papers that Spanish Social Security data, see De la Roca and Puga (2017), Bonhomme and Hospido (2017) and García-Pérez, Marinescu and Vall (2019).

split-shift schedule. A split-shift schedule implies an additional fixed time cost of work for women, which captures the difficulties of balancing family and work. Having a child is costly for parents, both in terms of time and money. Each period, women can be in one of three employment states: employed, unemployed, or out of the labor force. Only unemployed women get job offers and decide whether to accept them and work, or stay unemployed, or leave the labor market. Similarly, each period employed agents might lose their jobs and decide whether to stay unemployed or leave the labor force. Women who are not in the labor force choose each period whether to enter and start looking for a new job. As women work, they accumulate human capital, and the accumulation is faster for younger women. On the other hand, women's ability to have children declines by age. As a result, women face a trade-off between establishing their career (having more labor market experience and obtaining a permanent contract) and risking not having any children.

We use the model to quantify how labor market uncertainty and inflexibility affect fertility. To this end, we compare fertility in the benchmark economy with counterfactual worlds in which temporary jobs last longer or split-shift schedules are eliminated. These experiments reflect the academic and public debate on labor market reforms in Spain closely.[9] In the benchmark economy, temporary contracts last 9 quarters (little over 2 years). When temporary contracts last 12 quarters (3 years), employed mothers at age 44 have about 0.2 more children (1.67 vs. 1.44). Elimination of split-shift schedules has a larger impact on fertility; the number of children of employed mothers at age 44 increases from 1.44 to 1.75. When we combine these two reforms, i.e., lower the separation rates of temporary jobs and eliminate split-shift schedules, employed mothers at age 44 have 1.95 children. The average completed fertility rate for college-educated women in this alternative world is 1.88; close to Denmark and Sweden that have the highest TFR among highly-educated women in Europe (Lanzieri 2013). In the alternative economy with lower uncertainty and inflexibility, the higher fertility comes together with higher, not lower, labor force participation of women.

Related Literature Our paper contributes to the structural labor and macro literatures that study the labor force participation and fertility decisions of women.[10] Within this literature, Sommer (2016) emphasizes the importance of income uncertainty (wage shocks)

[9] In 2009, a manifesto signed by 100 academic economists called for the elimination of temporary and permanent contracts and the introduction of a single open-ended contract. Since then, there have been different reforms, but the dual labor market structure has not changed fundamentally (see Bentolila, Dolado and Jimeno 2012). Recently, the Deputy Prime Minister of Spain, Carmen Calvo, called for "rationalization" of working hours in Spain and state that "being a young and working woman and trying to be a mother, with or without a partner, is practically impossible" (https://www.elperiodico.com/es/sociedad/20180710/calvo-anuncia-ley-reforma-horaria-6935395).

[10] For papers that model joint labor supply and fertility decisions, see, among others, Mofitt (1984), Hotz and Miller (1988), Francesconi (2002), Caucutt, Guner and Knowles (2002), Erosa, Fuster and Restuccia (2010), and Eckstein, Kean and Lifshitz (2019).

for delayed childbearing.[11] Our focus is on the uncertainty that emerges from labor market transitions. The effect of labor market transitions on fertility has also been studied by Da Rocha and Fuster (2006). They show that differences in job-finding rates can account for fertility differences between Spain and the US. We explore the issue more broadly and incorporate into analysis dual labor markets and labor market inflexibility. Our framework allows us to disentangle the role of duality from the role of uncertainty. We explore how different forms of uncertainty in labor market transitions affect TFR and study the interactions between dual labor markets and the prevalence of split-shift jobs. We find that duality is just one form of uncertainty that leads to low TFR in Spain and that other forms of uncertainty may have similar implications. Another closely-related paper is by Lopes (2019), who studies the effects of temporary contracts on fertility in Portugal. She models durations and renewal of temporary contracts in more detail than we do, which allows her to study a richer set of experiments. On the other hand, she does not differentiate between unemployment and out-of-labor force states. Our analysis, on the other hand, shows that the entry of women to the labor force is critical to understand how labor market frictions affect fertility. We also provide a richer set-up to study how factors other than temporary contracts affect fertility decisions and interact with temporary contracts.

Our second contribution is to explore how different degrees of flexibility (in terms of the prevalence of split-shift jobs) affect fertility. The impact of flexibility on female labor market outcomes has been studied in several recent papers. Their message is that women balance family and work by choosing occupations that offer them a higher degree of flexibility. In Erosa, Fuster, Kambourov and Rogerson (2017) and Cubas et al. (2019) a substantial fraction of the observed gender-wage gap emerges as a result of occupational choice and labor supply. Their analysis, however, abstracts from fertility decisions. Adda, Dustmann and Stevens (2017) build a model with endogenous fertility and occupational choice to study how children affect career choices of women in Germany. In their model, females choose between low-wage-growth occupations that are more child-friendly and high-wage-growth occupations that carry a penalty for career breaks. Our focus is, however, on the fertility margin as a way to cope with inflexibility. Del Boca and Sauer (2008) estimate a model of labor force participation and fertility to disentangle the relative importance of state dependence and unobserved heterogeneity for Italy, Spain and France. They find that the first-order state dependence is the most critical factor determining female labor supply behavior. Furthermore, the order of state-dependence effects across countries is correlated with aggregate measures of labor market flexibility and childcare availability.

Finally, other potential drivers of the fertility decision have been considered. Bick (2016) shows that lower childcare costs, in the form of childcare subsidies, have a significant effect on female labor force participation in Germany. He finds, however, relatively small effects on

[11] De la Croix and Pommeret (2018) show that uncertainty surrounding income growth itself increases with childbearing.

fertility. In our framework, we find that the impact of a reduction in childcare cost is modest compared to the effects of eliminating of duality or split-shift jobs. On the other hand, Doepke and Kindermann (2019) show that in a model in which couples bargain over fertility and childcare, policies that lower the childcare burden of mothers can have a significant effect on fertility. Kim, Tertilt and Yum (2019) focus on Korea, another high-income country with very low TFR. They show that if parents care about their children's relative status in society, they might choose to have a very small number of children but invest in them a lot in their education.

2 Facts

In this section, we document key facts on labor market status and fertility decisions of college-educated women (women with at least a college degree) in Spain. Our main data source is the 2005-2010 Continuous Sample of Working Lives (Muestra Continua de Vidas Laborales con Datos Fiscales, the MCVL). The MCVL is a 4% random sample of individuals registered to the Spanish Social Security during a reference year. Starting from a reference year, e.g. 2010, and going back, the MCVL traces the social security records of individuals up to their first employment (or up to 1980 for the older cohorts). At any moment, a working-age individual can have a social security record if she is employed or is receiving unemployment benefits.

The unit of observation in the MCVL is an individual labor market spell, which can be employment with a particular contract (a job spell) or unemployment (an unemployment spell). Each spell is characterized by a start date, an end date, and a firm identifier. For each job spell, the MCVL provides information on part-time or full-time status, sector of employment (public or private), industry, occupation, and type of contract (temporary or permanent). It also provides working hours expressed as a percentage of a full-time equivalent job, which, combined with the information on the number of working days in each month and the monthly contribution base, allows us to construct full-time equivalent daily earnings. The MCVL also provides individual characteristics contained in social security records, such as age and gender. The MCVL is matched with municipal records, which provide demographic characteristic of individuals, such as nationality, education, marital status, the number of children, and new births.

Based on labor market spells, we construct a quarterly panel data set on labor market status and transitions of women in the MCVL. We start constructing the quarterly panel using the individuals that are registered to social security in 2010. For these individuals we trace their complete labor market history up to their first employment (or to 1980) and use the municipal records to add their demographic characteristics. For individuals who are not included in 2010, but appear in previous editions, we follow the same procedure. Hence, in each quarter for a person who is employed, we know her personal and work-related

characteristics. We restrict the analysis to native married women with at least a college degree who were born between 1966Q1 and 1971Q4 and are between 39 to 45 years old in 2010. Further details on the construction of the quarterly panel are provided in Appendix A.

While the MCVL is an excellent data source to capture the relation between temporary contracts and fertility, it also has shortcomings. First, it does not provide information on individuals who are out of the labor force. As a result, we use the Spanish Labor Force Survey (Encuesta de Población Activa, the EPA) and its rotating panel component (EPA-flujos or the EPA-flows) to construct stocks of individuals who are employed, unemployed and out of the labor force, and flows among these labor market states. Second, it is not possible to construct total household earnings from the MCVL since couples can not be matched, while the EPA does not contain any information on earnings. Therefore, we use the European Union Statistics on Income and Living Conditions (the EU-SILC) to construct household level income measures. Finally, we use the Spanish Time Use Survey (the STUS) to obtain information on workers with split-shift and regular work schedules. Appendix A also provides further details on these data sets.

The following facts emerge from our analysis:

1. **Fertility among College-Educated Women is very Low (especially if they are employed):** For college-educated married women between ages 25 and 44, Figure 5 shows the fraction of them who has a child. By age 30, only about 20% of these women have a child. Even by age 35, fraction of mothers is 63%. There is, however, a significant difference between women who work and women who do not. The upper panel of Table 1 shows the average number of children for employed and non-employed (unemployed or out of the labor force) women at different ages. Working mothers have a smaller number of children than non-working mothers by age 44; they have 1.5 children while non-working mothers have 1.8 children. Working mothers have their children much later as well; at age 30, they have only 0.26 children while non-working

mothers have 0.81.

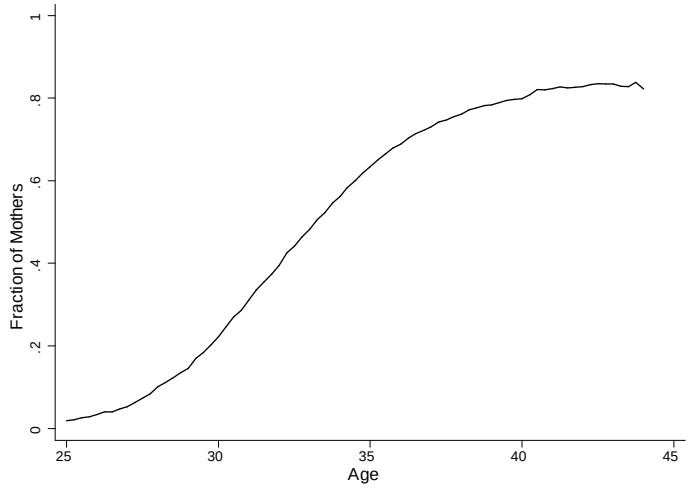

Figure 5. Cumulative Distribution of Married Women with Children

Source: The MCVL, 2005-2010.

Sample: Native, married women with college education or more, born between 1966Q1 and 1971Q4.

Table 1. Average Number of Children, Married Women

Age	Employed[a]	Non-Employed[c]
30	0.26	0.81
35	0.98	1.56
40	1.50	1.78
44	1.51	1.82
By Earnings Tercile at Age 44[b]		
1st	1.35	
2nd	1.49	
3rd	1.72	

Source: [a,b]The MCVL, 2005-2010. [c]The EPA, 1987-2010.

Sample: [a,b]Native, married women with college education or more, born between 1966Q1 and 1971Q4.[c] Native, married women with college education or more born between 1966 and 1971 (only household heads and spouses).

2. **Fertility is Positively Correlated with Women's Earnings:** The lower panel of Table 1 shows how completed fertility at age 44 differs by married women's earnings. The completed fertility is *increasing* with mothers' earnings. The number of children at age 44 is 1.35 for married women who are in the bottom third of the earnings distribution, while it increases to 1.72 children for women who are in the top third.

3. **Temporary Contracts are very Prevalent, even among College-Educated Women.** Figure 6 shows the fraction of women who work with a temporary contract

at different ages. At around age 25, 57% of college-educated women work with a temporary contract. As women age, the fraction of women with a temporary contract declines rapidly. Between ages 25 to 44, the fraction of women with a temporary contract is about 25%.

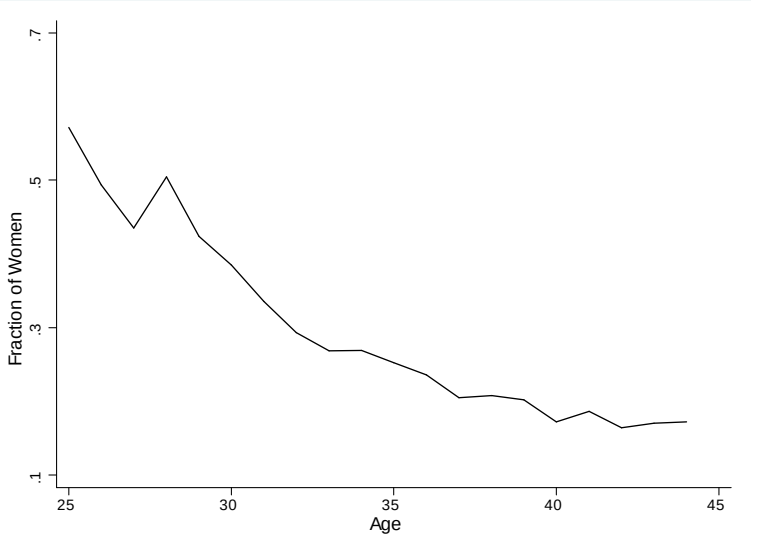

Figure 6. Fraction of women working on a temporary contract

Source: The EPA, 1987-2010.

