Labor Market Institutions and Fertility

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Abstract

Women in high-income countries have fewer and fewer children. In some countries, the TFR is as low as 1.3, and factors behind such low fertility levels are not well understood. In this paper, we show that uncertainty created by dual labor markets (the coexistence of jobs with temporary and open-ended contracts) and inflexibility of work schedules are responsible for low fertility. Using rich administrative data from the Spanish Social Security records, we show temporary contracts are 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. Split-shift schedules present a concrete example of inflexible work arrangements and fixed time cost of work for women. Reforms that reduce the duality of labor market and eliminate split-shift schedules increase the completed fertility of college-educated from 1.52 to 1.88. In the model, women face a trade-off between having children early and waiting and building their careers and these reforms allow them to have more children earlier in their careers. They also increase the labor force participation of women and eliminate the employment gap between mothers and non-mothers.

Key Words: Fertility; Labor Market Institutions; Temporary Contracts; Split-Shift Schedules

JEL Classification: E24, J13, J21, J22

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1 Introduction

The total fertility rate (TFR) has been falling everywhere in the world. Today it 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, around 1.3 children, a situation that demographers call lowest-low fertility (Kohler, Billari and Ortega 2002). Low fertility is 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. Yet, the ideal number of children in these countries is about 2, much higher than the observed TFR.

Population aging, low fertility coupled with high life expectancy, have 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, Krueger and Ludwig 2007; Aksoy, Basso, Smith, and Grasl 2019, and Jones 2019). Therefore, it is essential to understand why women choose such low fertility rates.

An extensive empirical literature points to economic *uncertainty* as a potential culprit. Women's inability to start and establish stable labor market careers delays and lowers fertility. High unemployment is associated with low fertility, both across and within countries (Adsera 2011, Ahn and Mira 2001 and Currie and Schwandt 2014). Job displacement reduces fertility, in particular, for women with career concerns (Del Bono, Weber and Winter-Ebmer 2012, 2015).[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. Micro evidence from different countries 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).[3]

Another factor behind low fertility can be the difficulty of women to combine work with childbearing. Labor market *inflexibility*, measured as requirements to work long and particular hours, reduces the female labor supply and increases the gender wage gap.[4] As Goldin (2014) emphasizes, the flexibility is likely to be more important for college-educated women at the high-end of the earnings distribution. Evidence from surveys and experiments suggests that women have a stronger preference for greater work flexibility and job stability (Mas and Pallais 2017, Wiswall and Zafar 2018). Flabbi and Moro (2012), who estimate

[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). During the last two recessions in the US, fertility started to fall several quarters before economic downturns (Buckles, Hungerman, and Lugauer 2020).

[3] Fertility and the fraction of women who work with a temporary contract is also negatively correlated across countries (see Figure A1 in Appendix B).

[4] Occupations with long working hours are associated with higher gender wage and employment gaps (Cortes and Pan 2016, 2017). The gender wage gaps are also higher in occupations that require coordinated working hours (Cubas, Juhn and Silos 2019).

a search model with an explicit role for working hours flexibility, find that women with a college degree value flexibility more than women with only a high school degree. Fixed time costs associated with employment, such as commuting times, also limit work opportunities for women. Petrongolo and Ronchi (2020) find that due to greater distaste for commuting, women accept lower-paid jobs in the UK, while Black, Kolesnikova and Taylor (2014) and Farre, Jofre and Torrecillas (2020) document that commuting times lower female labor force participation in the US and Spain. Clearly, one way women can cope with inflexible labor market arrangements is to have fewer children.[5]

In this paper, we study how labor market uncertainty and inflexibility affect the fertility of college-educated women in Spain. The focus on college-educated women is motivated by extensive empirical literature that documents the higher importance of labor market uncertainty and flexibility for highly-educated women. Furthermore, Spain is an ideal case to understand the effects of labor market institutions on fertility. First, a striking feature of fertility in Spain is the very low fertility rate of college-educated women. Figure 1 shows the TFR by the educational attainment in Spain and Europe.[6] 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 in Spain (1 versus 1.5). Despite the large fertility gap by education, as we document later, among college-educated women the completed fertility is increasing with mothers' earnings (see Section 5).

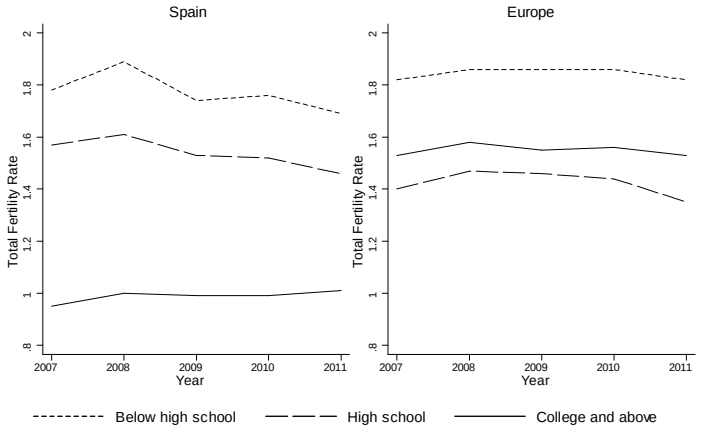

Figure 1. TFR by Education, Spain vs. Europe

Source: Lanzieri (2013, Table 6)

[5] Consistent with this argument, Figure A2 in Appendix B shows that across the OECD countries, higher flexibility (measured as women's ability to adjust their working hours) is associated with higher fertility.

[6] In Figure 1, the 1997 International Standard Classification of Education (ISCED) codes 0-2 cover education up to high school, 3-4 covers high school education, and 5-6 covers college and above (including two-year technical programs that do not lead to a college degree). The average number for Europe is based on 14 countries with available data.

Second, Spain also has one of the highest fraction of workers with temporary contracts in Europe. In 2018, about 28% of women worked with a temporary contract. But the incidence among the young is much higher since this is the usual type of contract to enter the labor market. Among women between ages 15 to 24, for example, 72% worked with a temporary contract in 2018.[7] The temporary contracts, that were introduced in 1984, can last up to 2 to 4 years.[8] 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.[9] As a result, a significant fraction of the labor force faces very uncertain labor market prospects as they move from one temporary job to the next one. In

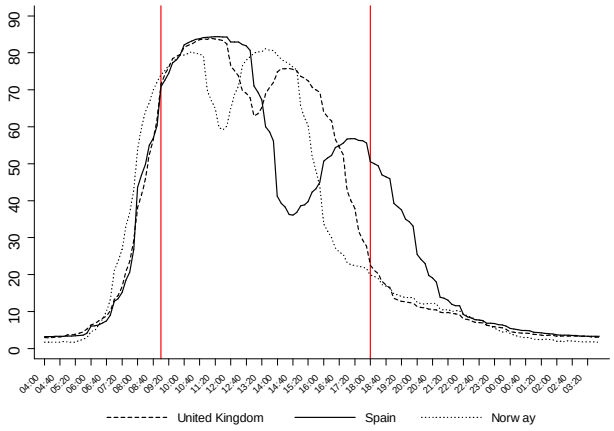

Figure 2. Fraction of People at Work

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

Finally, the organization of workday is unusual in Spain. Many jobs have long lunch breaks that create split-shift work schedules. Figure 2 shows the fraction of employees who are at work during different times of the day in Norway, Spain, and the UK.[10] 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 and fixed time cost of work for women.[11] Available evidence suggests that women are constrained in their work

[7] The OECD Labor Force Statistics, https://stats.oecd.org/Index.aspx?DataSetCode=TEMP_I.

