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Women's Employment and Fertility in Spain over the Last Twenty Years

Virginia Sánchez-Marcos

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Virginia Sánchez-Marcos[1]

Departamento de Economía

Universidad de Cantabria

Avda. de los Castros s/n

39005 Santander

Spain

sanchezv@unican.es

Abstract

Over the past twenty years there has been a 87% increase of the married women's employment rate and a 48% decrease of the fertility rate in Spain. This paper focus on the increase of the marital dissolution rate, following the introduction of the Divorce Law at the beginning of the eighties, as a possible explanation (the probability of divorce went from 0.5% to 2.1%). A model on the economics of the family, in which labor market and fertility decisions are made, is used to measure such effects. It's found that the increase of divorce risk explains 15%, 44% or 0% of the change in married women's full-time employment rate, depending on women's education, and 45% of the decrease of the fertility rate. So, contrary to what some people argue, the decrease of the fertility rate observed in Spain is not so closely related to the increase of women attachment to the labor market, there are other possible explanations. The model provides a good framework for the evaluation of certain social policies that target the reconciliation of family and labor life.

JEL: J12, J13, J20.

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1 Introduction

This paper deals with one of the major changes that have occurred over the last twenty years in Spain: the increase of women's employment rate and the decrease of the fertility rate. Women's employment rate of the youngest generations has increased by more than 50% from 1980 to 1998. It's shown that the key factor underlying this trend is the change of married women's behavior, who increase their employment rate by 87%. The decrease of the number of children per women has taken Spain to be one of the countries with the lowest fertility rates of Europe. During the same period, and after the Divorce Law was introduced in Spain in 1981, there has been a big increase of the marital dissolution rate, precisely, it went from 0.5% at the beginning of the eighties to 2.1% at the end of the nineties.

The aim of this paper is to measure the effect of the increase of marital status uncertainty on women's employment rate and fertility rate. Some papers show already the importance of family issues to explain macroeconomic magnitudes. Cubeddu and Ríos-Rull (2002) argue that marital status dynamics are crucial to explain saving decisions. They show that the size of savings differs dramatically depending on the details of the stochastic process that determines marital status. Fernandez and Rogerson (2000) investigate the interactions between marital sorting and income inequality and found that increased marital sorting significantly increase income inequality. This paper is also related to Aiyagari, Greenwood and Guner (2000), Regalía and Ríos-Rull (2001), Olivetti (2000), Erosa, Fuster and Restuccia (2001) and Caucutt, Guner and Knowles (2001).

It's used a model in which females differ, a priori, by education and child care facilities. Later on, they also differ by labor market experience, marital status and number and type of dependents. The decision choices are how much to work and how many dependents to have. Marital status and the type of dependents evolve exogenously. Labor market experience depends on past working decisions and affects wage per unit of time worked. Males only differ by earnings ability and always work. In biparental households there is income-pooling and mothers make the decision of fertility. Women working in the labor market have a cost in terms of utility that depends on time worked. Mothers working full-time in the labor market face child care costs

that depend on their child care facilities type.

The model is calibrated to the Spanish economy in 1998. The predictions of the model in dimensions of the data that have not been calibrated are checked and it's found that the performance is quite acceptable. Then the equilibrium is recomputed after adjusting the divorce rate to the one at the beginning of the eighties and the two steady state allocations are compared. The effects on employment and fertility rates of a reduction of the marital dissolution rate are measured. It's found that the reduction of marital dissolution risk implies only a small decrease of women's employment rate, however, it increases fertility rates by a considerable amount . So, the increase of the marital dissolution rate over the past twenty years, cannot explain too much of the increase of women's employment rate, however, it can explain a big fraction of the reduction of the fertility rate. If marital dissolution rate continues increasing and a higher fertility rate is wished, this result point out the need of some policies to avoid the reduction of the average number of children per women.