Sample: Native, married women with college education or more born between 1966 and 1971 (only household heads and spouses).

4. **Transitions from Temporary to Permanent Contracts are Lower for Females:** Table 2 shows the transitions among different labor market states for women. All states, in particular working with a temporary contract, are highly persistent. Each quarter, only about 6.2% of college-educated women who had a temporary contract last quarter moves to a permanent contract. This rate is 8.56%, or 2.3 percentage points higher,

for married men with college education.

Table 2. Quarterly Transition Rates across Labor Market States, aged 30-34

Married women	O_t	U_t	T_t	P_t
O_{t-1}	84.22	10.02	4.69	1.07
U_{t-1}	13.08	72.69	12.31	1.92
T_{t-1}	4.92	5.18	83.68	6.22
P_{t-1}	0.92	0.46	1.11	97.50
	Below College			College and above
Married men	N_t	T_t	P_t	N_t	T_t	P_t
N_{t-1}	67.17	30.56	2.27	80.00	18.18	1.82
T_{t-1}	8.24	86.35	5.42	5.88	85.56	8.56
P_{t-1}	0.81	2.04	97.15	0.26	0.77	98.97

Source: The EPA-flows, 2000Q1-2000Q4.

Sample: Married women with college education or more born between 1966 and 1970 and their potential husbands (married men born between 1966 and 1970). Notes: (i) O: Out of Labor Force, U: Unemployed N: Non-employed, T: Employed with a temporary contract, P: Employed with a permanent contract. (ii) 1966-1970 cohort is 30-34 years old in 2000.

The results in Table 2 can be due to selection if men and women with temporary contracts differ systematically along different characteristics, such as sector of employment, occupation, and tenure. In order to check whether the negative association between gender and promotions is robust to such controls, we focus on childless individuals working with a temporary contract in a given quarter and model the probability of a promotion from a temporary to a permanent job in the following quarter as

$$\begin{aligned} \Pr(y_{ijt+1} &= 1|F_i, P_{it+1}, F_iP_{it+1}, \mathbf{x}_{it}, \mathbf{z}_{ijt}, \varphi_t, y_{ijt}=0, P_{it}=0) \\ &= L(\alpha + \beta F_i + \gamma P_{it+1} + \delta F_iP_{it+1} + \mathbf{x}_{it}\boldsymbol{\theta} + \mathbf{z}_{ijt}\boldsymbol{\eta} + \varphi_t), \end{aligned} \tag{1}$$

where the outcome variable y_{ijt+1} takes the value of 1 if individual $i = 1, ..., n$ employed in firm $j = 1, ..., m$ with a temporary contract in quarter t is promoted to a permanent contract in quarter $t+1$ and 0 otherwise.

The set of explanatory variables include a binary gender indicator (F_i), a binary indicator for individuals who had a child and became a parent between quarter t and $t+1$ (P_{it+1}), which allows us to differentiate the effects of gender from the effect of children, and the interaction between gender and having children (F_iP_{it+1}). The relation between gender and the probability of promotion is given by β, the impact of children on the probability of promotion is given by γ, and δ measures the differential impact of children on promotion probability between men and women. The vector $\mathbf{x}_{it}$ includes other personal characteristics, such as age, and the vector $\mathbf{z}_{ijt}$ contains work-related

characteristics, such as firm tenure, full-time employment, an indicator for public sector employment, occupation, and industry. In addition to individual and work-related characteristics, the model also controls for year fixed-effects φ_t. The function L is the standard logistic distribution.

Table 3 shows the odds ratio estimates from the logistic regressions. In columns 1 and 2, we present the results when we only control for gender and when we only control for having a child, respectively. Both being a female and having a child are negatively and significantly associated with promotion probabilities. However, once we control for gender, having a child does not play a significant role in promotions. In column 3, where we only control for gender, the indicator for having a child, and the interaction between them, we find that it is only the gender that matters. In particular, females, on average, are about 10% less likely to be promoted than males. As we move across the columns, we gradually add other personal and work-related characteristics. In the most demanding specification (Column 4), where we control for all covariates along with year fixed-effects, the odds ratio estimate implies that females, on average, are 22% less likely to be promoted than men.

Table 3. Gender and the Probability of Promotion

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.838***	-	0.902**	0.870***	0.865**	0.780***
	(0.029)		(0.040)	(0.039)	(0.055)	(0.054)
Parent	-	0.772**	0.847	0.848	1.062	1.018
		(0.098)	(0.115)	(0.115)	(0.188)	(0.181)
Female × Parent	-	-	0.523	0.536	0.585	0.589
			(0.212)	(0.217)	(0.315)	(0.319)
Personal characteristics	NO	NO	NO	YES	YES	YES
Work-related characteristics	NO	NO	NO	NO	YES	YES
Year fixed effects	NO	NO	NO	NO	NO	YES
Number of observations	80,623	80,623	80,623	80,623	44,038	44,038

Source: The MCVL, 2005-2010. Sample: Native, married women with college-education or more born between 1966Q1 and 1971Q4 and native married men born between 1964Q1 and 1969Q4. See text for additional sample restrictions. Notes: (i) Reported are the odds ratio estimates. (ii) Individual level clustered robust standard errors in parentheses. (iii) $^{***}p < 0.1$, $^{***}p < 0.05$, $^{***}p < 0.01$. (iv) Personal characteristics include age. Work-related characteristics are firm tenure (in quarters), a binary indicator for public sector, a binary indicator for full-time, occupation dummies (ten social security categories) and NACE one-digit industry dummies (nine categories). All models include a constant term.

5. **Temporary Contracts are Associated with Lower Fertility.** Table 4 shows

the probability that a childless married woman, conditional on her current contract type, gives birth four quarters later. About 2.3% of childless women with a temporary contract are expected to have a child one year later. The probability is quite higher, about 3.4% for women with a permanent contract.

Table 4. Probability of Transition to Maternity by Type of Contract

	Childless at t	Give birth at t
Permanent contract at $t-4$	96.60	3.40
Temporary contract at $t-4$	97.70	2.30

Source: The MCVL, 2005-2010. Sample: Native, married women with college education or more, born between 1966Q1 and 1971Q4.

As it was the case for the association between gender and the promotions, the results in Table 4 can reflect differences in personal and work-related characteristics. In Table 5, we show the odds ratio estimates from the following model

$$\Pr(y_{it}=1|y_{it-1}=0, e_{it-4}=1, T_{it-4}, \mathbf{x}_{it}, \mathbf{z}_{it-4}, \varphi_t) = L(\alpha + \beta T_{it-4} + \mathbf{x}_{it}\boldsymbol{\theta} + \mathbf{z}_{it-4}\boldsymbol{\eta} + \varphi_t), \tag{2}$$

where outcome variable y_{it} now takes the value of 1 if individual $i = 1, ..., n$ has the first birth at a specific quarter t, given that she did not have a (first) child in previous quarter ($y_{it-1} = 0$) and was employed ($e_{it-4} = 1$) in the preceding year.[12] The coefficient of interest, β, is on the binary indicator of working with a temporary contract in the preceding year T_{it-4}. The vectors $\mathbf{x}_{it}$ and $\mathbf{z}_{it-4}$ again contain personal characteristics (at quarter t), work-related characteristics (in the preceding year), and φ_t is the year fixed-effect.

The column 1 presents the results of a simple specification where we only control for the temporary contract indicator. The odds ratio estimate is less than one suggesting a negative and significant association between temporary contracts and fertility. In the next three columns, we gradually add personal and work-related characteristics. In final column, where we control for all covariates together with year fixed-effects, the estimated odds ratio suggests that childless women who are employed with a temporary contract are 28% less likely to have a (first) child than childless women who are

[12] Women drop out of the sample if they have a first child. Otherwise, they are in the sample for the following quarter. Each additional quarter is considered an independent observation, but the standard errors are clustered at individual level for the possible intra-group correlations.

employed with a permanent contract.

Table 5. Temporary Contracts and the First Birth Probability

	(1)	(2)	(3)	(4)
$\text{Temporary}_{\mathbf{t-4}}$	0.633^{***}	0.672^{***}	0.661^{***}	0.723^{***}
	(0.031)	(0.035)	(0.053)	(0.059)
Personal characteristics	NO	YES	YES	YES
Work-related characteristics	NO	NO	YES	YES
Year fixed effects	NO	NO	NO	YES
Number of observations	66,286	66,286	37,581	37,581

Source: The MCVL, 2005-2010. Sample: Native, married women with college-education or more born between 1966Q1 and 1971Q4. See text for additional sample restrictions. Notes: (i) Reported are the odds ratio estimates. (ii) Individual level clustered robust standard errors in parentheses. (iii) $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. (iv) Personal characteristics include age. Work-related characteristics are firm tenure (in quarters), a binary indicator for public sector, a binary indicator for full-time, occupation dummies (ten social security categories) and NACE one-digit industry dummies (nine categories). All models include a constant term.

Tables 4 and 5 show that women with temporary contracts are less likely to have children at a point in time. These women might still have, however, the same total number of children as those with a permanent contract, but simply have their children later. In Table 6 we show the role of temporary contracts along the life-cycle. To this end, we split women between ages 25 and 44 into two groups: those who spent less than 50% of their working life with temporary contract and those who spent 50% or more of their working life with a temporary. We then compare the number of children these women have at different ages. A college-educated woman who was employed in a temporary contract for 50% or more of her employed life has about 1.27 kids by age 44. The number of children is higher, about 1.53, for women who spend less time employed in temporary contracts. Differences between these two groups open up early; at age 35 there is a difference of about 0.14 children and the gap is not closed as they age.

Table 6. Number of Children by Time Spent on Temporary Contracts, aged 25-44

	$<50\%$	$\geq 50\%$
Married at age 35	1.01	0.87
Married at age 40	1.53	1.37
Married at age 44	1.53	1.27

Source: The MCVL, 2005-2010. Sample: Native, married women with college education or more, born between 1966Q1 and 1971Q4. See text for further sample restrictions. We restrict the sample to women who were employed at least 50% of the time between 1996Q1 and 2010Q4.

6. **Mothers are Less Likely to Work in Split-Shift Schedule Jobs:** Finally, we document the relation between split-shift schedule jobs and fertility. In the STUS 2009-2010, about 26% of mothers between ages 25 to 44 hold a split-shift schedule contract. The fraction is quite higher for women who do not have children; about 44%.[13] This difference can reflect the extra cost that split-shift schedules entail for women with children. To compute this cost, we calculate the time interval between the first time and the last time a worker is indicating that she is working in a day. This interval is 7.03 hours for women with a standard contract and 8.31 for women with a split-shift contract. For women with split-shift contacts, the longer interval involves breaks, which make childcare arrangements more difficult.[14]

   In order to investigate the association between motherhood and probability of working with a split-shift schedule, we once again run a logistic regression

$$\Pr(y_i = 1|, F_i, P_i, F_iP_i, \mathbf{x}_i, I_i, \mathbf{z}_i) = L(\alpha + \beta F_i + \gamma P_i + \delta F_iP_i + \mathbf{x}_i\boldsymbol{\theta} + \lambda I_i + \mathbf{z}_i\boldsymbol{\eta}), \quad (3)$$

   where outcome variable y_i takes the value of 1 if individual $i = 1, ..., n$ works with a split-shift schedule and 0 otherwise. The set of predictors include a binary gender indicator (F_i), a binary indicator for presence of own children in the household (P_i) and the interaction between them (F_iP_i). The vector $\mathbf{x}_i$ includes personal characteristics, such as age and region, and I_i is the household income. The vector $\mathbf{z}_i$ contains work-related characteristics, such as full-time employment, temporary contract, occupation, and industry, as well as indicators for having a second job and whether the respondent stated to have flexible working hours.

   Table 7 presents the odds ratio estimates from various logistic regressions. Column 1 presents the results when we only include a gender indicator, while in column 2 we only control for an indicator for presence of own children in the household (i.e. being a parent). In column 3, we control for both gender and presence of own children in the household, as well as their interaction. The odds ratios show a significant difference between men and women for the impact of children on probability of working in a split-shift job (i.e. although we do not observe significant difference between childless men and women, we see a significant negative impact of children on females but not on males). Mothers are about 57% less likely to work with a split-shift schedule compared

[13] The respondents are asked whether they work with a split-shift or regular schedule, so the fraction of mothers and non-mothers who work with a split contract is simply the fraction of those who answer that their work schedule is a split one. We restrict the sample to native, married, 25-44 years old women with at least a college education, but as the sample size is small, we do not restrict the sample to a particular cohort of women. We only consider employees who filled the diary in an ordinary/usual day in a regular working week and who worked that week. In the sample, about 35% of women hold jobs with a split-shift schedule, and split-shift jobs are observed across different occupations, industries, and regions.

[14] The STUS 2009-2010 time-diaries include information on whether the respondent is working or not within each 15-minute interval (from 6.00am-6.14am to 5.45am-5.59am) within 24 hours.

to men and women without children. As we move across columns from left to right, we again gradually add personal characteristics, household income, and work-related characteristics, and odds ratio remains significant and similar in magnitude.