[8] 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 of 8 days' wages per year of service were introduced in 2001 and have gradually increased up to 12 days.

[9] Felgueroso et al (2018) report that 25% of all existing contracts in 2015 lasted less than a week.

[10] 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.

[11] In the 2009-2010 Spanish Time Use Survey, about 38% of employees between ages 25 to 44 work with a split-shift schedule, and these arrangements are prevalent across different occupations, industries, and

schedules, and there are no compensating wage differentials for having a split-shift schedule (Amuedo-Dorantes and De la Rica 2009).

We first use administrative data from the Spanish Social Security Records to study the relationship between temporary contracts and fertility.[12] We show that 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 more than 50% 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.

Next, we 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. 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 split-shift schedule. The fraction of women who work with a split-shift schedule is, however, endogenous since women can choose not to accept such contracts. Having a child is costly, both in terms of time and money. Each period, women are employed, unemployed, or out of the labor force. 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.

The model is then used 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.[13] 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.

regions. In Table A1 in the Appendix B, we document the fraction of workers with a split-shift schedule across occupations, industries, and regions. For different occupations, for example, the fraction of workers with a split-shift schedule is around or above 30%.

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

[13] 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." See: https://bit.ly/3ctCeGL.

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). Furthermore, the higher fertility comes together with higher, not lower, labor force participation of women.

Our results show that incentives to postpone fertility in an economy with temporary and permanent contracts can be stronger than those in an economy with a single contract with low firing costs, e.g., the US. The existence of a more stable option makes women with temporary contracts wait to have children. We also show that what makes women delay their fertility decisions is not the higher income uncertainty associated with temporary contracts. What is critical is that temporary contracts force women to go back to unemployment frequently. On the one hand, this limits women's ability to build human capital during the initial stages of their careers. On the other hand, frequent restarts of the job search process increase the probability of ending with split-shift schedule jobs, which are hard to combine with having young children.

Related Literature Our paper contributes to the structural labor and macro literatures that study the labor force participation and fertility decisions of women.[14] Within this literature, Sommer (2016) emphasizes the importance of income uncertainty (wage shocks). Our focus is on the uncertainty that emerges from labor market transitions. The effect of labor market transitions on fertility was studied by Da Rocha and Fuster (2006), with a focus on US-Spain differences in job finding rates. We disentangle the role of duality from the role of uncertainty, and explore the interactions between dual labor markets and flexibility. Another related paper is by Lopes (2019), who studies the effects of temporary contracts on fertility in Portugal. While she models temporary contracts in greater detail, her analysis abstracts from labor force participation decisions. Our analysis shows that the entry of women to the labor force is critical to understand how labor market institutions affect fertility.

Our second contribution is to introduce labor market flexibility into a life-cycle model of fertility. Del Boca and Sauer (2008) is one of the first papers highlighting the importance of aggregate measures of labor market flexibility and childcare availability for differences in labor force participation and fertility across Italy, Spain, and France. Erosa, Fuster, Kambourov and Rogerson (2017) and Cubas et al. (2019) show that a substantial fraction of the observed gender wage gap is due to women's occupational choice and labor supply decision. 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

[14] Dynamic models of fertility and labor supply decisions go back to Heckman and Willis (1976) and Heckman and MaCurdy (1980). For recent papers that model joint labor supply and fertility decisions, see, among others, Francesconi (2002), Caucutt, Guner and Knowles (2002), Erosa, Fuster and Restuccia (2010), and Eckstein, Kean and Lifshitz (2019).

that carry a penalty for career breaks. Our focus is on fertility as a mechanism to cope with inflexibility.[15]

2 Facts

In this section, we document how temporary contracts and split-shift schedules are related to fertility decisions of college-educated married women (those with at least a college degree) in Spain. Our primary 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 and individual characteristics contained in social security records, such as age and gender. The MCVL is matched with municipal records, which provide demographic characteristics of household members, such as nationality, education, marital status, the number of children, and new births. The sample includes individuals who are legally married or cohabitating, which we refer as married through the paper.[16] Based on labor market spells, we construct a quarterly panel data set on labor market status and transitions of women in the MCVL. We restrict the analysis to native married women 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

[15] Other potential drivers of the low fertility in developed countries have also been considered, such as childcare costs (Bick 2016), allocation of household work between husband and wife ((Feyrer, Sacerdote, and Stern 2008; de Laat and Sevilla-Sanz 2011; Doepke and Kindermann 2019), and parental incentives to invest in children's education (Kim, Tertilt and Yum 2019).

[16] In 2010, 35.5% of births in Spain were outside marriage. But only for 1.9% of births, the age of father missing in the birth records, which can be an indication of single-motherhood. This fraction was slightly higher, 2.5%, in 2018. See: The National Statistical Institute, https://bit.ly/2SXzutq.

match wives and husband and construct joint labor market transitions or total household earnings. The EPA does not contain any information on earnings, either. 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.

Three facts emerge from our analysis:

1. Transitions from Temporary to Permanent Contracts are Lower for Females: In the EPA sample, where we can calculate transitions among employment, unemployment and out-of-labor force as well as well moves from temporary to permanent contracts, each quarter about 6.2% of college-educated women are promoted from a temporary to a permanent contract. The transition rate is 8.56%, or 2.3 percentage points higher, for married men with a college education. The difference can be due to selection, if men and women with temporary contracts have different characteristics, such as the sector of employment, occupation, and tenure. To check whether the negative association between gender and promotions is robust to such controls, we use the MCVL sample. We focus on childless individuals working with a temporary contract in a given quarter and model the promotions as

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

where L is the standard logistic function and the outcome variable y_{ijt+1} is 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 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 an interaction term ($F_i P_{it+1}$). 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.[17] In addition to individual and work-related

[17] We do not restrict the sample to workers in private sector. The fraction of workers with a temporary contract in public sector is quite similar to the one in private. In 2010, about 24% of workers in public sector has a temporary contract.

characteristics, the model also controls for year fixed-effects φ_t.

Table 1. 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

Notes: (i) Individual level clustered robust standard errors in parentheses. (ii) 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.

Table 1 shows the odds ratio estimates. In columns 1 and 2, we present the results when we only control for gender and 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. 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 6), where we control for all covariates along with year fixed-effects, females are 22% less likely to be promoted than men.[18]

2. Temporary Contracts are Associated with Lower Fertility: Next we look at the relationship between temporary contracts and fertility. In the MCVL sample, a childless married woman with a permanent contract today has a 3.4% probability of giving birth in a year. The probability is much lower for a woman with a temporary contract, only 2.3%. In Table 2, we check whether this unconditional gap is robust to controls by reporting the odds ratio estimates from the following model

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

[18] A potential concern in Table 1 is that women who gave births might be on maternity leave and might not get a promotion in just one quarter. In Table A2 in Appendix B, we reproduce Table 1 with promotions between t and $t+4$ (one year after) instead of t and $t+1$, and show that the results are very similar.

where outcome variable y_{it} now takes the value of 1 if individual i 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 in firm j ($e_{ijt-4} = 1$) in the preceding year.[19] The coefficient of interest, β, is on the binary indicator of working with a temporary contract in the preceding year T_{ijt-4}. The vectors $\mathbf{x}_{it}$ and $\mathbf{z}_{ijt-4}$ again contain personal characteristics (at quarter t), work-related characteristics (in the preceding year), and φ_t is the year fixed-effect.