There are several papers related to this paper that should be mentioned. Arellano and Bover (1995), using macroeconometric methods, analyze the determinants of the increase of women's employment rate in Spain. They state that the increase of women's education and the decrease of fertility rates, after controlling for their endogeneity, are the main factors underlying the increase of labor employment of women between 25-44 years old. This paper shows that the increase of women's employment rate takes place at all of the educational levels. Ahn and Mira (2001), using a microeconometric approach, supports that the lack of stable jobs among young men is one of the factors that has forced many young people to delay marriage and childbearing, lowering fertility rate in Spain. This result is also supported by Da Rocha and Fuster (2002) that analyze the role of labor market frictions in a time allocation and fertility decisions general equilibrium model. Lastly, there are several papers, that using a microeconometric approach, support a positive impact of marital dissolution risk on women's employment and fertility for the U.S., most notably Johnson and Skinner (1986), Peters (1986), Parkman (1992) and Vuri (2002).

So this papers focus on a different explanation for the increase of the women´s employment

rate and the decrease of the fertility rate that those that have been considered until now for the case of Spain. Furthermore, this paper measures the effect of maritual status uncertainty on employment and fertility relying in a behavioral model of the family what would allow a better understanding of the responses of women to changes in the enviorment.

The paper is organized as follows. In Section 2 data that motivate the question posed are reported. In Section 3 the literature on women's employment in Spain and the literature on the interactions between marital dissolution risk and employment and fertility decisions is reviewed. In Section 4 the model is carefully explained. In Section 5 the calibration of the model economy is explained. In Section 6 results are presented and then, the answer to the question that was tackled. Finally, Section 7 concludes.

2 Data

2.1 Employment Rates

For most of the statistics reported, data came from the Encuesta de Población Activa (provided by the Instituto Nacional de Estadística). Table 1 shows the average women's employment rate (total employed over total population) in Spain for years 1980 and 1998. As it was said before, the increase is above 50% when we look at youngest generations of women.

Table 1: **Females' Employment Rate, 25-45**

1980	1998
29.9	45.5

Figure 1 plots the evolution of women's employment rate for those between 25-54 years old (graph provided by the Instituto Nacional de Estadística) from 1977 to 2001. There has been a continuous increase since the beginning of the eighties.

However, it must be noted that this increase is the result of the increase of married women's employment rate, as is show in Table 2

Table 2: **Females' Employment Rate by Marital Status, 25-45**

	1980	1998
Married	23.2	43.3
Single	65.6	70.7

The increase of the employment rate for married women was 87% whereas for single women it was only 1%. Because during this same period there was also an increase of the education level, it's necessary to know if the increase of women's employment remains across educational groups. Population is divided according to the educational level of the individual. For the age group considered, most of the individuals have finished their education process. Three levels of education are distinguished: high (university graduated), medium (secondary school graduated and/or some years of university education) and low (less than secondary school graduated). As is shown in Table 3, the increase of women's employment is observed for all groups of education. So the increase of women's employment is not totally explained by changes in their educational level.

Table 3: **Married Females' Employment Rate by Education, 25-45**

	1980	1998	Change
High	66.9	75.7	18%
Medium	37.4	50.7	38%
Low	20.6	32.4	52%

Table 4 shows that the increase of women's full-time employment rate (35 or more hours of work) is quite high. In fact, this paper is specially concerned with changes in married women's full-time employment rates. The reason is that the increase of part-time employment rate is likely to be affected by new regulations on these type of contracts introduced during the last two decades.

Table 4: **Fraction of Married Females working more than 35 hours per week, 25-45**

	1980	1998	Change
High	32.3	42.7	34%
Medium	23.1	33.7	48%
Low	14.0	18.5	32%

2.2 Fertility Rates

Table 5 shows the average number of dependents per female 25-45 for years 1980 and 1998.