Table 7. Motherhood and the Probability of Working with a Split-Shift Schedule

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.446***	-	0.843	0.746	0.806	1.097
	(0.060)		(0.236)	(0.214)	(0.234)	(0.363)
Parent	-	0.818	1.017	1.182	1.163	1.181
		(0.120)	(0.181)	(0.219)	(0.217)	(0.235)
Female × Parent	-	-	0.431***	0.453**	0.457**	0.428**
			(0.139)	(0.149)	(0.150)	(0.152)
Personal characteristics	NO	NO	NO	YES	YES	YES
Household income	NO	NO	NO	NO	YES	YES
Work-related characteristics	NO	NO	NO	NO	NO	YES
Observations	1,174	1,174	1,174	1,174	1,174	1,174

Source: The Spanish Time Use Survey (STUS) 2009-2010. Sample: 25-44 years old native, married women with at least a college degree and 25-44 years old native, married men. Sample is further restricted to wage earners. Notes: (i) Standard errors in parentheses. (ii) $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.(iii) Personal characteristics include age and regional dummies (seven categories). Household income is net average monthly household income (four categories <1200 euros, between 1201 and 2000 euros, between 2001 and 3000 euros, and >3000 euros). Work-related characteristics include a binary indicator for full-time employment, CNO one-digit occupation dummies (regrouped, five categories), CNAE one digit industry dummies (regrouped, nine categories), a binary indicator for having a second job, a binary indicator for having flexible working hours, and a binary indicator for having a temporary contract. All models include a constant term.

3 Model

To study the effects of labor market frictions and childcare costs on fertility, we next build a life-cycle model where married females make labor force participation, fertility, and savings decisions. The model economy is populated by married households. Each married household consists of two potential earners, a male (m) and a female (f). Individuals are born married and do not experience marital transitions. Husbands and wives age together. Males can have low (less than college) or high (college or more) education, denoted by $e_m \in \{0, 1\}$. We focus on the behavior of college-educated females and suppress the education indicator for them. Besides their education, individuals also differ by their ability levels, denoted by a. The ability levels for a couple are drawn from a joint distribution, $F(a_f, a_m)$, at the start of the life and remain constant afterwards.

Demographics Model period is a quarter. We focus on the behavior of women between ages 25 ($j = 1$) and 54 ($J = 54 \times 4$). Fertility decisions are uncertain in the sense that even if a woman would like to have a child, she may not get pregnant. Fertility opportunities decrease with a woman's age. Let α_j be the probability that a female of age j gets pregnant, conditional on her decision to have a baby.

Once children are born, they age stochastically. There are three age groups for children: less than 2 (babies), between 2 and 15 (children), and more than 15 years olds (young adults). Each period a baby becomes a child with probability $\delta_b = 1/8$. After age 2, children face a probability δ_c of becoming a young adult each period. We set $\delta_c = 1/52$, so on average childhood lasts 13 years and young adulthood starts at age 15. We assume that if a female has a baby, she can not have another one in that period. We denote by $n_1 \in \{0, 1\}$ the number of babies in the household. The number of children and young adults are denoted by n_2 and n_3, respectively. Let $\mathbf{n} = \{n_1, n_2, n_3\}$ be a vector that indicates number of children in each age group, and $n = n_1 + n_2 + n_3$ be the total number of children in the household.

Let $b \in \{0, 1\}$ indicate whether or not a household decides to have a baby. Then, for a household with $\mathbf{n}$, the number of babies next period is given by

$$n_1' = \begin{cases} 1 \text{ with prob. } \alpha_j \text{ if } n_1 = 0 \text{ and } b = 1 \\ 0 \text{ with prob. } (1 - \alpha_j) \text{ if } n_1 = 0 \text{ and } b = 1 \\ 0 \text{ with prob } \delta_b \text{ if } n_1 = 1 \\ 1 \text{ with prob } (1 - \delta_b) \text{ if } n_1 = 1 \end{cases} . \tag{4}$$

Similarly, n_2 evolves according to

$$n_2' = \begin{cases} n_2 + 1 \text{ with prob. } \delta_b(1 - \delta_c) \text{ if } n_1 = 1 \\ n_2 \text{ with prob. } (1 - \delta_b)(1 - \delta_c) \text{ if } n_1 = 1 \\ n_2 \text{ with prob. } (1 - \delta_c) \text{ if } n_1 = 0 \\ n_2 - 1 \text{ with prob. } \delta_c \text{ if } n_1 = 0 \text{ and } n_2 > 0 \end{cases} . \tag{5}$$

Finally, the number of young adults next period reads

$$n_3' = \begin{cases} n_3 \text{ with prob. } (1 - \delta_c) \text{ if } n_2 > 0 \\ n_3 + 1 \text{ with prob. } \delta_c \text{ if } n_2 > 0 \\ n_3 \text{ if } n_2 = 0 \end{cases} . \tag{6}$$

Hence, all households start with $\mathbf{n} = \{0, 0, 0\}$, first move to $\mathbf{n} = \{1, 0, 0\}$ and end up with $\mathbf{n} = \{0, 0, n\}$. We represent this stochastic structure as[15]

$$\mathbf{n}' = \Gamma(\mathbf{n}; b, j).$$

[15] In order to save computational time, when we solve the model we assume that when a baby arrives to a household all existing children become babies. Since when a female has a baby, she can't have another one, this assumption implies that in a household there are either only babies or only children.

Preferences Each period, a married female decides whether or not to work, how much to consume, how much to save, and whether or not to have another child. Each female has one unit of time endowment each period. Her preferences are given by

$$u(c, n, \ell, j) = \log\left(\frac{c}{\Omega(n)}\right) + \gamma_1 \frac{exp(j-\gamma_3)}{1+exp(j-\gamma_3)}(\overline{n}+n)^{\gamma_2} + \chi \log(\ell), \tag{7}$$

where c is consumption, $\Omega(n)$ is the household equivalence scale, ℓ is leisure, and n is the *total* number of children. In this formulation $\overline{n}$ denotes an exogenously given number of children from which parents get utility, independent of the number of children they have. This is a standard feature of models with fertility, which allows us to pin down the fraction of childless females. We also assume that utility that parents' get from children is increasing in parents age, given by $\frac{exp(j-\gamma_3)}{1+exp(j-\gamma_3)}$ term. This term captures other factors that might push parents to delay their fertility, such as housing or other high fixed-cost investments.

Labor Market - Females A married women can be in one of three labor market states: *working, unemployed or out-of-labor force.* Each women is endowed with one unit of time each period. We assume that all jobs are full-time and require l units of time. Each period, with probability ϕ, an unemployed female receives a job offer. If she accepts the offer, she starts working next period. If she rejects the offer, she also decides whether to continue to be unemployed or move out of the labor force. Only unemployed workers can get job offers. They have to incur, however, a search cost in terms of leisure, denoted by ξ. Females who are out of the labor force do not receive job offers, and do not incur this costs. In order to receive job offers, a female, who is out of the labor force, has to enter first the labor force as unemployed.

There are two types of jobs in the economy: temporary and permanent, denoted by indicator $P = 0$ and $P = 1$, respectively. Jobs also differ by the type of work schedule they offer. They can have a split-shift or a regular work schedule, denoted by indicator $S = 1$ and $S = 0$, respectively. Split contracts have a fixed time cost denoted by κ. Hence, total working hours for a split-shift contract is $l + \kappa$, while the worker only receives a wage for l hours. We assume that a fraction ψ of all new job offers (temporary or permanent) have a split-shift schedule.

All new jobs start as temporary. A female with a temporary contract is promoted to a permanent job with probability $\pi^f_{0,1} = \pi$ and the probability of staying with a temporary is given by $\pi^f_{0,0} = 1- \pi$. Each period a job can be destroyed with probability δ_P. Temporary contracts have a higher probability of being destroyed, i.e. $\delta_0 > \delta_1$.

Females accumulate human capital, h, as they work. Each female starts her life with $h = 1$, and if she works in a given age then her next period human capital is given

$$\ln(h') = \ln h + \ln(1 + \eta_1 + \eta_2 j). \tag{8}$$

Each extra quarter of work on a job is associated with a η_1 percent growth in wages. The growth rate, however, declines with age since $\eta_2 < 0$. We assume that there is no depreciation associated with not working.

The wage rate of a female depends on her ability, human capital, and the type of contract, and is given by

$$w_f(a, h, P) = \zeta_P a h, \tag{9}$$

where $\zeta_1 = 1$, and $\zeta_0 < 1$ is the wage penalty for temporary contracts.

Labor Market - Males All males are in the labor force. They do not make any decisions and their labor market status changes exogenously. Males can be in three different labor market states: working with a temporary contract, working with a permanent contract, or unemployed. Let $\lambda_m \in \{0, 1, u\}$ denote these labor market states, and $\pi^m_{x,x'}$, for $x, x' \in \{0, 1, u\}$, be the associated transition probabilities from employment state x to x'.

Wage rate for a male of age-j depends on his education, ability, and type-of contract and is given by

$$w_m(e_m, a, j, P) = a \exp(\omega_0^{e,P} + \omega_1^{e,P} j + \omega_2^{e,P} j^2). \tag{10}$$

Child Care Costs Each period a working female with children has to pay childcare costs. We assume that childcare costs are independent of the number and age of children in the household. We also assume that not all households pay childcare costs. A household can have access to informal childcare (e.g. grandparents), denoted by $g \in \{0, 1\}$. If $g = 1$, a household has access to grandparents (or other relatives) and does not pay any childcare cost. We assume that $g = 1$ for a fraction φ of all households.

The per-child childcare costs also depend on whether a female works with a split-shift or regular contract and are given by

$$D(g, l, S) = \begin{cases} d\left(1 + \frac{\kappa S}{l}\right), & \text{if } g = 0 \\ 0, & \text{if } g = 1 \end{cases}. \tag{11}$$

If a household does not use informal care, then they pay d if $S = 0$ (i.e. the mother works in a regular schedule). If the mother works with a split-shift contract, her childcare costs are given by $d(1 + \frac{\kappa}{l})$, i.e. they are increased by κ/l, the fixed time cost of split-shift contracts. Besides monetary costs, young (0 to 2 years old) children also imply a fixed time cost for their mother, denoted by ι.

Government There is a government that taxes individuals and uses the tax revenue to provide means-tested transfers, unemployment benefits, and to finance government consumption. Let $G(I)$ denote any means-tested transfers from the government to the household where I is the total household income. Let $T(I)$ be the taxes that an individual with income

level I pays. We assume that unemployed individuals get a $\theta \in (0,1)$ fraction of average labor income in the economy as unemployment benefits, and let θ be different for females and males with low and high education.

4 Household Problem

Let $\boldsymbol{s} = (e_m, a_f, a_m, g)$ be the permanent characteristics of a household. Suppose the wife has a type-(P,S) job, her human capital level is h, the labor market status of her husband is λ_m, and household assets are given by k. Then, the problem of an age-j female with $\mathbf{n}$ children, who is currently employed, is given by

$$\begin{aligned} V_j^w(\boldsymbol{s}, k, \mathbf{n}, P, S, h, \lambda_m) &= \max_{k',b} u(c, n, \ell, j) \\ &\quad +\beta(1-\delta_P) EW_{j+1}^o(\boldsymbol{s}, k', \mathbf{n}', P', S, h', \lambda_m' | P, \lambda_m, \mathbf{n}, b) \\ &\quad +\beta\delta_P EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', \lambda_m' | \lambda_m, \mathbf{n}, b), \end{aligned}$$

subject to

$$c + k' + D(g,l,S)\mathcal{J}(n_1+n_2) = I_m + I_f + k(1+r) + G(I) - T(I_f + \frac{kr}{2}) - T(I_m + \frac{kr}{2}),$$

$$\ln(h') = \ln h + \ln(1 + \eta_1 + \eta_2 j),$$

where

$$\ell = 1 - l - \iota\chi(n_1) - \kappa S,$$

and

$$I_m = \begin{cases} w_m(e,a,j,\lambda_m) \text{ if } \lambda_m \in \{0,1\} \\ \theta_m^e \overline{I}_{lab} \text{ if } \lambda_m = u. \end{cases}, \; I_f = \zeta_p a h,$$

where $\mathcal{J}(x)$ is an indicator function with $\mathcal{J}(x) = 1$ if $x > 0$, $\overline{I}_{lab}$ is the average labor income in the economy and $\theta_m^e \overline{I}_{lab}$ is the unemployment payment for an unemployed husband with education level e.

Hence, a married female has earnings given by $\zeta_P a h$, which are increasing in her human capital. Given her husband's earnings (I_m), which depend on whether he is employed or unemployed, a married female decides how much to consume (c) and whether to have a baby (b). She enjoys $\ell = 1 - l - \iota\mathcal{J}(n_1) - \kappa S$ units of leisure, which reflects her labor market hours, child care time for babies (ι), and the fixed cost of work associated with split-shift jobs (κ).

If she does not loose her job, which happens with probability $1-\delta_P$, then the expected value of having the opportunity to work next period is given by

$$
\begin{aligned}
&EW^o_{j+1}(\boldsymbol{s}, k', \mathbf{n}', P', S, h', \lambda'_m | P, \lambda_m, \mathbf{n}, b) = \\
&\sum_{\lambda'_m} \sum_{P'} \sum_{\mathbf{n}'} \max\{V^w_{j+1}(\boldsymbol{s}, k', \mathbf{n}', P', S, h', \lambda'_m), V^u_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m), V^{np}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m)\} \\
&\pi^m_{\lambda_m, \lambda'_m} \pi^f_{P,P'} \Gamma(\mathbf{n}; b, j),
\end{aligned}
$$

where $\pi^m_{\lambda_m, \lambda'_m}$ is the exogenous transition probabilities on husband's labor market status, $\pi^f_{P,P'}$ is probability of being promoted from type P to type P' contract, and $\mathbf{n}' = \Gamma(\mathbf{n}; b, j)$ is the transition probabilities for the number of children.