Table 2. 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

Notes: (i) Individual level clustered robust standard errors in parentheses. (ii) 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.

Column 1 presents the results where we only control for the temporary contract indicator. In the next three columns, we gradually add personal and work-related characteristics. In the final column, where we control for all covariates together with year fixed-effects, childless women who are employed with a temporary contract are 28% less likely to have a (first) child than childless women who are employed with a permanent contract.[20]

Table 2 shows that women with temporary contracts are less likely to have children at a point in time. These women might still have, however, the same completed fertility as those with a permanent contract, but have their children later. In Table 3, we show that this is not the case. We split women between ages 25 and 44 into two groups: those who spent less than 50% of their working life with a temporary contract and those who spent 50% or more. We then compare the number of children these women have at different ages. A woman who worked in a temporary contract for more than 50% 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

[19] 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.

[20] Lower promotion rates of women might reflect, among other factors, statistical discrimination by employers in the presence of more frequent career interruptions. Fernandez-Kranz, Rodriguez-Planas, and Lang (2013) evaluate a 1999 Spanish reform that granted employment protection to workers with children younger than 6 who ask for a shorter workweek due to family responsibilities. Since the duration of a contract limits the protection by this law, the policy mainly affects women with permanent contracts. They show that the reform had a significant adverse effect on women's promotion probabilities.

employed in temporary contracts. The difference between these two groups opens up early; at age 35, there is a difference of about 0.14 children, and the gap does close as they age.

Table 3. Number of Children by Time Spent on Temporary Contracts, aged 25-44

	<50%	≥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

Notes: We restrict the sample to women who were employed at least 50% of the time between 1996Q1 and 2010Q4. See the text for further sample restrictions.

3. 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%. 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.[21] For women with split-shift contacts, the longer interval involves breaks, which make childcare arrangements more difficult. 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 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

[21] 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.

for having a second job and whether the respondent states to have flexible working hours.

Table 4. 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

Notes: (i) 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.

The Column 1 in Table 4 shows the results when we only include a gender indicator, while in column 2, we only control for an indicator for the 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, as well as their interaction. The results show that children affect men and women differently. While we do not observe a significant difference between childless men and women in the probability of working with a split-shift job, there is 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 to men and women without children. As we move across columns from left to the right, we gradually add personal characteristics, household income, and work-related characteristics, and odds ratio remains significant and similar in magnitude.

3 Model

To study the effects of labor market institutions 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). Young adults do not imply any cost. 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 cannot 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[22]

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

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

$$u(c, n, \ell, j) = \log\left(\frac{c}{\Omega(n_1 + n_2)}\right) + \gamma_1 \frac{exp(j - \gamma_3)}{1 + exp(j - \gamma_3)}(\overline{n} + n)^{\gamma_2} + \chi \log(\ell), \tag{7}$$

where c is consumption, $\Omega(.)$ 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.[23] 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 participation 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. As a result, total working hours for a split-shift contract is $l + \kappa$, while the worker only receives a wage for l

[22] To reduce the number of states and save computational time, when we solve the model, we assume that when a baby arrives in 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. In the model, babies (independent of their number) imply a time cost for mothers and babies, and children (again independent of their number) imply a monetary cost. Hence, this assumption does not affect the cost of fertility.

[23] We abstract from part-time work. While introducing part-time work will be an easy extension, only 22.2% of employed women between ages 25 and 54 worked part time in Spain in 2015. This is lower than several other European counties, e.g., Germany (36.7%) and Italy (32.6%). Source: https://stats.oecd.org/Index.aspx?DataSetCode=FTPTC_I.

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.[24]

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.[25] 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.

[24] Note that gender differences in the mean abilities of men (a_m) and women (a_f), are isomorphic to a gender penalty, $\zeta_f < 1$, in females wages, $w_f(a, h, P) = \zeta_f \zeta_P a h$.

[25] We do not model maternity leave. In Spain, mothers have 16 weeks of maternity leave (see: https://ec.europa.eu/social/main.jsp?catId=1129&langId=en&intPageId=4789). This is little more than a quarter, the model period. We could allow women to keep their current jobs and income without any extra childcare payments for one model period. This would create another state variable, whether women is on leave or not, and the effects are likely to be small.

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, babies (0 to 2 years old children) also imply a fixed time cost for their mother, denoted by ι.[26]

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

$$\ell=1-l-\iota\mathcal{J}(n_1)-\kappa S,$$

[26] While fathers' income help the household to cope with the monetary cost of children, fathers do not share the time cost of children in the model. Childcare time by fathers is very small in Spain (de Laat and Sevilla-Sanz 2011).

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.

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

$$\begin{aligned} &EW_{j+1}^o(\boldsymbol{s}, k', \mathbf{n}', P', S, h', \lambda_m' | P, \lambda_m, \mathbf{n}, b) = \\ &\sum_{\lambda_m'} \sum_{P'} \sum_{\mathbf{n}'} \max\{V_{j+1}^w(\boldsymbol{s}, k', \mathbf{n}', P', S, h', \lambda_m'), V_{j+1}^u(\boldsymbol{s}, k', \mathbf{n}', \lambda_m'), V_{j+1}^{np}(\boldsymbol{s}, k', \mathbf{n}', \lambda_m')\} \\ &\pi_{\lambda_m, \lambda_m'}^m \pi_{P,P'}^f \Gamma(\mathbf{n}; b, j), \end{aligned}$$

where $\pi_{\lambda_m, \lambda_m'}^m$ is the exogenous transition probabilities on husband's labor market status, $\pi_{P,P'}^f$ 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_{j+1}^{no} 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

$$\begin{aligned} &EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', \lambda_m' | \lambda_m, \mathbf{n}, b) = \\ &\sum_{\lambda_m'} \sum_{\mathbf{n}'} \max\{V_{j+1}^u(\boldsymbol{s}, k', \mathbf{n}', \lambda_m'), V_{j+1}^{np}(\boldsymbol{s}, k', \mathbf{n}', \lambda_m')\} \pi_{\lambda_m, \lambda_m'}^m \Gamma(\mathbf{n}; b, j). \end{aligned}$$

In order to save on computational time, we set $V_{J+1}^w(\boldsymbol{s}, k, \mathbf{n}, P, S, h, \lambda_m)$, 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.[27]

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

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

$$\begin{aligned} V_t^u(\mathbf{s}, k, \mathbf{n}, h, \lambda_m) &= \max_{k',b} u(c, n, 1-\xi-\iota\mathcal{J}(n_1), j) + \beta\phi EW_{j+1}^o(\boldsymbol{s}, k', \mathbf{n}', h'=h, \lambda_m'|\lambda_m, \mathbf{n}, b) \\ &\quad +\beta(1-\phi)EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', h'=h, \lambda_m|\lambda_m, \mathbf{n}, d) \end{aligned}$$