Table 5: **Average Number of Dependents per Female, 25-45**

1980	1998	Change
3.22	1.66	-48%

2.3 Marital Dissolution Rates

Lastly, Table 6 shows marital dissolution rates for several years. Numbers for 1976 to 1990 have been obtained from the Encuesta Sociodemógrafica, however, the number for 1999 was built using some extra information, because the figure was not available in the survey. According to the Consejo General del Poder Judicial, between 1989 and 1999 the number of marital dissolutions increased by 66%. Assuming that the number of marriages have not changed (conservative assumption) this means that in 1999 marital dissolution rate was around 2.1%, as is shown in Table 6. The number seems quite reliable because Eurostat reports a marital dissolution rate of 1.8% for 1996. Compared with other countries of the European Union the number is quite low. For Finland, United Kingdom, Belgium, Denmark, Holland or Germany it's around 5-6.0%. The comparison of women´s employment performance between Spain and other European countries is outside the scope of this paper, however, it´s worth to mention that differences in marital risk could be one of the reasons for differences in women's employment rate between Spain and other European countries.

Table 6: **Marital Dissolution Rate (in %)**

1976-80	0.6
1981-85	1.0
1985-90	1.3
1999	2.1

The increase of marital dissolution rate from the beginning of the eighties to the end of the nineties implies that the probability of a marriage been dissolute after 10 years went from 5% to 18%.

3 Previous Literature

3.1 Women's Employment in Spain

As it was said before, Arellano and Bover (1995) analyzed the determinants of the increase of women's employment rate in Spain using econometric methodology (time series). They stated that the increase in education level of women and the decrease in fertility rates, after controlling for their endogeneity, are the main factors behind the increase in the labor employment of women between 25-44 years old. Another paper supporting that result is Novales and Mateos (1990). It has been shown in previous Section that the increase in women's employment rates is observed for all of the educational levels. These authors don't consider the increase of marital dissolution rate as a possible factor for explaining the change of labor and fertility behavior of women.

3.2 Interactions between employment and marital dissolution risk

As Becker (1992) states, marital risk makes less profitable the specialization in household activities versus market activities. The reason is that labor market experience has a return in terms of higher future earnings, as for example is shown in Altug and Miller (1998) and Olivetti (2000) for the U.S.. As far as dependents require parent's time, when labor market experience affects future earnings, the opportunity cost of child care time is higher. Furthermore, upon divorce, if dependents are attached to the mother (as it's usual), divorced women suffer a lost in their living conditions. So, it's reasonable to think that the risk of divorce may be a reason for a reduction of fertility rates and an increase of labor supply.

It's also true that the higher the earnings of an individual, the higher the utility outside marriage, and then the probability of divorce. When costs of divorce are reduced by, for example, new laws that make the process shorter, both employment and divorce rate increases can be expected and they reinforce each other in the process. However, for considering such a possibility, marital dissolution should be endogenous and the process of consumption allocation inside the household should be modeled. That is something that it's avoided in this paper.

There is an extensive literature supporting that the risk of marital dissolution increases married women's labor supply for the U.S.. Peters (1986) found that for married women living in states with an unilateral divorce law the probability of participating in the labor market is higher than in states in which there are a mutual divorce law (requires that both members of the couple agree to divorce). However, she found that differences in law don't seem to affect the fertility behavior of women, maybe because even if dependents may increase the cost of being divorce, this cost could be partly offset by the positive effect that dependents have on the divorce settlement. Parkman (1992) also found that women in unilateral-divorce states increase their labor supply in response to their potential losses of human capital if their marriages are dissolved. Johnson and Skinner (1986) results support the hypothesis that divorce probabilities increase labor supply. They concluded that the rise in the frequency of divorce may account for one-third of the unexplained increase in women's postwar labor force participation in the US. They also found that there is little support for significant effects of labor force participation on divorce probabilities, result that can give some support to the assumption of exogenous marital status. Vuri (2001) supports the fact that couples with higher *ex ante* divorce probabilities are less likely to give birth to children. As has been said before, all these papers use a different methodology from the one used in this paper.