Similarly, EW^{no}_{j+1} is the expected value for a women who does not have an offer, and hence decides whether to search (be unemployed) or move out of labor market, reads as

$$
\begin{aligned}
&EW^{no}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m | \lambda_m, \mathbf{n}, b) = \\
&\sum_{\lambda'_m} \sum_{\mathbf{n}'} \max\{V^u_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m), V^{np}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m)\} \pi^m_{\lambda_m, \lambda'_m} \Gamma(\mathbf{n}; b, j),
\end{aligned}
$$

In order to save on computational time, we set $V^w_{J+1}(\boldsymbol{s}, k, \mathbf{n}, P, S, h, \lambda_m)$, the end-of-life value functions as follows: we assume that both the husband and the wife keep their last period's (period $J's$) labor market income for 10 more years (i.e. from ages 55 to 64), at age 65 they retire, and live for 10 more periods. During retirement, they only have asset income. After age 54, they get utility from the number of children they had at age 54 until age 75, but do not incur any cost associated to children (in terms of time, childcare costs or consumption congestion). Hence, after age 54, households solve a simple consumption savings problem with a constant labor income for 10 years, and no labor income for another 10.[16]

4.1 Value Function of Unemployed

An unemployed woman receives unemployment benefits θ_f. The household income is then given by the sum of θ_f and the earnings of the husband. Like a woman who is employed, an unemployed woman decides how much to consume and how much to save and whether to have a new baby. In contrast to a working woman, her human capital remains the same, i.e. $h' = h$. Her problem is given by

$$
\begin{aligned}
V^u_t(\mathbf{s}, k, \mathbf{n}, h, \lambda_m) \quad = \quad & \max_{k', b} u(c, n, \ell, j) + \beta\phi EW^o_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h' = h, \lambda'_m | \lambda_m, \mathbf{n}, b) \\
& + \beta(1-\phi) EW^{no}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h' = h, \lambda_m | \lambda_m, \mathbf{n}, d)
\end{aligned}
$$

[16] This approach is common in structural model of life-cycle decisions, see e.g. Eckstein et al. (2019).

subject to

$$c + k' = I_m + I_f + k(1+r) + G(I) - T(I_f + \frac{kr}{2}) - T(I_m + \frac{kr}{2}),$$

where

$$\ell = 1 - \xi - \iota \mathcal{J}(n_1),$$
$$I_f = \theta_f \overline{I}_{lab} \text{ and } I_m = \begin{cases} w_m(e,a,j,\lambda_m) \text{ if } \lambda_m \in \{0,1\} \\ \theta^e_m \overline{I}_{lab} \text{ if } \lambda_m = u \end{cases},$$

If she has an opportunity to work, $EW^o_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m)$ captures the expectations over an unconditional distribution over S' (whether her new job has a split-shift or regular schedule) as well as children:

$$\begin{aligned} & EW^o_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda'_m | \lambda_m, \mathbf{n}, b) \\ = & \sum_{\lambda'_m} \sum_{S'} \sum_{\mathbf{n}'} \max\{V^w_{j+1}(\boldsymbol{s}, k', \mathbf{n}', 0, S', h', \lambda_m), V^u_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m), V^{np}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m)\} \\ & \pi^m_{\lambda_m, \lambda'_m} \Phi(S') \Gamma(\mathbf{n}'; b, j), \end{aligned}$$

where $\pi_{\lambda'_m \lambda_m}$ is the exogenous transition probabilities on male's labor market status, and $\Gamma(\mathbf{n}'; b, j)$ are the transition probabilities for the number of children as defined above. Here $\Phi(S')$ is the distribution of temporary jobs with respect to the work schedules. Note that all jobs start as temporary ($P = 0$).

Similarly, if a female does not have a job offer, her expected value next period is given by

$$\begin{aligned} & EW^{no}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m | \lambda_m, \mathbf{n}, b) = \\ & \sum_{\lambda'_m} \sum_{\mathbf{n}'} \max\{V^u_{j+1}(\boldsymbol{s}, k', \mathbf{n}', \lambda'_m), V^{np}_{j+1}(\boldsymbol{s}, k', \mathbf{n}, \lambda'_m)\} \pi^m_{\lambda_m, \lambda'_m} \Gamma(\mathbf{n}; b, j). \end{aligned}$$

4.2 Value function of Non-participants

Finally, the problem of a j-years old female who is out of labor force is given by

$$V^{np}_t(\boldsymbol{s}, k, \mathbf{n}, h, \lambda_m) = \max_{k', b} u(c, n, \ell = 1 - \iota \chi(n_1), j) + \beta EW^{no}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h' = h, \lambda_m | \lambda_m, \mathbf{n}, b)$$

subject to

$$c + k' = I_m + I_f + k(1+r) + G(I) - T(I_f + \frac{kr}{2}) - T(I_m + \frac{kr}{2}),$$
$$I_f = 0 \text{ and } I_m = \begin{cases} w_m(e,a,j,\lambda_m) \text{ if } \lambda_m \in \{0,1\} \\ \theta^e_m \overline{I}_{lab} \text{ if } \lambda_m = u \end{cases},$$

and

$$\begin{aligned} & EW^{no}_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m | \lambda_m, \mathbf{n}, b) \\ = & \sum_{\lambda'_m} \sum_{\mathbf{n}'} \max\{V^u_{j+1}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda'_m), V^{np}_{j+1}(\boldsymbol{s}, k', \mathbf{n}, h', \lambda'_m)\} \pi^m_{\lambda_m, \lambda'_m} \Gamma(\mathbf{n}; b, j). \end{aligned}$$

5 The Benchmark Economy

In order to calibrate the benchmark economy, we proceed in two steps. In the first step, we set several parameters to their data counterparts. These parameters are listed in Table 8. Based on the EPA, we assume that 49% of college-educated females are married to college-educated males.[17] The average long-term real interest rates in Spain were around 1.6%, while the average real deposit rates were close to zero in recent decades.[18] We set $r = 0.8\%$ as an intermediate value. We also adopt the modified OECD household equivalence scale and set $\Omega(n) = 1 + 0.5 + 0.3n$, i.e. we assume that the second adult counts 50% of the first adult while each child counts as 30% of the first adult.[19]

In order to set values for θ, we calculate the average incomes of unemployed individuals from unemployment benefits (which might be zero if an unemployed individual does not receive any unemployment insurance) as a fraction of the average labor income using data from the EU-SILC.[20] We find $\theta_f = 0.089$, $\theta_m^0 = 0.142$, and $\theta_m^1 = 0.109$. We set l, the average working hours in a standard-time contract, to 0.4. We take α_j values, which determine the probability that an age-j woman might get pregnant upon trying, from Sommer (2016, Figure 1).[21]

We select the parameters of the wage process for males

$$w_m(e, a, j, P) = a \exp(\omega_0^{e,P} + \omega_1^{e,P} j + \omega_2^{e,P} j^2), \tag{12}$$

in order to match the age-earnings profiles of males in the data – Figure 7.[22] Finally, the employment transitions for males between temporary contracts, permanent contracts and unemployment, $\pi^m_{\lambda_m,\lambda'_m}$, can be calculated directly from the data in Table 2. When males enter the labor market at age 25, distribution across different labor market states are also

[17] We use pooled data from the EPA for 1987-2010. The sample is restricted to 25-44 years old married native women with college education or above born between 1966 and 1971 and their husbands.

[18] The real interest rates are calculated as the nominal rates minus the CPI-inflation. The data on long-term interest rates and the consumer prices index is taken from the OECD database (https://data.oecd.org/interest/long-term-interest-rates.htm, and https://data.oecd.org/interest/long-term-interest-rates.htm). The data on deposit rates is taken from the monthly Statistical Bulletin of the Bank of Spain. The numbers refer to average values for 2003-2018 period (https://www.bde.es/webbde/en/estadis/infoest/bolest.html).

[19] http://www.oecd.org/els/soc/OECD-Note-EquivalenceScales.pdf.

[20] We use pooled data from the EU-SILC from 2006 to 2012. We restrict sample to married couples in which wife is born between 1966 and 1971 born, native, with college education or more, and 25-44 years old. Then for household heads and spouses, we calculate the average incomes of unemployed from unemployment insurance (including zeros) as a fraction of the average labor income (using gross employee cash or near cash income) of the employed.

[21] Probability of not being able to conceive is 8% at age 20, increases slowly to 23% by age 30, and then rapidly to 57.5% at age 40 and 95% at age 45.

[22] In the simulations, the earnings of a college-educated husband with a permanent contract at the age 25 of her wife is normalized to 1. As a result, we also transform the data by subtracting from the average log earnings at each age the log(68), where 68 is the average daily earnings of a high-educated husband with a permanent contract at the age of 27 (her wife would be 25) in the data.

taken directly from the data (Table A1a). Figure 8 shows how well the model matches the labor market status for men along the life-cycle.

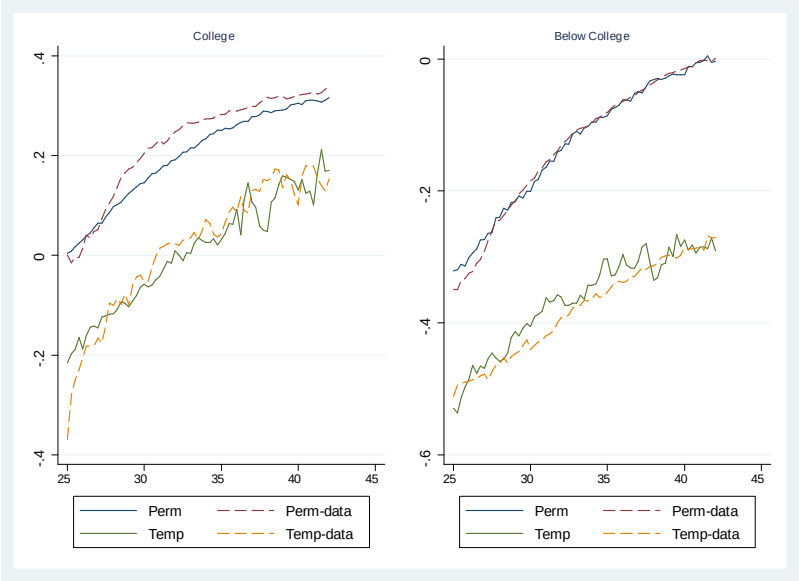

Figure 7. Age-Earnings Profiles for Males

Source: The MCVL, 2005-2010.

Sample: Native, married men born between 1964Q1-1969Q4.

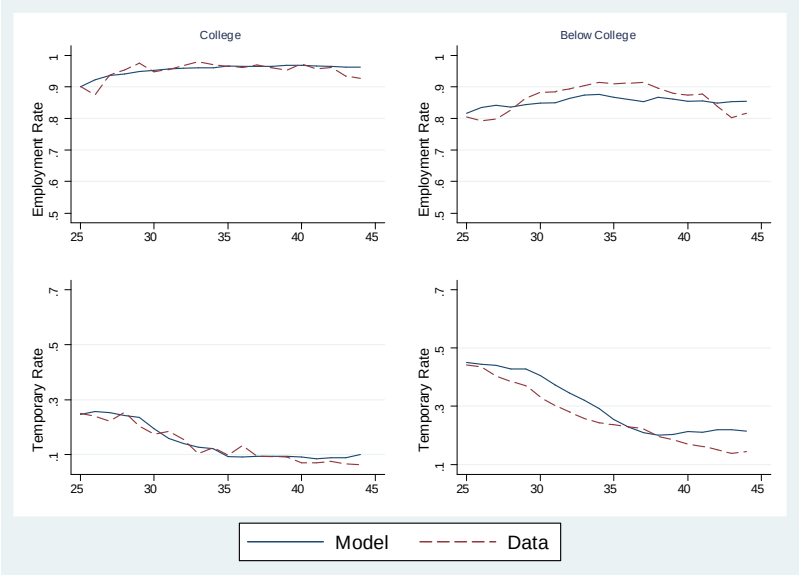

Figure 8. Labor Market Outcomes for Males (model vs. data)

Source: The EPA, 1987-2010. Sample: Husbands of native, married women born between 1966 and 1971.

We assume that the transfer function $G(I)$ takes the following form

$$\frac{G(I)}{\overline{I}} = \begin{cases} g_0 \text{ if } I = 0 \\ \left[g_1 + g_2(I/\overline{I})\right] \text{ if } I > 0 \end{cases}, \tag{13}$$

where $\overline{I}$ is the mean household income. We estimate g_0, g_1 and g_2 using EU-SILC data on transfer incomes.[23] We find that a household with no income receives a transfer that is about 4% of the mean household income in the economy (about 1900 Euros). The transfers decline as a household gets richer and become zero around 2.4 times the mean household income.