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

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

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

$$\begin{aligned} & EW_{j+1}^o(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m'|\lambda_m, \mathbf{n}, b) \\ = & \sum_{\lambda_m'}\sum_{S'}\sum_{\mathbf{n}'} \max\{V_{j+1}^w(\boldsymbol{s}, k', \mathbf{n}', 0, S', h', \lambda_m), V_{j+1}^u(\boldsymbol{s}, k', \mathbf{n}', \lambda_m'), V_{j+1}^{np}(\boldsymbol{s}, k', \mathbf{n}', \lambda_m')\} \\ & \pi_{\lambda_m, \lambda_m'}^m \Phi(S')\Gamma(\mathbf{n}'; b, j), \end{aligned}$$

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

$$\begin{aligned} & EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m|\lambda_m, \mathbf{n}, b) = \\ & \sum_{\lambda_m'}\sum_{\mathbf{n}'} \max\{V_{j+1}^u(\boldsymbol{s}, k', \mathbf{n}', \lambda_m'), V_{j+1}^{np}(\boldsymbol{s}, k', \mathbf{n}, \lambda_m')\}\pi_{\lambda_m, \lambda_m'}^m \Gamma(\mathbf{n}; b, j). \end{aligned}$$

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

$$V_t^{np}(\boldsymbol{s}, k, \mathbf{n}, h, \lambda_m) = \max_{k',b} u(c, n, 1-\iota\mathcal{J}(n_1), j) + \beta EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', h'=h, \lambda_m|\lambda_m, \mathbf{n}, b)$$

subject to

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

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

and

$$\begin{aligned} & EW_{j+1}^{no}(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m | \lambda_m, \mathbf{n}, b) \\ = & \sum_{\lambda_m'} \sum_{\mathbf{n}'} \max\{V_{j+1}^u(\boldsymbol{s}, k', \mathbf{n}', h', \lambda_m'), V_{j+1}^{np}(\boldsymbol{s}, k', \mathbf{n}, h', \lambda_m')\} \pi_{\lambda_m, \lambda_m'}^m \Gamma(\mathbf{n}; b, j). \end{aligned}$$

5 The Benchmark Economy

To calibrate the benchmark economy, we proceed in two steps. In the first step, we set several parameters to their data counterparts or choose them based on a priori information. These parameters are listed in Table 5. Based on the EPA, we assume that 49% of college-educated females are married to college-educated males.[28] In recent decades, the average long-term real interest rates in Spain were around 1.6%, while the average real deposit rates were close to zero.[29] We set $r = 0.8\%$ as an intermediate value. We also adopt the modified OECD household equivalence scale and set $\Omega(n) = 1 + 0.5 + 0.3(n_1 + n_2)$, i.e. we assume that the second adult counts 50% of the first adult while each child counts as 30% of the first adult.[30]

For θ (unemployment benefits), we calculate the average income 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.[31] 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).[32]

[28] 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.

[29] 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).

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

[31] 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 of the employed.

[32] 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.

We select the parameters of the wage process for males

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

to match the age-earnings profiles in the data – Figure 3.[33] Finally, the employment transitions for males between temporary contracts, permanent contracts and unemployment, $\pi_{\lambda_m,\lambda'_m}$ are chosen to match the labor market shares along the life-cycle (Figure 4).[34] When males enter the labor market at age 25, distribution across different labor market states are also taken directly from the data (Table A4).

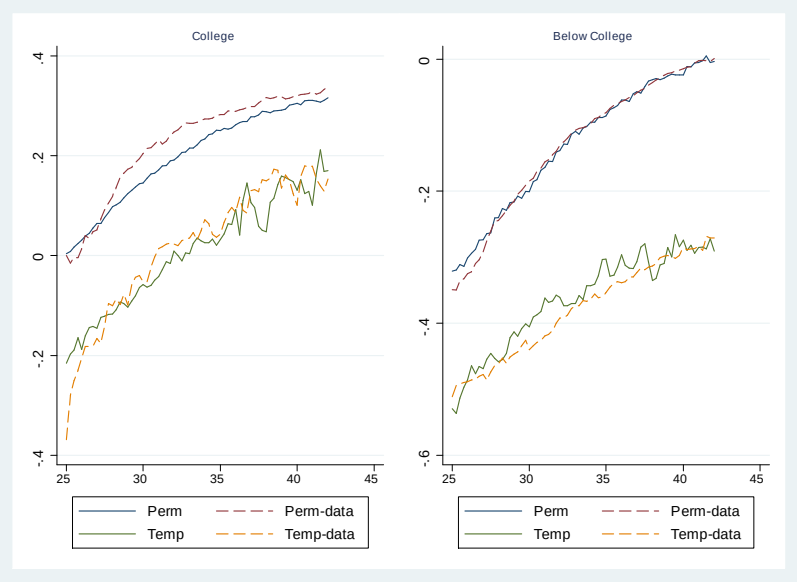

Figure 3. Age-Earnings Profiles for Males (model vs. data)

Source: The MCVL, 2005-2010.

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

[33] 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.

[34] These exogenous transitions can be calibrated without running the full model. In order to reduce the number of parameters, we assume transitions are same for three age groups, 25-29, 30-34, and 35-54, which are shown in Table A3 in Appendix B. Calibrated transitions differ slightly from the ones we observe in the data (e.g. in Table A7) since were are matching labor market shares. We could alternatively take the transitions from the data, which would result in slightly different shares.

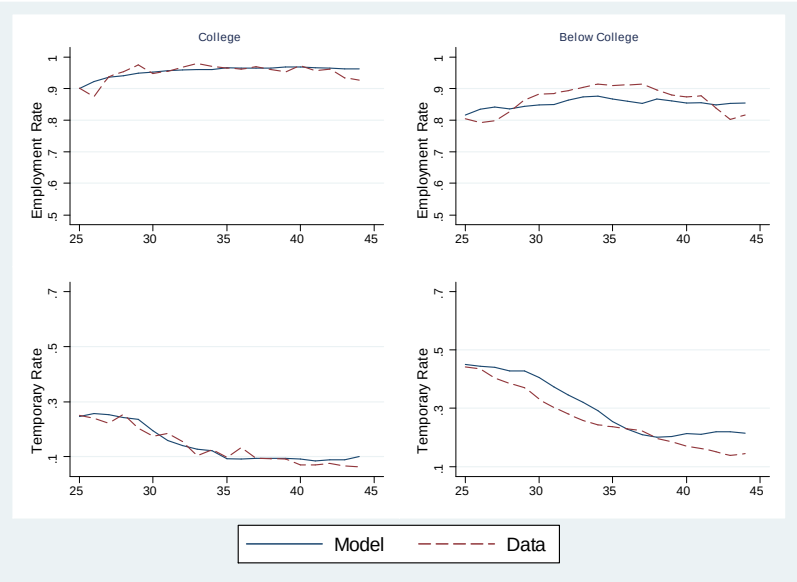

Figure 4. Labor Market Outcomes for Males (model vs. data)

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.[35] 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, 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. 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

[35] 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).

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 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.

Table 5: Parameter Values
(based on a priori Information)

Description	Parameters/Values	Comments
Frac. of Women		
Married to College Edu. 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 3
Male Employment Transitions	$\pi^m_{\lambda_m,\lambda'_m}$, for $\lambda_m, \lambda'_m \in \{0,1,u\}$	Tables A3 and A4
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 A4. 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 6 shows the calibrated parameters. We organize the moments that we use to discipline the parameters in Table 6 into three groups: inequality (Table 7), labor market outcomes (Table 8), and fertility (Table 9). 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 6 with individual targets in Tables 7-9, Figures C1-C3 show that particular targets play relatively more important roles in identifying certain parameters.

Table 6: 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 income)	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 Participation
$\pi = 0.05$	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 7 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.[36]

[36]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. To access the EFF data: bit.ly/3ij7Ouj.

Table 7: The Model vs. Data – Inequality

	Model	Data	Source
Variance of Wife Log Earnings	0.16	0.21	Table A6
Variance of Husband Log Earnings	0.20	0.21	Table A6
Husband and Wife Earnings Correlation	0.43	0.44	Table A6
Female Wage Growth 25–35 (permanent)			Figure 5
Female Wage Growth 35–52 (permanent)			Figure 5
Temporary to Permanent Wage Ratio			Figure 5
Hourly Wage Gender Gap	0.96	0.93	Table A6
Median Wealth 45-54/Median Wealth 35-44	2.22	2.30	The EFF

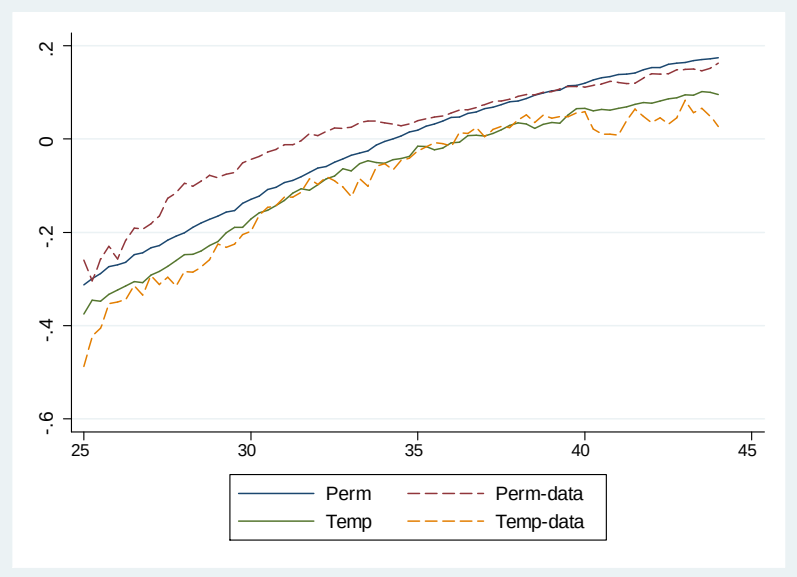

Figure 5. Age-Earnings Profiles for Females (model vs. data)

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 8). 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 the fraction of standard (non-split) contracts among mothers and non-mothers. Other targets in Table 8, participation, employment and unemployment decisions 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 participation (ξ). A high value of ξ, for example, is needed to generate a 86% of participation rate among women in the model.

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.[37]

Table 8: The Model vs. Data – Labor Market

	Model	Data	Source
Female Unemployment/Population 25	0.27	0.23	Table A4
Female Unemployment/Population, Mothers, 25–44	0.06	0.07	Table A5
Female Unemployment/Population 25–44	0.08	0.08	Table A5
Fraction of Temporary Workers, Females 25–44	0.26	0.25	Table A5
Trans prob Temporary to Unemployment 30–34	4.6	5.2	Table A7
Trans prob Permanent to Unemployment 30–34	0.5	0.5	Table A7
Female Employment/Population, 25-44, Non-mothers	0.81	0.81	Table A5
Female Employment/Population, 25-44, Mothers	0.75	0.76	Table A5
Female Employment/Population, 25-44, Mothers with Babies	0.69	0.71	Table A5
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

The last set of targets pertains to the level and the timing of fertility (Table 9), i.e., the average number of children for employed and non-employed (unemployed or out of the labor force) women at different ages. 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.

[37] 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).

Table 9: The Model vs. Data – Fertility

	Model	Data	Source
Average Number of Children at 44, Not Employed	1.82	1.82	Table A8
Average Number of Children at 30, Employed	0.16	0.26	Table A8
Fraction of Childless Women at 44, Employed	0.15	0.18	Table A9
Fraction of Women with more than 2 Children at 44, Employed	0.59	0.57	Table A9
Informal Child Care Use, Mothers with Children age 0-2, Employed	0.30	0.31	Table A10

Few parameters in Table 6 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 for a family with small children (ages 2-3) as a fraction of household income was 5.5% between 2004-2019.[38] Our estimates are smaller, which is not surprising since in the model childcare costs are independent of children's age and childcare costs decline by the age of children. 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 smaller to 1.3 hours fixed-cost for split-shift contacts that we calculate from the STUS data in Section 2. As we use this parameter to match the fraction of mothers and non-mothers with split-shift contract, it captures in the model other costs associated with such contracts. 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 6 shows the fraction of women with a temporary contract. Both in the model and in the data, most contracts start as temporary; at around age 25, 55% of women work with a temporary contract. Between ages 25 to 44, the fraction of women with a temporary contract is about 25%. The fraction declines smoothly as women age, although by age 40 about 15% of women still work with a temporary contract.

[38] See https://stats.oecd.org/Index.aspx?DataSetCode=NCC. The estimates refer to a household with 2 children, ages 2 and 3, in which the primary earners has 100% and the secondary earner has 67% of the mean wage in the economy.

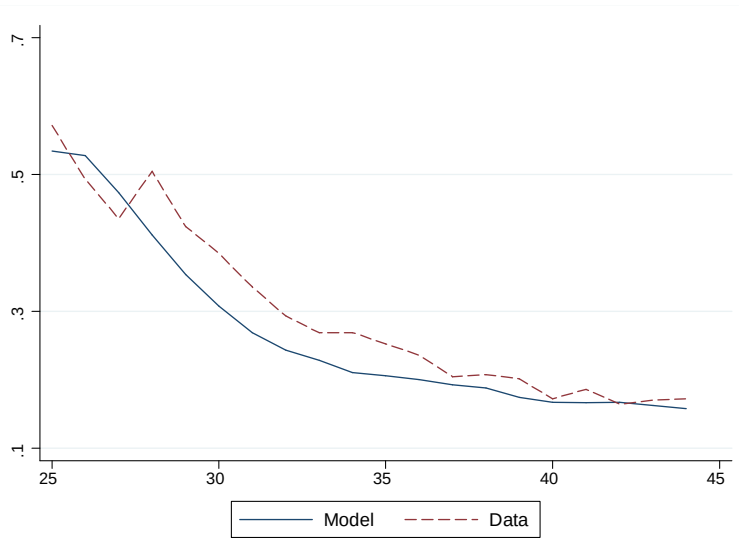

Figure 6. Share of Female Workers with a Temporary Contract (model vs. data)

Source: The EPA, 1987-2010.

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

Table 10 shows the performance of the model on several other dimensions that are not directly targeted in the calibration. First, the model can replicate the fact that female employment and household income levels are positively correlated. Second, we present several additional moments on fertility. Working mothers have 1.52 children, while non-working mothers have 1.82 children by age 44 in the data.[39] The model counterparts are 1.44 (Table 10) and 1.82 (Table 9), respectively. The model can generate the fact that completed, age 44, fertility is increasing in both female earnings and total household income. On the other hand, the model is not able to generate the extent of fertility delay for employed mothers. In the data, a working mother has only 0.98 children at age 35, while such women have 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 are having a cumulative impact along the life cycle. A female who spends more than 50% of her working life with a temporary contract has 1.24 children in the model, while one who spends less than 50% of her working life has 1.5 children. Finally, we also check how the model performs if we look at the completed fertility based on the husband's education. College-educated males have 1.76 children at age 44 in the data. The number of children is lower for non-college educated males, 1.45. The model can generate very similar levels.