Finally, following Guner, Kaygusuz and Ventura (2014) and Heathcote, Storesletten and Violante (2019), we assume that $T(I)$ takes the following form

$$T(I) = \begin{cases} 0, \text{ if } I \leq \widetilde{I} \\ I \times \max\{1 - (1-\tau_0)(I/\overline{I})^{-\tau_1}, 0\} \text{ if } I > \widetilde{I} \end{cases}, \tag{14}$$

where $\overline{I}$ is the mean income. Hence, households do not pay any taxes if their income is below a certain threshold $\widetilde{I}$. Beyond $\widetilde{I}$, households face progressive tax schedule. We take estimates of $1 - \tau_0 = 0.904$, $\tau_1 = 0.121$,and $\widetilde{I} = 0.47\overline{I}$ from Garcia-Miralles, Guner, and Ramos (2019). Households whose income is below 47% of the mean household income do not pay any taxes. The parameter $1 - (1 - \tau_0) = 1 - 0.904 = 0.096$ gives the average tax rate for a household with mean income and parameter τ_1 determines the progressivity of taxes.[24]

[23] We use pooled data from the EU-SILC from 2006 to 2012. We restrict the sample to households with one married couple and only consider the household heads and the spouses. We further restrict wives to be native, with college education or more, and 25 to 44 years old. Transfer income includes old-age benefits, survivor' benefits, sickness benefits, disability benefits, education-related allowances, family/children related allowances and housing allowances, and social exclusion not elsewhere classified. We calculate the total transfer income for the entire household. Both the transfers and household income is reported as a fraction of the average household income in the sample (about 48,043 Euros).

[24] With this tax function, a household with income level Xy (where $X > 1$), has an after-tax income of $(1-\tau_0)(Xy)^{1-\tau_1}$. Hence, the ratio $\frac{(1-\tau_0)(y)^{1-\tau_1}}{(1-\tau_0)(Xy)^{1-\tau_1}} = \left(\frac{1}{X}\right)^{1-\tau_1} < \frac{1}{X}$, if $\tau_1 > 0$.

Table 8: Parameter Values
(Based on a priori Information)

Description	Parameters/Values	Comments
Wom. Married to Coll. Men.	0.49	The EPA
Time on Regular Contracts	$l = 0.4$	Standard
Interest Rate (annual)	$r = 0.8\%$	OECD, The Bank of Spain
Fecundity	α_j	Sommers (2006)
Male Wage Profiles	$\omega^e_{0,P}, \omega^e_{1,P}, \omega^e_{2,P}$	Figure 7
Male Employment Transitions	$\pi^m_{\lambda_m,\lambda'_m}$, for $\lambda_m, \lambda'_m \in \{0, 1, u\}$	Tables 2 and A1a
Equivalence of Scale	$\Omega(n) = 1 + 0.5 + 0.3n$	OECD Modified Scale
Unemployment Benefits	$\theta_f = 0.089$, $\theta^0_m = 0.142$, $\theta^1_m = 0.109$	The EU-SILC
Transfers	$g_0 = 0.037$, $g_1 = 0.024$, $g_2 = -0.01$	The EU-SILC
Taxes	$1 - \tau_0 = 0.904$, $\tau_1 = 0.121, \widetilde{I} = 0.47\overline{I}$	Garcia-Miralles et al (2019)

In the second stage, we calibrate remaining 24 parameters to match a set of 24 targets. To this end, we first assume that the ability distribution, $F^e(a_f, a_m)$, is joint normal with parameters $(\mu_{a_f}, \mu_{a_m}, \sigma_{a_f}, \sigma_{a_m}, \rho)$, where ρ is the correlation coefficient, and normalize $\mu_{a_m} = 1$. For the initial, i.e. age 25, labor market states of females, we assume that a fraction ϕ_{25} of them have an opportunity to work while remaining $1 - \phi_{25}$ do not. Those who have an opportunity to work receive offers according to the distribution of temporary and permanent jobs in Table A1a. Given these job opportunities women at age 25 make decisions whether or not to participate in the labor market and take jobs that they are offered.

Table 9 shows the calibrated parameters. We organize the moments that we use to discipline the parameters in Table 9 into three groups: inequality (Table 10), labor market outcomes (Table 11), and fertility (Table 12). In Figures C1-C3 in Appendix C, we illustrate how each of these targets change when we increase a single parameter by 10%. While, given highly non-linear nature of the problem, it is not possible to associate individual parameters in Table 9 with individual targets in Tables 10-12, Figures C1-C3 show that particular targets play relatively more important roles in identifying certain parameters.

Table 9: Parameter Values
(Calibrated)

Parameter	Description
Ability Distribution	
$\mu_{a_f} = 0.72, \sigma_{a_f} = 0.436, \sigma_{a_m} = 0.361, \rho = 0.4$	
Preferences	
$\beta = 0.9961$	Discount Factor
$\gamma_1 = 0.44$, $\gamma_2 = 0.36$, $\gamma_3 = 22.0$, $\overline{n} = 2.20$	Preferences for Children
$\chi = 0.757$	Preferences for Leisure
Cost of Children	
$d = 0.08$ (4% of household inc)	Childcare Cost
$\varphi = 0.22$	Frac. of Household with Informal Care
$\iota = 0.15$	Time Cost of Babies
Female Wages	
$\eta_0 = 0.02$, $\eta_1 = -0.0004$	Human Capital Accumulation
$\zeta_0 = 0.95$	Temporary Contract Wage Penalty
Labor Market	
$\xi = 0.765$	Time Cost of Search
$\pi = 0.05$	Promotion Probability
$\phi = 0.225, \phi_{25} = 0.6$	Job Finding Rate
$\delta^1 = 0.008, \delta^0 = 0.055$	Job Destruction Rate
$\kappa = 0.135$	Time Cost of Split Jobs
$\psi = 0.40$	Frac. of Split-Schedule Jobs

Targets in Table 10 determine the parameters of the ability distribution and the parameters of female wage process. Mean female ability, μ_{a_f}, maps into gender wage gap (recall that $\mu_{a_m} = 1$), while σ_{a_f} and σ_{a_m} into variances of male and female earnings. The correlation between earnings of husbands and wives in the data (about 0.44) determines ρ. The parameters η_0, η_1, and ζ_0 generate the observed age earnings profiles for women with temporary and permanent contracts (recall that female human capital accumulation is given by $\ln(h') = \ln h + \ln(1 + \eta_1 + \eta_2 j)$, while female wages are determined as $w_f(a, h, P) = \zeta_P a h$ with $\zeta_0 < \zeta_1 = 1$). Finally, in order to calibrate the discount factor, β, we target the ratio of median wealth between ages 45-54 and 35-44.[25]

[25] In order to compute this ratio we use the 2014 wave of Bank of Spain's Survey of Household Finances (Encuesta Financiera de las Familias or the EFF). The EFF is a survey conducted by the Bank of Spain that collects information on socio-economic characteristics, income, assets, and debt of around 6,000 households in each wave. We restrict the sample to married couples in which the wive has at least a college degree.

Table 10: The Model vs. Data – Inequality

	Model	Data	Source
Variance of Wife Log Earnings	0.16	0.21	Table A2
Variance of Husband Log Earnings	0.20	0.21	Table A2
Husband and Wife Earnings Correlation	0.43	0.44	Table A2
Female Wage Growth 25–35 (permanent)			Figure 9
Female Wage Growth 35–52 (permanent)			Figure 9
Temporary to Permanent Wage Ratio			Figure 9
Hourly Wage Gender Gap	0.96	0.93	Table A2
Median Wealth 45-54/Median Wealth 35-44	2.22	2.30	The EFF

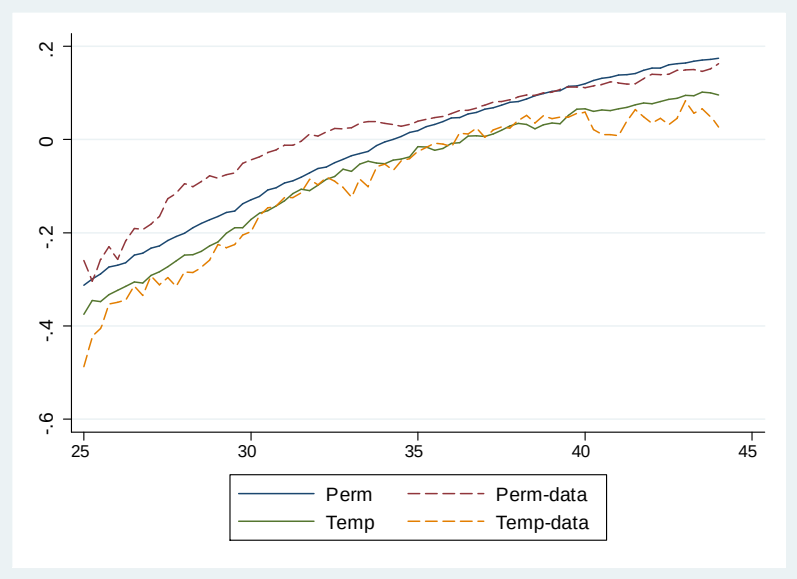

Figure 9. Age-Earnings Profiles for Females (model vs. data)

Source: The MCVL, 2005-2010.
Sample: Native, married women with at least a college education born between 1966Q1 and 1971Q4.

The next set of targets pertains to labor market outcomes (Table 11). Again, mapping between some parameters and targets is straightforward. The parameter ϕ_{25} (fraction of women of age 25 who have an opportunity to work) is calibrated to match the fraction of age-25 unemployed women. In the model economy, a fraction ψ of jobs have split-shift schedules and they have a time cost of κ. These parameters help us to match fraction of standard contracts among mothers and non-mothers. Other targets in Table 11, employment and unemployment among women with or without children, determine the parameters such as the preferences

for leisure (χ), goods and time cost of children (d and ι), and the time cost of search (ξ). Finally, the fraction of females with a temporary contract and transitions from temporary and permanent contracts to unemployment allow us to identify the promotion probability (π), and destruction rates for temporary (δ_0) and permanent jobs (δ_1). It is important to note that while each temporary (or permanent) job has an exogenous destruction rate, the transitions to unemployment depend both on whether a woman chooses to stay unemployed or leaves the labor force upon the termination of her job, and on whether, independent of a destruction shock, she chooses to move to unemployment or out-of-the-labor force.

Table 11: The Model vs. Data – Labor Market

	Model	Data	Source
Female Unemployment/Population 25	0.27	0.23	Table A1a
Female Unemployment/Population, Mothers, 25–44	0.06	0.07	Table A1b
Female Unemployment/Population 25–44	0.08	0.08	Table A1b
Fraction of Temporary Workers, Females 25–44	0.26	0.25	Table A1b
Trans prob Temporary to Unemployment 30–34	4.6	5.2	Table 2
Trans prob Permanent to Unemployment 30–34	0.5	0.5	Table 2
Female Employment/Population, 25-44, Non-mothers	0.81	0.81	Table A1b
Female Employment/Population, 25-44, Mothers	0.75	0.76	Table A1b
Female Employment/Population, 25-44, Mothers with Babies	0.69	0.71	Table A1b
Fraction of Non-mothers on Standard Contracts	0.52	0.54	Section 2
Fraction of Mothers on Standard Contracts	0.70	0.71	Section 2

Finally, we also target the level and the timing of fertility (Table 12). These targets determine parameters that govern how much households value children ($\gamma_1, \gamma_2, \gamma_3$ and $\overline{n}$). In the model economy, a φ fraction of households have informal care and do not pay any childcare costs. We choose this parameter to match the fraction of employed mothers with babies (ages 0-2) that use informal care.

Table 12: The Model vs. Data – Fertility

	Model	Data	Source
Average Number of Children at 44, Not Employed	1.82	1.82	Table 1
Average Number of Children at 30, Employed	0.16	0.26	Table 1
Fraction of Childless Women at 44, Employed	0.15	0.18	Table A3
Fraction of Women with more than 2 Children at 44, Employed	0.59	0.57	Table A3
Informal Child Care Use, Mothers with Children age 0-2, Employed	0.30	0.31	Table A4

Few parameters in Table 9 can be compared directly with their data counterparts. Our calibrated value for $d = 0.08$ implies that households on average spend about 4% of their income on childcare. For Spain, the OECD estimates that net childcare costs as a fraction of household income was 4.7% in 2015, which is very close to our estimates.[26] The calibrated value of $\kappa = 0.135$ implies that fixed time cost of a split-shift job is about 2.2 hours more per day (13.5% of 16 non-sleeping hours). This is close to 1.3 hours fixed-cost for split-shift contacts that we calculate from the Spanish time use data in Section 2. Finally, it is important to comment on $\frac{exp(j-\gamma_3)}{1+exp(j-\gamma_3)}$ term in the utility function. Given our estimated value for γ_3, this term is equal to 0.95 for a 25-years old woman, i.e. for a 25 years old female the weight on the utility from children is $0.95\times\gamma_1$. The weight increases quickly to 1 for a 28 years old woman. Hence, this term simply helps us to push fertility away from very young (25 to 28) ages.

5.1 Non-Targeted Moments

In order to assess the model's ability to account for observed fertility and labor market behavior in the data, in this section we present several non-targeted moments from the model and their data counterparts. Figure 10 shows the fraction of women with a temporary contract. Both in the model and in the data, most contracts start as temporary and the fraction of women with a temporary contract declines smoothly as women age, although by age 40 about 15% of women still work with a temporary contract.

[26] See https://stats.oecd.org/Index.aspx?DataSetCode=NCC. The estimates refer to a household with 2 children in which the primary earners has 100% and the secondary earner has 67% of the mean wage in the economy.