[39] The numbers in Table 10 for completed fertility are similar to ones reported in the Spanish Fertility Survey. In 2018, college-educated women between ages 45 and 49 had 1.47 children (see Spanish Statistical Institute, https://bit.ly/3fHCsvP).

Table 10: Non-Targeted Moments – Fertility

	Model	Data	Source
Employment/Pop., Females, 25-44, hhold inc., 1st tercile	0.52	0.58	Table A11
Employment/Pop., Females, 25-44, hhold inc., 2nd tercile	0.91	0.83	Table A11
Employment/Pop., Females, 25-44, hhold inc., 3rd tercile	0.89	0.93	Table A11
Number of children at 35, Employed	1.32	0.98	Table A8
Number of children at 40, Employed	1.39	1.50	Table A8
Number of children at 44, Employed	1.44	1.51	Table A8
Number of children at 44, female earnings, 1st tercile	1.33	1.35	Table A8
Number of children at 44, female earnings, 2nd tercile	1.43	1.49	Table A8
Number of children at 44, female earnings, 3rd tercile	1.55	1.72	Table A8
Number of children at 44, hhold inc., 1st tercile	1.41	1.55	Table A12
Number of children at 44, hhold inc., 2nd tercile	1.47	1.56	Table A12
Number of children at 44, hhold inc., 3rd tercile	1.64	1.79	Table A12
Prob of transition maternity (permanent)	3.2	3.4	Section 2
Prob of transition maternity (temporary)	2.0	2.3	Section 2
Average number of children at 44			
on temp. contracts, ages 25-44 $< 50\%$	1.50	1.53	Table 3
on temp. contracts, ages 25-44 $\geq 50\%$	1.24	1.27	Table 3
Number of children at 44, hhold with high edu. husbands	1.69	1.76	See text
Number of children at 44, hhold with low edu. husbands	1.33	1.45	See text

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? To answer these questions, we construct 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 with split-shift schedules. In the second experiment, we lower the separation rate of temporary contracts from 5.5% to 1.8% for women 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). We keep the separation rates for men intact. 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 11 shows the results.

The first experiment increases the completed fertility of employed mothers substantially. While employed women at age 44 have about 1.44 children in the benchmark economy (column BM), they have 1.75 children, about 0.3 children more, in a world without split-shift contracts (column i). 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 (column ii). The combined reform increases the completed fertility rate of employed mothers to 1.88 (column i+ii). 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 non-employed mothers 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) when we eliminate both split-shift jobs and make temporary contracts last longer. In this experiment, the average completed fertility for college-educated women is 1.88.

In order to put these increases in the fertility in perspective, in the last three columns of Table 11 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 as large (an increase from 1.44 to 1.59).[40]

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 experiment on fertility is relatively small; 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 (column 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

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

(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 women to have a larger number of children? The results in Table 11 indicate that the answer is the entry into labor force. In all experiments in Table 11, 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, with longer duration of temporary contracts, the fraction of mothers with split-shift schedules declines from 0.3 to 0.12.

Finally, all experiments generate negligible effects on the gender wage gap. Two forces in the model work in opposite directions. On the one hand, due to human capital accumulation, 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.[41]

[41] Olivetti and Petrongolo (2008) point out that positive self-selection is essential to understand gender employment gaps and gender wage gaps across countries.

Table 11: The Effect of Higher Flexibility and Lower Uncertainty

	BM	(i)	(ii)	(i)+(ii)	(iii)	(iv)	(v)
		No Split	Longer Temp.		No Dual.	Low. Child.	Hig. Prom.
Child. at 35 (employed)	1.32	1.68	1.62	1.83	1.73	1.48	1.47
Child. at 40 (employed)	1.39	1.73	1.65	1.87	1.80	1.55	1.51
Child. at 44 (employed)	1.44	1.75	1.67	1.87	1.81	1.59	1.54
Child. at 44 (non emp.)	1.82	1.85	1.90	1.95	1.92	1.86	1.86
Child. 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
Unemp./Pop., 25-44	0.08	0.09	0.08	0.06	0.09	0.09	0.08
Emp./Pop., 25-44	0.77	0.82	0.82	0.89	0.83	0.77	0.81
O.of LF/Pop., 25-44	0.15	0.09	0.10	0.05	0.08	0.14	0.11
Unemp. rate, 25-44	0.09	0.10	0.09	0.06	0.10	0.10	0.09
Emp./P, 25-44, Moth	0.75	0.84	0.83	0.90	0.85	0.77	0.81
(with 0–2 children)	0.69	0.83	0.83	0.89	0.87	0.77	0.79
Split, 25-44, Non-Moth.	0.48	-	0.36	-	0.29	0.47	0.53
Split, 25-44, Mothers	0.30	-	0.12	-	0.03	0.32	0.14
Temporary, 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 Empl. Gap	0.85	0.91	0.91	0.99	0.92	0.86	0.90
π (promotion prob.)	0.05	0.05	0.05	0.05	0.05	0.05	0.12
κ (time cost of split)	0.135	0	0.135	0	0.135	0.135	0.135
δ_0 (job dest., temp.)	0.055	0.055	0.018	0.018	0.008	0.055	0.055
δ_1 (job dest., perm.)	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 Why do Women Wait?

In the model economy, husbands with temporary contracts also face a higher job destruction rate than those with permanent contracts. As a result, even in a world without temporary contracts for women (as in column (iii) in Table 11), households, especially young ones, still face significant income uncertainty. In the column (i) of Table 12, we eliminate the temporary contracts for husbands, while wives face the same labor market transitions as

they do in the benchmark economy. Under the benchmark calibration, this counterfactual generates a larger share of employed men than the benchmark economy. In column (ii), we lower the job-finding rate for men so that the employment rate of men in the counterfactual economy is the same as in the benchmark.[42] In contrast to Table 11, the effects on fertility are minimal. Why is this the case?

Three model features make children costly for women with a temporary contract. First, households with working mothers incur childcare costs. Childcare costs are more binding when household members are on temporary contracts since wages associated with temporary contracts are lower, and there is a higher risk of becoming unemployed. Second, women with babies incur a time cost. This cost is relatively more important for women entering the labor force as they have to bear the participation cost as well. Furthermore, even when a woman finds a job, it can have a split-shift schedule, which comes with a fixed-time cost. Again, having a temporary contract, which ends up in unemployment with a high probability, is riskier for women with children. Finally, women's human capital grows as they work, and the growth is more substantial for younger women, which again makes temporary contract costly. Among these three factors, childcare costs are also a concern when men work with a temporary contract since what matters is the household income and not the income by mothers. Therefore, results in Table 12 suggest that two model features, the time cost of babies and human capital accumulation, are critical to understand the results in Table 11.