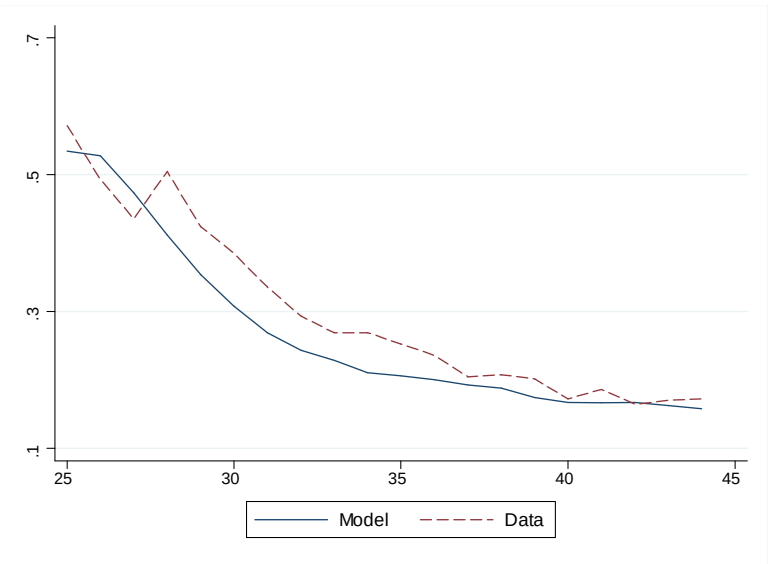

Figure 10. Labor Market Outcomes for Females (model vs. data)

Source: The EPA, 1987-2010.

Sample: Native, married women with at least a college education, born between 1966 and 1971.

Tables 13 and 14 show the performance of model along several other dimensions that are not directly targeted in the calibration. First, the model is able to replicate the fact that female employment and household income levels are positively correlated (Table 13). Furthermore, both in the model and the data, temporary contracts last about 2 years (the mean duration is 7 quarters in the data and 9 quarters in the model). Since uncertainty in labor markets generated by short durations of temporary jobs is a key factor for low fertility in the model, it is reassuring that the model is able to generate reasonable durations of temporary jobs.

Table 13: Non-Targeted Moments – Labor Markets

	Model	Data	Source
Employment/Pop., Females, 25-44, hhold inc., 1st tercile	0.52	0.58	Table A5
Employment/Pop., Females, 25-44, hhold inc., 2nd tercile	0.91	0.83	Table A5
Employment/Pop., Females, 25-44, hhold inc., 3rd tercile	0.89	0.93	Table A5
Mean firm tenure, temporary (quarters)	9	7	The MCVL

In Table 14, we present several additional moments on fertility. The model is able to generate the fact that completed (age 44) fertility is increasing in both female earnings and total households income. On the other hand, the model is not able to generate the extent of fertility delay for employed mothers. In the data an employed mother has only 0.98 children at age 35, while such women has 1.3 children in the model. The model does an excellent job, however, in capturing the effects of temporary contract on fertility. First, both in the data

and in the model, a childless female who has a temporary contract at $t-4$ (four quarters ago) has a much smaller chance of becoming a mother (3.2 versus 2 percent). Furthermore, such short run effects has a cumulative effect along the life cycle. A female who spends more than 50% of her working life with temporary contract has 1.24 children in the model, while one who spends less than 50% of her working life has 1.5 children.

Table 14: Non-Targeted Moments – Fertility

	Model	Data	Source
Number of Children at 35, Employed	1.32	0.98	Table 1
Number of Children at 40, Employed	1.39	1.50	Table 1
Number of children at 44, Employed	1.44	1.51	Table 1
Number of children at 44, female earnings, 1st tercile	1.33	1.35	Table 1
Number of children at 44, female earnings, 2nd tercile	1.43	1.49	Table 1
Number of children at 44, female earnings, 3rd tercile	1.55	1.72	Table 1
Number of children at 44, hhold inc., 1st tercile	1.41	1.55	Table A6
Number of children at 44, hhold inc., 2nd tercile	1.47	1.56	Table A6
Number of children at 44, hhold inc., 3rd tercile	1.64	1.79	Table A6
Prob of transition maternity (permanent)	3.2	3.4	Table 4
Prob of transition maternity (temporary)	2.0	2.3	Table 4
Average number of children at 44			
on temp. contracts, ages 25-44 $< 50\%$	1.50	1.53	Table 6
on temp. contracts, ages 25-44 $\geq 50\%$	1.24	1.27	Table 6

6 Understanding the Lowest Low Fertility

Why is the fertility rate so low in the benchmark economy? What role do labor market uncertainty and inflexibility play? In order to answer these questions, we consider three counterfactual experiments. In the first experiment, we eliminate jobs with split-shift schedules and make them identical to jobs with regular schedules by setting $\kappa = 0$. This saves about two hours of fixed-cost of work for women who were working with split-shift schedules in the benchmark economy. In the second experiment, we lower the separation rate for temporary contracts from 5.5% to 1.8% so that the mean duration of jobs with a temporary contract increases from 9 quarters (little over 2 years) in the benchmark economy to 12 quarters (3 years) in the counterfactual economy. In the third experiment, we combine the first two experiments and eliminate both labor market inflexibility associated with split-shift schedules and reduce labor market uncertainty associated with temporary contracts. Table 15 shows the results.

The first experiment increases the completed fertility rate of employed mothers at age 44 substantially. While employed women at age 44 have about 1.44 children in the benchmark economy, they have 1.75 children, about 0.3 children more, in a world without split-shift contracts. In the second experiment, when we increase the duration of temporary jobs from 9 to 12 quarters, the fertility of employed mothers increases from 1.44 to 1.67, an increase of about 0.2 children. The combined reform of eliminating split-shift and increasing the duration of temporary contracts increases the completed fertility rate of employed mothers to 1.87. Not surprisingly, the higher completed fertility comes with an earlier childbearing, much smaller fraction of women who are childless, and an increase in the fraction of women who have 2 or more children.

In each of these experiments, the completed fertility of mothers who are not employed also increases, but the increase is much smaller. As a result, the fertility gap between employed and non-employed mothers declines significantly. In the benchmark economy, non-employed mothers have about 0.4 more children more than employed mothers (1.82 vs. 1.44). The gap is only 0.08 (1.87 vs. 1.95) children when we eliminate both split-shift jobs and make temporary contracts last longer. In this experiment, the average TFR for college-educated women, employed or unemployed at age 44, is 1.88.

In order to put these increases in the fertility in perspective, in the last three columns of Table 15 we present three additional experiments. First, in column (iii), we completely eliminate temporary contracts and assume that separation rates are the same for temporary and permanent contracts and equal to the separation rate for permanent contracts in the benchmark economy, i.e. $\delta_0 = \delta_1 = \delta = 0.8\%$. This experiment makes jobs much more stable. While such a radical change in the duration of jobs might be unrealistic, a comparison between columns (ii) and (iii) shows that simply increasing the duration of temporary jobs from 9 to 12 quarters goes a long way in increasing the fertility and generates about 84% of the fertility increase that would occur by making all jobs last much longer quarters.

Second, in column (iv), we lower the childcare cost, d, by 25%. Among the OECD countries, Spain has one of the lowest net childcare expenditures as a fraction of total household income, which reflects the widespread use of informal childcare. The net childcare costs are also low in Scandinavian countries, which, in contrast to Spain, reflects government childcare subsidies (in kind or cash). A 25% decline in childcare costs would lower the total spending on childcare to a level comparable to Sweden (from about 5% to 4% of total household income). Lower childcare costs increase the completed fertility of employed mothers at age 44, but the effect is not large (an increase from 1.44 to 1.59).[27] A possible reason for this in our framework might be the existence of frictions, which might limit how much fertility can increase.

Finally, in column (v), we increase the promotion rates for females (π) so that the fraction of females with a temporary contract is the same as the one for males. The effect of this

[27] Bick (2016) also finds that reductions in childcare costs have a modest effect on fertility.

experiment on fertility is not significant either; the completed fertility for employed women increases from 1.44 to 1.54, an increase of about 0.1 children. The economy in this experiment (v) has, by construction, as many women in permanent contracts as men (about 14%). The temporary jobs are, however, still risky since they have a higher separation rate (remember that $\delta_0 = 0.055$ while $\delta_1 = 0.008$ in the benchmark economy). As a result, many young women still choose to wait to have a child after they settle on a permanent job.

What does it take for working women to have a larger number of children? The results in Table 15 show that the answer is to make them enter the labor force. In all the experiments in Table 15, columns (i), (ii) and (i)+(ii), higher fertility goes together with higher female labor force participation and employment. The combined experiment of higher flexibility and lower uncertainty, column (i)+(ii), increases female labor force participation from 85% to 95%. Indeed, due to the higher labor force participation of women, the measured unemployment rate barely changes between these experiments. This experiment also eliminates the employment gap between mothers and mothers with babies, and therefore reduces the gender employment gap. As women enter the labor force they also stay away from split-shift contracts. In the second experiment, the fraction of mothers with split-shift schedules declines from 0.3 to 0.15.

Finally, experiments generate negligible effects on the gender wage gap. Indeed, two forces in the model work in opposite directions. On the one hand, due to learning by doing, higher labor market attachment has a positive impact on female wages. On the other hand, in the presence of positive self-selection of women into the labor market, an increase in female employment depresses average female workers' ability. Olivetti and Petrongolo (2008) find that positive self-selection is essential to understand gender employment gaps and gender wage gaps across countries.

Table 15: The Effect of Higher Flexibility and Lower Uncertainty

	BM	(i)	(ii)	(i)+(ii)	(iii)	(iv)	(v)
Children at 35 (employed)	1.32	1.68	1.62	1.83	1.73	1.48	1.47
Children at 40 (employed)	1.39	1.73	1.65	1.87	1.80	1.55	1.51
Children at 44 (employed)	1.44	1.75	1.67	1.87	1.81	1.59	1.54
Children at 44 (non employed)	1.82	1.85	1.90	1.95	1.92	1.86	1.86
Children at age 44	1.52	1.76	1.71	1.88	1.83	1.64	1.60
Fraction childless	0.15	0.05	0.08	0.03	0.04	0.06	0.12
Fraction with $\geq$2 kids	0.59	0.79	0.75	0.90	0.85	0.64	0.66
Unemployed/Population, 25-44	0.08	0.09	0.08	0.06	0.09	0.09	0.08
Employed/Population, 25-44	0.77	0.82	0.82	0.89	0.83	0.77	0.81
Out of Labor Force/Population, 25-44	0.15	0.09	0.10	0.05	0.08	0.14	0.11
Unemployment rate, 25-44	0.09	0.10	0.09	0.06	0.10	0.10	0.09
Emp./Population, 25-44, mothers	0.75	0.84	0.83	0.90	0.85	0.77	0.81
Emp./Population, 25-44, mothers 0–2	0.69	0.83	0.83	0.89	0.87	0.77	0.79
Split-shift sched., 25-44, Non-Mothers	0.48	-	0.36	-	0.29	0.47	0.53
Split-shift sched., 25-44, Mothers	0.30	-	0.12	-	0.03	0.32	0.14
Temporary workers, 25–44	0.26	0.26	0.28	0.26	-	0.26	0.14
Gender Wage Gap	0.95	0.94	0.94	0.93	0.95	0.95	0.95
Gender Employment Gap	0.85	0.91	0.91	0.99	0.92	0.86	0.90
π	0.05	0.05	0.05	0.05	0.05	0.05	0.12
κ (time cost of split contract)	0.135	0	0.135	0	0.135	0.135	0.135
δ_0 (job destruction, temporary)	0.055	0.055	0.018	0.018	0.008	0.055	0.055
δ_1 (job destruction, permanent)	0.008	0.008	0.008	0.008	0.008	0.008	0.008
d (childcare cots)	0.08	0.08	0.08	0.08	0.08	0.06	0.08

Note: (BM) Benchmark, (i) No split contract, (ii) Higher duration for temporary contract, (iii) No duality, (iv) Lower childcare costs, (v) Higher promotion rate.

6.1 The Role of Temporary Contracts

Temporary contracts in the benchmark economy have a much higher separation rate than the permanent ones. This labor market uncertainty makes women stay out of the labor force, and even when they are in the labor force, they choose not to have children. In this section, we try to understand the mechanisms driving the increase in the TFR after the elimination of labor market duality.

We consider a set of counterfactuals that can separate the role played by the increase in participation that comes with the elimination of duality from the pure effect of eliminating duality. In Experiment (iii), the labor market is more attractive because the overall destruction rate in the economy is smaller than in the benchmark. Therefore, searching for a job has a higher return for women. In Experiment (iii-find) of Table 16, we replicate Experiment (iii) from Table 15 but lower the job-finding rate so that the fraction of women who stay out of the labor force is the same as in the benchmark economy. In such an economy, the increase in fertility is much more muted (the TFR of working mother increase from 1.44 to 1.50). Long unemployment duration discourages women from entering the labor force and makes fertility again a risky decision.