Table 12: The Effect of Lower Uncertainty for Men

	BM	(i)	(ii)
		No Duality	No Duality, Higher Job Finding
Children at 35 (employed)	1.32	1.39	1.35
Children at 40 (employed)	1.39	1.44	1.42
Children at 44 (employed)	1.44	1.48	1.47
Children at 44 (non employed)	1.82	1.88	1.85
Children at age 44	1.52	1.57	1.55
Fraction childless	0.15	0.13	0.13
Fraction with $\geq$2 kids	0.59	0.60	0.60

6.2 The Role of Labor Market Duality

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 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 fertility after the elimination of labor market duality.

[42] For the experiment in column (i), we set P-T and U-T transitions to zero in Table A3. In column (ii), we lower U-P transitions by 1% points so that the counterfactual economy has the same fraction of men employed (93%).

We consider a set of counterfactuals that can separate the role played by the increase in participation that comes with the elimination of uncertainty from the direct effect of eliminating duality. In column (iii) in Table 11, 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 column (ii) of Table 13, we replicate column (iii) from Table 11 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 a common job destruction rate so that the new economy has again the same fraction of women who are out of the labor force (column iii). 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.[43]

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 column (iii) in Table 11, 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. To understand the importance of this channel, we again consider an economy in which temporary contracts have a much lower separation rate as in column (iii). But we increase the 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 13 (column iv) 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 one in column (i). Hence, the ability of women to choose to work with regular schedule contracts is a critical

[43] 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 or destruction rates in the economy may be affected. Hence, a possible way to read the results in Table 13 is such general equilibrium reactions can influence how the elimination of duality affects fertility.

factor behind the positive effect of eliminating the duality of labor markets on fertility.

Table 13: Female Labor Force Participation and the Fertility

	BM	(i)	(ii)	(iii)	(iv)
		No Duality	(i)+ Lower Job Find.	(i)+Higher Dest.	(i)+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 emp.)	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./Pop., 25-44	0.08	0.09	0.08	0.08	0.07
Empl./Pop., 25-44	0.85	0.92	0.86	0.86	0.89
Out of LF./Pop., 25-44	0.15	0.08	0.14	0.14	0.11
Unemp. rate, 25-44	0.09	0.10	0.09	0.09	0.08
Split, 25-44, Non-Moth.	0.48	0.26	0.52	0.48	0.61
Split, 25-44, Mothers	0.30	0.03	0.29	0.27	0.30
Temp. workers, 25–44	0.26	-	-	-	-
ϕ (prob. of a job offer)	0.225	0.225	0.125	0.225	0.225
δ_0 (job destruction, temp.)	0.055	0.008	0.008	0.019	0.008
δ_1 (job destruction, perm.)	0.008	0.008	0.008	0.019	0.008
ψ (fraction of split jobs)	0.40	0.40	0.40	0.40	0.55

Note: (i) No duality, (ii) No duality with a lower job finding rate, (iii) No duality with higher job destruction rate, (iv) No duality with a higher share of split-shift jobs.

7 Conclusions

In this paper, we study how labor market institutions 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 birth 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 finishing 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 the number of those who have two or more children. They also eliminate the employment gender gap. 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. We also show that the main reason for low fertility is not the higher income uncertainty associated with temporary contracts, but the short duration of employment spells for women. Short work spells hinder women's ability to build human capital and increase the probability of ending with split-shift schedule jobs, which are hard to combine with having young children.

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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.[44] In a given year, a working age person can have a social security record if he/she is employed or is receiving unemployment benefits. 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).

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).[45] 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 (at the NACE three-digit level), occupation (ten social security occupation categories), type of contract (temporary or permanent), and working hours expressed as a percentage of a full-time equivalent job.[46] The MCVL also contains monthly labor earnings (called the 'contribution basis') at individual-establishment level and the days worked in a particular month. Although the labor earnings are both top and bottom coded, this information allows us to calculate censored earnings for each job that an individual holds in a month.[47]

The MCVL also provides information on individual characteristics contained in social security records, such as age and gender but lacks information on other demographic characteristics such as education or marital status. However, it can be matched with the Continuous Municipal Registry (Padrón Continuo), which contains information on the country of birth, nationality, and educational attainment. The MCVL can also be matched 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). These registries allow us to construct socio-economic variables, such as marital status, number of children and new births. We count a woman as being married if there is a male household member in the household whose age difference with her is between

[44] The MCVL does not cover public sector employees who belong to a different social assistance system.

[45] The MCVL also includes information on self-employed. Since our focus on wage and salary earners, they are excluded from the sample.

[46] 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.

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

-2 and +10 years.[48] We determine mothers based on the presence of household members aged 0-16 year old. Since 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, a male, and a child who live in the same household are not related. 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.[49]

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.

Note that constructing a quarterly panel from the individual-spell data require assigning a single job to each individual in each quarter (the 'main job'). For individuals that only have a unique spell in a quarter, i.e. if they hold a single job or they are unemployment during an entire quarter, this procedure is straightforward. There can also be individuals who hold multiple jobs within a quarter.[50] For such cases, we follow a similar approach to De la Roca and Puga (2017) to determine the main job. In particular, if an individual has more than one spell *with the same firm* in a given quarter (around 10% in each birth-year cohort), we select the main job as that with the longest duration (in days) in that quarter. If these multiple spells are of the same duration in that quarter (less than 1% in each birth-year cohort), we assign the main job as that with the total (not only in that quarter) longest duration (in days). If the total duration of these multiple spells is also the same (less than 0.5% in each birth year-cohort), we record the most recent one as the main job. 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 individuals who have more than one spell in a quarter *with multiple firms*, we select the main job as that with the highest labor earnings in that quarter. For individuals who hold at least one job but also experience a spell (or spells) of unemployment in a given 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

[48] 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.

[49] 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.

[50] If an individual changes job within a firm in a given 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.

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.[51] 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.[52]

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. 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.

Our female sample is restricted to native, married women with at least a college education who were born between 1966Q1 and 1971Q4.[53] When we look at male earnings, we focus on married 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 (see below). As per females, we determine the marital status of a male based on his household members and their dates of birth. We count a man as being married if there is a female household member in the household whose age difference with him is between -10 and +2 years and who is old enough to be his potential wife (at least 22 years old). We drop from the sample men who are living in households with more than one potential wife or with another man from the same cohort.

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 the 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.[54] These surveys are run by the Instituto Nacional de Estadística (INE), the Spanish Statistical Institute, 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

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

[52] 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.

[53] The country of birth and nationality information in the MCVL enables us to distinguish between natives and immigrants. Note that 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. Among native, married women who were born between 1966Q1 and 1971Q4, 18% are college educated.

[54] 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.

of all individuals who are older than 16 in each household. When we calculate the 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 at least college education, born between 1966 and 1971 and their 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 restrictions on the husband's education level.

Since the second quarter of 1987, the EPA also has a rotating panel dimension (called EPA-flujos or EPA-flows) that follows individuals up to six consecutive quarters. This enables us to calculate quarterly transition rates across the labor market states. We calculate the transition rates across different labor market states using 2000 wave of the EPA-flows. Since in the 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.[55] In contrast to the EPA, the 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 to 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) In the MCVL, it is not possible to match wives and husband and construct joint labor market transitions or total household earnings. The EPA does not contain any information on earnings, either. Therefore, we use the European Union Statistics on Income and Living Conditions (the EU-SILC) 2004-2012, to construct household-level income measures. 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 earnings, we also restrict the sample to employees with non-missing wage and hours information. 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, babysitters or relatives, that a household uses. To calculate childcare statistics, we also restrict the 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.[56]

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 native, married, 25-44 years old women with at

[55] 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 2000 EPA-flows, the 1966-1971 cohort were 29-34 years then. But the only category that overlaps with this groups is 30-34 which correspond to 1966-1970.

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

least a college education, but as the sample size is small, we do not restrict the sample to a particular cohort of women. If a household member reports to be the child (son or daughter) of a female household member in the household roster, we consider that female as a mother. As this only identifies the motherhood status based on cohabiting children, then we use the respondent's answer to the STUS question: "Do you have children under 18 who do not live with you?" to determine mothers who have non-cohabiting children. The split vs. regular work schedule is a question in the STUS, stated as "Do you have a continuous or a split work schedule?". Therefore, 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 only consider employees who filled the diary in an ordinary/usual day in a regular working week and who worked that week. To identify mothers, we use information from the household roster.

Appendix B: Additional Tables and Figures

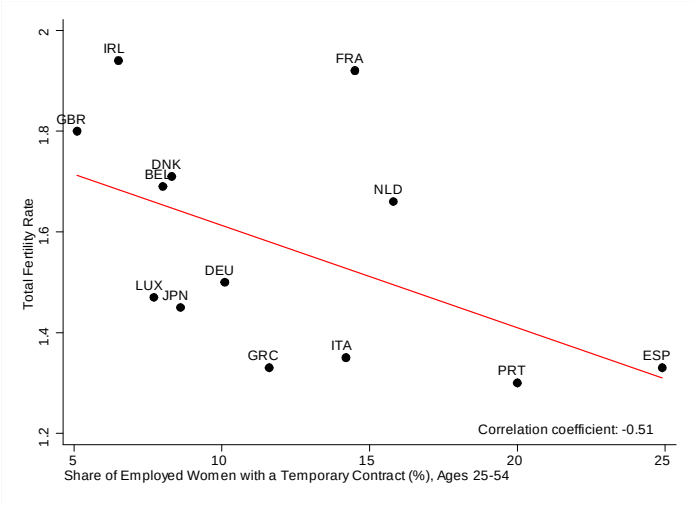

Figure A1. Temporary Contracts and the TFR

Source: OECD Employment Database, https://bit.ly/2AjAnGc (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).

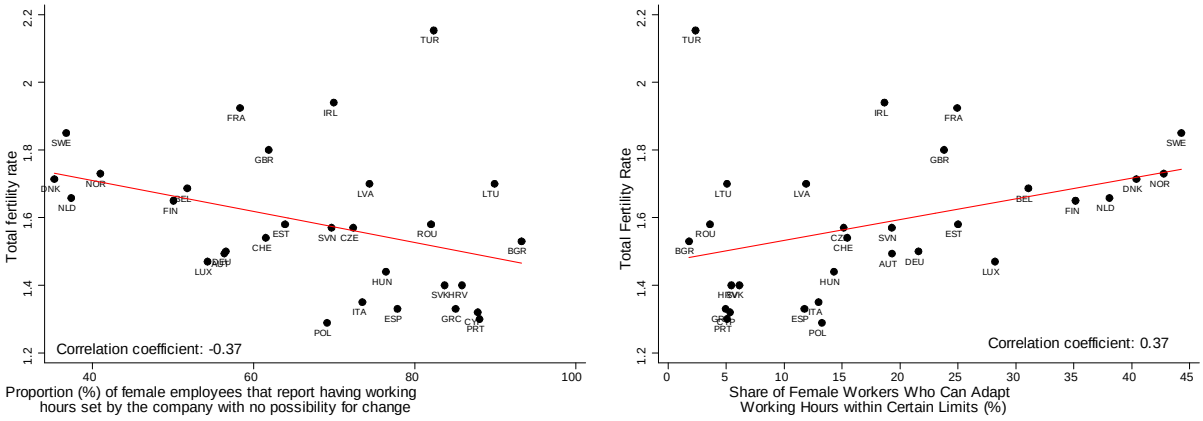

Figure A2. Flexibility and the TFR

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)

Table A1. Incidence of split-shift work schedules by occupation, industry and region

	%
Occupation	
Managers and public administrations	59.46
Professionals and technicians	37.51
Support technicians and professionals	44.41
Clerical support workers	33.33
Service and sales workers	31.54
Skilled agricultural/fishery workers	37.14
Craft and related workers	55.50
Plant/machine operators and assemblers	33.89
Elementary occupations	28.41
Industry	
Agriculture	45.87
Mining and quering	71.43
Manufacturing	44.84
Electricity, gas, water supply	35.14
Construction	70.99
Wholesale and retail trade, repair of motor vehicles	50.97
Hotels and restaurants	43.21
Transport, storage, communication	29.24
Financial intermediation	36.25
Real estate, renting, business activities	49.10
Public administration and defense; compulsory social social security	18.35
Education	35.46
Health and social work	13.29
Other community, social and personal service activities	38.53
Region	
Galicia, Asturias, Cantabria	41.44
Community of Madrid	38.34
Basque Community, Navarre, La Rioja, Aragon	36.42
Catalonia, Valencian Community, Balearic Islands	45.50
Castile and Leon, Castile-La Mancha, Extremadura	36.94
Andalusia, Region of Murcia	28.47
Canary Islands, Ceuta, Melilla	25.42

Source: The STUS, 2009-2010. Sample: 25-54 years old employees.

Table A2. Gender, First-birth and the Probability of Promotion

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.898***	-	0.904**	0.854***	0.866**	0.797***
	(0.042)		(0.043)	(0.041)	(0.061)	(0.062)
First-birth	-	0.833**	0.896	0.906	0.886	0.843
		(0.062)	(0.072)	(0.073)	(0.106)	(0.104)
Female × First-birth	-	-	0.607**	0.630**	0.622	0.651
			(0.133)	(0.138)	(0.215)	(0.225)
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	63,527	63,527	63,527	63,527	32,054	32,054

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. Sample is further restricted to childless women when first observed. Notes: (i) The outcome variable takes the value of 1 if an individual employed in a firm with a temporary contract in quarter t is promoted to a permanent contract in quarter t + 4 and 0 otherwise. 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.

Table A3. Labor Market Transitions for Men (Calibrated)

	Below College			College and above		
Married men	N_t	T_t	P_t	N_t	T_t	P_t
	25-29					
N_{t-1}	70.0	28.0	2.00	85.00	15.0	0.00
T_{t-1}	12.00	83.00	5.00	3.00	87.00	10.00
P_{t-1}	1.00	3.00	96.00	0.00	3.00	97.00
	30-34					
N_{t-1}	67.0	31.0	2.00	80.00	18.0	2.00
T_{t-1}	9.00	84.00	7.00	5.00	86.00	9.00
P_{t-1}	3.00	0.00	97.00	0.00	1.00	99.00
	35-54					
N_{t-1}	62.0	31.0	7.00	67.00	23.0	16.00
T_{t-1}	8.00	76.00	16.00	24.00	70.00	6.00
P_{t-1}	6.00	0.00	94.00	1.00	2.00	97.00

Table A4. 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 A5. 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).

Table A6. 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 A7. 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.

Table A8. 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).

Table A9. 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 A10. 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 A11. 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 A12. 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 7, 8 and 9 changes when we increase each parameter in Table 8 by 10%. Figures C1, C2 and C3 correspond to targets in Tables 7, 8, and 9, 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.