Next, we eliminate the dual labor market structure, i.e. set $\delta_0 = \delta_1$, but choose the common job destruction rate so that the new economy has again the same fraction of women who are out of the labor force (about 15%). Again, the effect on fertility is much lower. These experiments show that duality per se does not affect the fertility decision of women. What limits women's entry to the labor force and lowers fertility is the uncertainty that the duality generates. According to our analysis, even in a single contract economy, a low job-finding rate or a high job-destruction rate that keeps the participation at its benchmark economy levels can result in low fertility.[28]

Finally, another aspect that we explore in this section is the interaction between the degree of uncertainty in the economy and the prevalence of split-shift jobs. As shown in Experiment (iii) in Table 15, when the overall destruction rate is smaller (and therefore jobs are more stable), females stay away from jobs with split-shift schedules. This endogenous decision may work as an amplification effect of the elimination of duality on the TFR. The reason is that split-shift jobs entail a higher cost of having children. To understand the importance of this channel, we consider an economy in which temporary contracts have a much lower separation rate as in Experiment (iii), but a higher fraction of jobs come in split-shift schedules so that the fraction of mothers working with split-shift schedules is the same as it is in the benchmark economy (about 30%). The last column of Table 16 illustrates such an economy. The fertility rate of working mothers increases from 1.44 to 1.47. The increase is again much smaller than the decline in column (iii). Hence, the ability of women to choose to work with regular schedule contracts is a critical factor behind the positive effect

[28] Our analysis abstracts from firms. Yet, one can imagine that firms can react to changes in labor market regulation. In particular, if the government tries to increase the duration of temporary contracts or establish a single one, firms can react, and the job finding and/or destruction rates in the economy may be affected. Hence, a possible way to read the results in Table 16 is such general equilibrium reactions can influence how the elimination of duality affects fertility.

of eliminating the duality of labor markets on fertility.

Table 16: Female Labor Force Participation and the Fertility

	BM	(iii)	(iii-lower find.)	(iii-alter.)	(iii-higher split)
Children at 35 (employed)	1.32	1.73	1.42	1.27	1.40
Children at 40 (employed)	1.39	1.80	1.47	1.37	1.45
Children at 44 (employed)	1.44	1.81	1.50	1.48	1.47
Children at 44 (non employed)	1.82	1.92	1.85	1.79	1.88
Children at age 44	1.52	1.83	1.57	1.54	1.54
Fraction childless	0.15	0.04	0.15	0.15	0.15
Fraction with $\geq$2 kids	0.59	0.85	0.65	0.62	0.62
Unemp./Population, 25-44	0.08	0.09	0.08	0.08	0.07
Empl./Population, 25-44	0.85	0.92	0.86	0.86	0.89
Out of Labor F./Population, 25-44	0.15	0.08	0.14	0.14	0.11
Unemployment rate, 25-44	0.09	0.10	0.09	0.09	0.08
Split-shift sched., 25-44, Non-Mothers	0.48	0.26	0.52	0.48	0.61
Split-shift sched., 25-44, Mothers	0.30	0.03	0.29	0.27	0.30
Temporary workers, 25–44	0.26	-	-	-	-
ϕ	0.225	0.225	0.125	0.225	0.225
δ_0	0.055	0.008	0.008	0.019	0.008
δ_1	0.008	0.008	0.008	0.019	0.008
ψ	0.40	0.40	0.40	0.40	0.55

Note: (iii) No duality, (iii-lower finding) iii with a lower job finding rate, (iii-alternative) no duality but higher job destruction rate, (iii-split) iii with a higher share of split-shift jobs.

7 Conclusions

In this paper, we study how labor market frictions affect fertility decisions. In many European countries, there is a divide between temporary jobs that have low firing costs and permanent ones that have high firing costs. Young workers start their careers with temporary jobs, and only after moving between different temporary jobs they land in a permanent one. For women, this implies a race between the biological clock and job security. If they wait, they can build their human capital and have a stable job. If they don't, they risk having children with short-lasting jobs that often come with unemployment spells between them. Many women choose to wait, which increases the age at first marriage and decreases completed fertility. It is even more difficult for women who work in inflexible jobs that require long and particular hours.

We build and estimate a model of fertility and labor market choices of women to under-

stand these trade-offs. We then ask whether women would choose to have more children in a world with lower uncertainty and inflexibility. We focus on college-educated women in Spain, a country with a very low fertility rate, especially among college-educated women. Spain has the highest fraction of workers with temporary contracts in Europe. It also provides us with a concrete example of inflexible working arrangements for women: split-shift schedules that involve long lunch breaks and very late ending times.

Our results show that labor market reforms that reduce labor market uncertainty and inflexibility have a significant positive effect on fertility. These reforms enable women to have their children early, reduce the fraction of women who are childless, and increase substantially those who have two or more children. They also eliminate the employment gender gap. Indeed, higher fertility in the counterfactual worlds with lower uncertainty and higher flexibility goes together with an increase in labor force participation and employment of mothers.

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Appendix A: Data

Spanish Social Security Records Our main data source is the 2005-2010 Continuous Sample of Working Lives (Muestra Continua de Vidas Laborales con Datos Fiscales, MCVL). The MCVL is a random sample of 4% of the population of the individuals registered to the Spanish Social Security during the reference year.[29] Individuals without a relationship with the social security system at any time during the reference year are not included in that particular MCVL edition. Starting from the reference year and going back, the MCVL records all changes about the labor market history of individuals up to the date of first employment (or up to 1980 for older cohorts). In a given year, a working age person, can have a social security record if he is employed or is receiving unemployment benefits.

The unit of observation in the MCVL is an individual labor market spell, which can be employment with a particular contract (a job spell) or unemployment (an unemployment spell).[30] Each spell is characterized by a start date, and date and a firm identifier. For each job spell of an employee, the MCVL provides information on part-time or full-time status, sector of employment (public or private), industry at the NACE three-digit level, occupation, type of contract (temporary or permanent), and working hours expressed as a percentage of a full-time equivalent job.[31] The MCVL also contains monthly social security contributions at individual-establishment level and the days worked in a particular month. Although the social security contributions are both top and bottom coded, this information allows us to calculate censored earnings for each job that an individual holds in a month.[32]

The MCVL also provides information on important individual characteristics contained in social security records, such as age and gender but lacks information on other key demographic characteristics such as education or marital status. However, it can be matched with the Continuous Municipal Registry (Padrón Continuo, hereinafter Padrón), which contains information on the country of birth, nationality, and educational attainment and with the Spanish Municipal Registry of Inhabitants (Padrón Municipal de Habitantes), which contains information on the household composition (date of birth and the sex of each individual living in the household at the time of interview). These registries allow us to construct vari-

[29] The MCVL does not cover public sector employees who belong to a different social assistance system, e.g. armed forces and judicial power.

[30] The MCVL also includes information on self-employed. Since our focus on wage and salary earners, we exclude from the sample all individuals enrolled in the self-employment regime.

[31] Part-time/full-time status can be constructed using the working hours expressed as a percentage of a full-time equivalent job. Employers assign workers into one of ten social security occupation categories to proxy the skills required by the job. Information on contractual conditions for workers were required to be provided by the employer since 1996.

[32] In addition to censored earnings, earnings information is also available from income tax records for any job that was held between 2005 and 2010. However, as described later in more detail, we restrict the sample to women born between 1966-1971. As a result, uncensored earnings are available only after women in our sample (1966-1971 born) are 35-44 years old, thus we use censored earnings in our analysis.

ables, such as marital status, the number of children and new births. We consider a woman married if there is a male household member in the household whose age difference with her is between -2 and +10 years.[33] We determine mothers based on the presence of household members aged 0-16 year old. As we determine marital and motherhood status of a woman based on her household members and their dates of birth, there is a possibility that a woman and a male/child can live in the same household but they are not spouses/parent and child. To minimize this probability, we drop from the sample women who are living in households with more than one potential husband or with another potential mother.[34]

Based on labor market spells, we construct a quarterly panel data set on labor market transitions of women in the MCVL. We start to construct the quarterly panel using the individuals that were registered to social security in 2010. For these individuals we record the complete labor market history contained in this edition going back to their date of first employment (or to 1980 for the older cohorts) and use municipality records for their personal characteristics. For individuals who are not included in 2010, but appear in previous editions, we follow the same procedure. The resulting data set contains information for each individual in each quarter on type of employment contract, sector of employment, industry, occupation, earnings, country of birth, nationality, education, marital status, number of children and new-born children.

For individuals that only have a unique spell in a quarter, i.e. they hold a single job or they are unemployment during an entire quarter, this procedure is rather straightforward. If an individual changes job within a firm in a quarter, we combine the consecutive employment spells into a single job spell for the purposes of constructing firm tenure, but otherwise treat them as separate spells with different job characteristics. There can also be individuals who hold multiple job at the same time or change jobs during the quarter. For such cases, we follow De la Roca and Puga (2017) to assign a main job. If an individual had more than one spell with the same firm in a given quarter (around 10% in each birth year cohort): we keep the one with longest duration (in days) in that quarter. If the duration in quarter is the same (only handful - less than 1% in each birth year-cohort), we keep the one with the total (not in that quarter) longest duration (in days). If the total duration is also the same (only handful - less than 0.5% in each birth year-cohort), we keep the latest one (most of them are on day contracts). At this stage, individuals may have more than one spell by quarter if they worked in more than one firm (or spent some time unemployed). For those who have more than one spell in a quarter (in multiple firms), the main job is the one that has the highest social security contributions in that quarter.[35] For individuals who hold at least one

[33] In the EPA, for around 94% of women in our sample, age gap between them and their husbands is between -2 and 10, with a median age difference of 2.

[34] Any other male household member in the household whose age difference with her is between -2 and +10 years is considered as another potential husband. Similarly, any other 1966-1971 born women living in the same household can be another potential mother.

[35] Fernandez-Kranz and Lacuesta (2009) also use MCVL data and determine the main job of an individual.

job and but also experience spell (or spells) of unemployment in a quarter, we assign a main job, independent of the duration of unemployment spell, following the same criteria.

After determining the main job for each worker in each quarter, we express the quarterly earnings for the main job in 2000 Euros using quarterly consumer price index. Then, we compute the daily earnings from the main job by dividing the quarterly real earnings by the days worked in that quarter in that job.[36] Finally, we adjust the real daily earnings from the main job by part-time work and calculate the full-time equivalent real daily earnings in euros for each quarter.[37]

We restrict the analysis to native, married women with at least a college education who were born between 1966Q1 and 1971Q4. Among native, married women who were born between 1966Q1 and 1971Q4, 18% are college educated.[38,39] When we look at male earnings, we focus on men born between 1964Q1 and 1969Q4 since the median age difference between husbands and wives is about 2 years for this sample of women in the EPA sample (see below). We consider a man married if there is a female household member in the household who is 22 years old or older and whose age difference with him is between -10 and +2 years. We implement the former restriction to ensure that we do not consider a man married if the female household member has the age difference with him is between -10 and +2 years but she is still too young to be his spouse, or married. Finally, again we drop from the sample men who are living in households with more than one potential wife or those who have another man from the same cohort living in the household.

Since the type of contract is a key variable in our analysis and since the MCVL provides reliable information on the type of contract only after 1996, we restrict our sample to job spells from 1996 to 2010. We construct labor market experience and tenure variables, however, using all available information back to 1980. We drop workers who worked less than 30 full-time equivalent days in any year. In the sample, there are temporary contracts that continue beyond the legal limit of 3 years (7% of the total temporary spells in our sample). Following Guell and Petrongolo (2007), we censor all temporary durations longer than 14 quarters at 14 quarters.

However, their main job definition is different than ours, that is, if an individual has multiple jobs in a given year, the main job is the one under a permanent contract. In the case of multiple jobs with the same type of contract, the main job is the one that the individual worked the largest number of days.

[36] The MCVL data do not contain information on hours worked to construct hourly wages.

[37] The MCVL provides information on a part-time coefficient which identifies the working hours of a part-time worker in a company in proportion to the duration of normal working hours of a full-time worker in the same company. This allows us to build a measure of full-time equivalent (FTE) earnings that is what part-time workers could be expected to earn if they worked full-time.

[38] In the MCVL, we distinguish between natives and immigrants according to the country of birth and nationality.

[39] In our sample, women are 25 to 31 years old in 1996 and 39 to 45 years old in 2010. By this way, we ensure that childless women in our sample are unlikely to be mothers after 2010.

Spanish Labor Force Survey As a rich administrative data source, the MCVL provides an excellent picture of the Spanish labor market dynamics. The MCVL does not contain, however, any information on individuals who are out of the labor force. To be able to calculate distribution of workers across different labor market states (employment, unemployment and out-of-the-labor force), we use data from the Spanish Labor Force Survey (Encuesta de Población Activa, EPA) from 1987 to 2010.[40] These surveys are run by the Instituto Nacional de Estadística (INE), the Spanish Statistical Agency, and constitute the Spanish part of Labor Force Statistics of the OECD. Each survey consists of a representative sample of about 60,000 households and provides detailed labor market information of all individuals who are older than 16 in each household. When we calculate EPA statistics, we restrict the sample to heads of households and their partners or spouses, and, following the same restriction as in the MCVL sample, focus on married native women with college education or more born between 1966 and 1971 and husbands. However, when we look at labor market outcomes for males, we consider all men (not only husbands of high educated women) as in the MCVL where we cannot implement restriction on husband's education level.

Since the second quarter of 1987, the EPA has also a rotating panel dimension (called EPA-flujos or EPA-flows) that follows individuals up to six consecutive quarters. This allows us to calculate quarterly transition rates across labor market states. We calculate the transition rates across different labor market states using 1995, 2000 and 2005 waves of EPA-flows. Since in EPA-flows the age information is available only in 5-year intervals, we have to base the analysis on the 1966-1970 cohort of married women instead of the 1966-1971 cohort that we used in the MCVL.[41] EPA-flows do not allow us to link husbands and wives. As a result, since the median age difference between husbands and wives is about 2 years for this cohort in the EPA sample, for men we restrict the sample the 1966-1971 cohort married men. Finally, since in EPA-flows we do not have information on nationality, we consider all women instead of only native women.

European Union Statistics on Income and Living Conditions (EU-SILC) Neither the MCVL nor the EPA allow us to construct a measure of total household earnings. We construct household level income variables using the European Union Statistics on Income and Living Conditions (EU-SILC) from 2004 to 2012. We restrict the sample to heads of households and their spouses, and again focus on married native women with at least a college education born between 1966 and 1971 and their husbands. To calculate earning statistics, we also restrict sample to employees with non-missing wage and hours information.

[40] Since the particular cohort we are focusing is between 25-44 only in years 1991-2010, we are effectivity using data from the EPA from 1991 to 2010.

[41] The age is reported in 5 year intervals in EPA-flows, from 16-19 to 60 – 64, and one age group for those who are older than 65. Consider 2005 EPA-flows, the 1966-1971 cohort were 34-39 years then. But the only category that overlaps with this groups is 35-39 which correspond to 1966-1970.

We also exploit the information on childcare arrangements that is available in the EU-SILC. For each child under age 12, the EU-SILC reports the number of hours of different forms of childcare, such as center-based care, baby-sitters or relatives, that a household uses. To calculate childcare statistics, we also restrict sample to those who reported positive hours of education or childcare use in any of the childcare arrangement categories for at least one 0-12 years old child.[42]

Spanish Time Use Survey (STUS) Finally, we calculate the fraction of mother and non-mother working with a split-shift contract from the Spanish Time Use Survey (STUS) for 2009-2010. We restrict the sample to wage earners and to 25-44 years old native married women with at least a college education. Mothers are identified from the household roster. If any of the household member of a respondent is identified as son/daughter, or if the respondent herself is identified by the STUS as having children under 18 who live with the respondent, we consider them as mothers. The split vs. regular work schedule is a question in the STUS, so the fraction of mothers and non-mothers who work with a split contract is simply the fraction of those who answer that their work schedule is a split one.

Appendix B: Additional Tables for Targets

Table A1a. Distribution across Labor Market States at age 25

	Out of Labor Force		Unemployed	Temp.		Perm.
Married Women (%)	21.34		22.78	27.12		28.75
	Low educated			High educated		
	Non-employed	Temp.	Perm.	Non-employed	Temp.	Perm.
Married Men (%)	12.05	24.43	63.52	4.29	26.99	68.71

Source: The EPA, 1987-2010. Sample: 23-27 years old married native women with at least a college education born between 1966 and 1971 and their husbands (only household heads and spouses).

Table A1b. Distribution across Labor Market States by Motherhood Status, ages 25-44 (%)

	Out of Labor Force	Unemp.	Temp.	Perm.
All	15.28	7.68	19.34	57.70
Non-mothers	7.74	11.37	26.36	54.52
Mothers	17.62	6.54	17.16	58.68
Mothers of 0-2 years old	21.84	6.70	16.84	54.62

Source: The EPA, 1987-2010. Sample: 25-44 years old married native women with at least a college education born between 1966 and 1971 (only household heads and spouses).

[42] The information on the number of hours in childcare in the EU-SILC is collected only from household members not over 12 years old.

Table A2. Inequality

	All
Average hourly wage of wives	12.97
Average hourly wage of husbands	13.89
Variance of wives' log(hourly wage)	0.207
Variance of husbands' log(hourly wage)	0.214
Correlation between husbands' and wives' log(hourly wage)	0.438

Source: The EU-SILC, 2004-2012. Sample: 25-44 years old married native women with at least a college education born between 1966 and 1971 and their husbands (only household heads and their spouses). Sample is restricted to employees with non-missing wage and hours information.

Table A3. Distribution of Women across Parities, Employed (%)

	Childless	One child	Two children	Three (or more)
married at age 30	78.58	17.38	3.73	0.31
married at age 35	36.65	33.15	26.53	3.67
married at age 40	20.11	23.59	45.18	11.12
married at age 44	17.54	25.40	47.38	9.68

Source: The MCVL, 2005-2010. Sample: Native, married women with at least a college education born between 1966Q1 and 1971Q4.

Table A4. Distribution of Households by the Main Mode of Childcare Arrangement (%)

	Children, 0-2
Education at pre-school	51.07
Childcare at a day-care centre	2.67
Childcare by a professional childcare provider	15.51
Childcare by grandparents/relatives/friends	30.75

Source: The EU-SILC ,2004-2012. Sample: 25-44 years old married native women with at least a college education born between 1966 and 1971 and their husbands (only household heads and their spouses).
The sample is restricted to households who have at least one 0-2years old child and reported positive hours of education or childcare use in any of the above categories for a 0-2 years old child.
Note: The number of hours in education and childcare during a usual week is collected for household members not over 12 years old (age at the date of interview).

Table A5. Employment Rate of Women by Household Gross Income Tercile

Tercile	Employment/Population	Household income (Euros)
1	0.58	23,595.6
2	0.83	44,342.32
3	0.93	76,336.9

Source: The EU-SILC, 2004-2012. Sample: 25-44 years old married native women with at least a college education born between 1966 and 1971 (only household heads and spouses).

Table A6. Number of Children at age 44 by Household Gross Income Tercile

Tercile	Number of Children	Household income (Euros)
1	1.55	23,557.02
2	1.56	46,121.04
3	1.79	78,958.73

Source: The EU-SILC, 2004-2012. Sample: 40-44 years old married native women with at least a college education born between 1966 and 1971 (only household heads and spouses).

Appendix C: Identification

In this section of the Appendix, we show how each target in Tables 10, 11 and 12 changes when we increase each parameter in Table 9 by 10%. Figures C1, C2 and C3 correspond to targets in Tables 10, 11, and 12, respectively. In each figure, a darker area for a parameter-target pair suggests that the target plays a relatively important role for the identification of that parameter.

Figure C1: Sensitivity of Moments to Paramaters (Inequality)

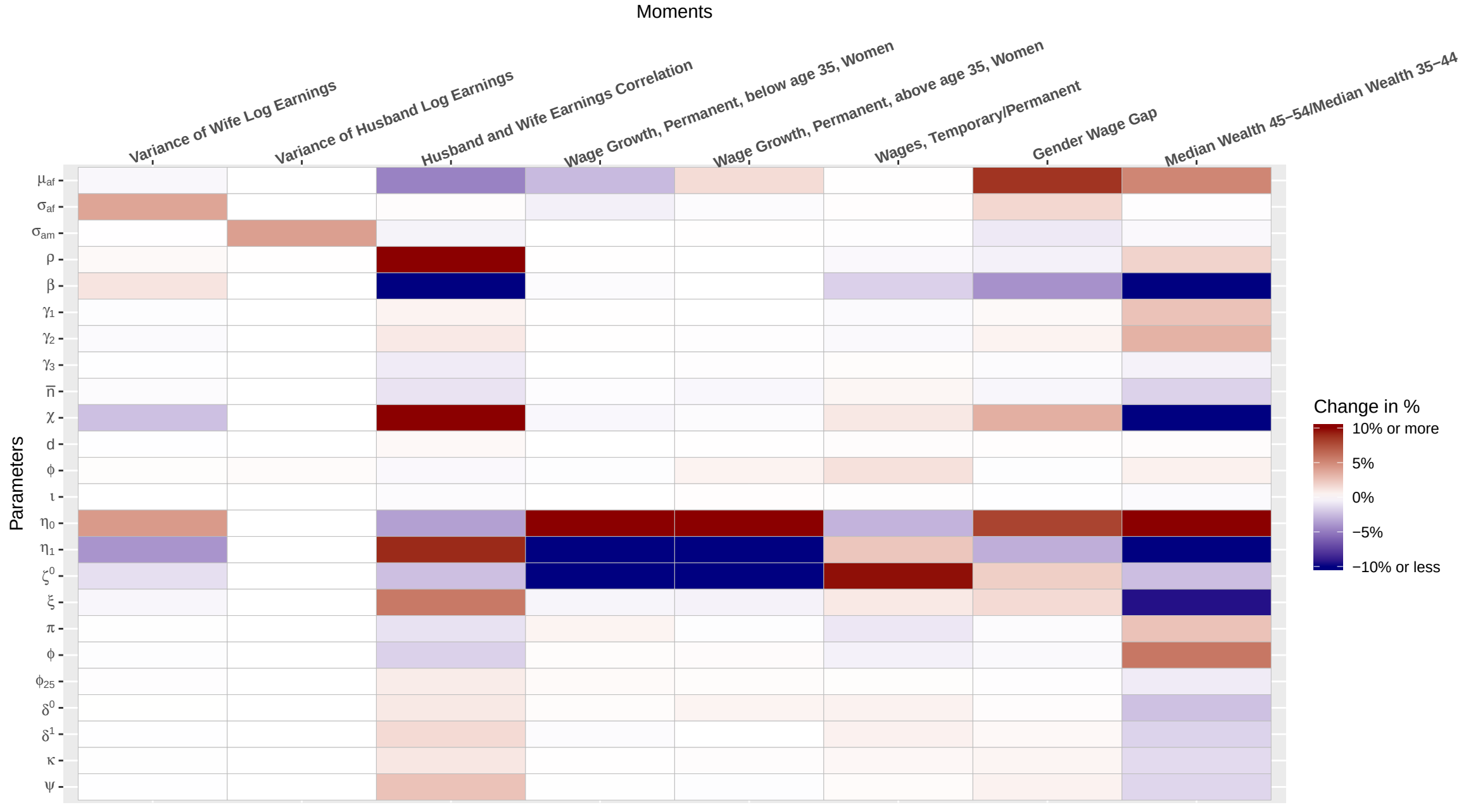

Figure C2: Sensitivity of Moments to Paramaters (Labor Market)

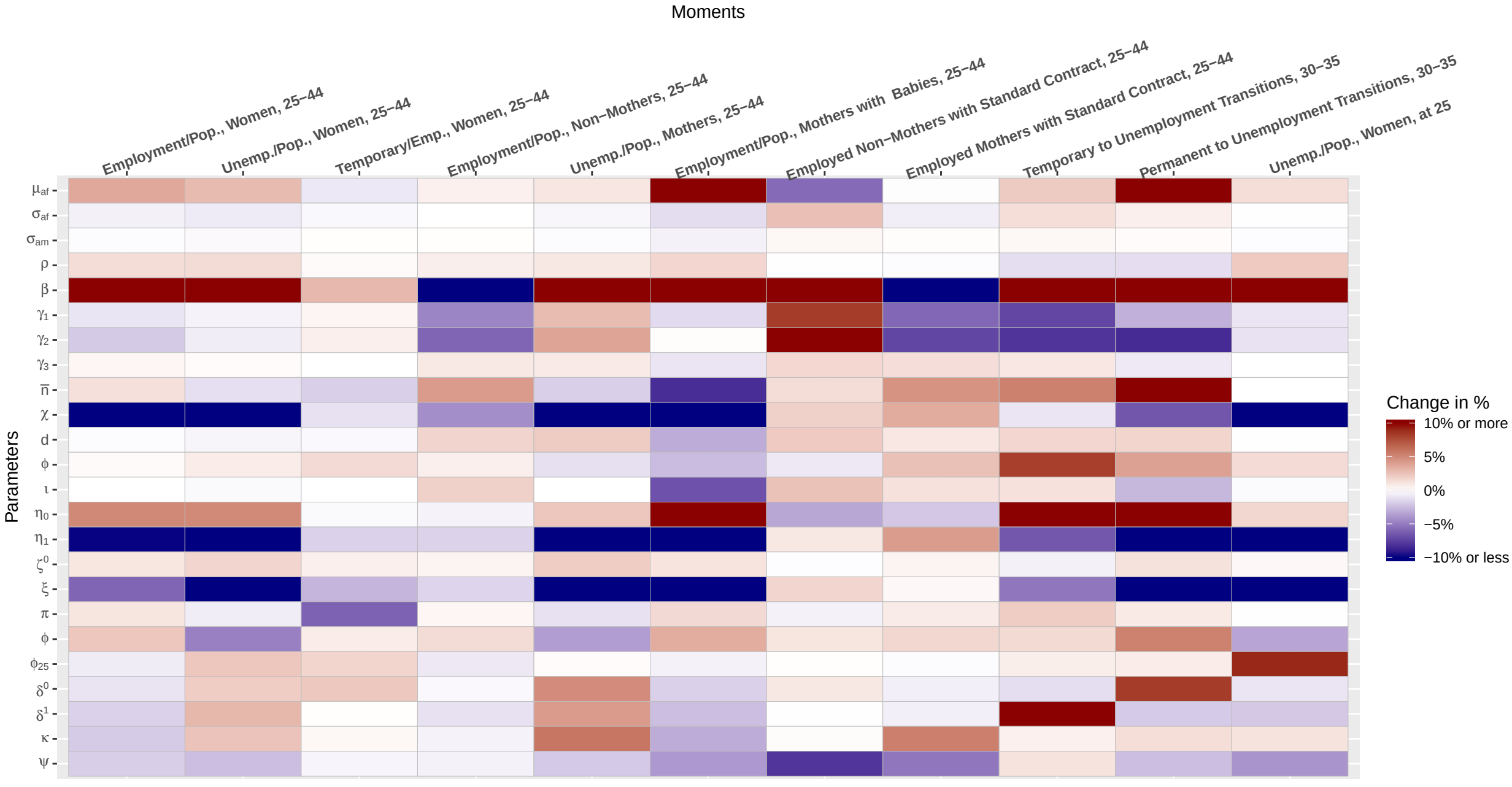

Figure C3: Sensitivity of Moments to Paramaters (Fertility)