4 Model

4.1 General Features

An exponential population model with heterogenous agents is built. Individuals survive to the next period with probability p. Adult individuals differ in several dimensions. Some of them are fixed along their lives, others can change.

Individuals differ by sex, $g \in \{f, m\}$. Because only females make decisions in this model, their sources of heterogeneity are explained, differences across males would be implicit. Females differ by education, $\varepsilon \in \Xi$, and child care facilities, $\eta \in \Psi$. These features remain unchanged

along their lives. They also differ by marital status, $z \in \{0, F\}$, labor market experience, x, number of dependents $n \in \{0, 1, 2, 3, 4\}$ and, lastly, by their dependents type $d \in \{B, C, Y\}$. A female may be single, $z = 0$, or may be married, in which case spouse's earnings type $\zeta \in F$ is relevant. Dependents may be babies, B, children, C, or young adults, Y.

Dependents evolve as follows. A female without dependents may choose to have n babies. After that, a baby comes a child with probability q_B in the following period. A child comes a young adult with probability q_C in the following period, and finally, a young comes an adult (and then leaves parental household) with probability q_Y. If the mother dies the dependents came adults, whatever their type. The transition is denoted as $\Lambda(d\prime/d)$. All dependents belonging to a female are of the same type. Marital status evolves exogenously as a Markov process with transition matrix $\Gamma^{\epsilon}_{z,z'}$. Upon divorce dependents stay with the mother.

Females derive utility from: (i) consumption and non-working time in the current period, (ii) dependents living at home and (iii) expected utility next period.

Each period, females must decide working full-time, part-time or not working at all, $h = \{0, part, full\}$. When female works she accumulates one period of experience, if she doesn't work, she faces a probability π of losing all her experience. Working mothers face a cost of child care that is given by the function $G(n, d, h, \eta)$, so it depends on the number and type of dependents, time spent on labor market and child care facilities type of the mother. Males always work.

Furthermore, each period married females with no dependents have to decide having or not having descendents the following period. The utility derived from descendents by the mother is given by the function $A(n)$.

Single females with no earnings receive a transfer T that can be though as a mix of government subsidies and some kind of private transfers. $B(n, \zeta)$ is a transfer that a single mother receives from her dependents's father, that depends on father's earnings type.

4.2 Maximization problem for a single female

As it has been already said, each period a single female has to decide working full-time, part-time or not working at all.

$$V(\varepsilon, n, d, 0, \eta, x) = \max_{C,h} u(c,h) + A(n) + p\beta \sum_{d'} \sum_{z'} V(\varepsilon, n', d', z', \eta, x') \Lambda(d\prime/d) \Gamma^{\varepsilon}_{z,z'}$$

subject to:

$$C = R_f(\varepsilon, x, h) - G(n, d, h, \eta) + TI_{h=0} + B(n, \zeta)$$

$$x' = \Gamma(x, h)$$

C is household total consumption and c is individual consumption, that depends on C and on the number and type of individuals in the household. $R_f(\varepsilon, x, h)$ is female's earnings function, that depends on education, labor market experience and, of course, time spent on labor market.

Single males consume all their earnings.

4.3 Maximization problem for a married female

Only females make decisions in biparental household. They decide working full-time, part-time or not working at all. If there are no dependents, they decide also having descendants the following period or not. It's assumed that married couples share all their earnings for consumption (income-pooling). Female maximization problem is as follows

$$V(\varepsilon, n, d, \zeta, \eta, x) = \max_{C,h,n'} u(c,h) + A(n) + p\beta \sum_{d'} \sum_{z'} V(\varepsilon, n', d', z', \eta, x') \Lambda(d\prime/d) \Gamma^{\varepsilon}_{z,z'}$$

subject to:

$$C = R_f(\varepsilon, x, h) + R_m(\zeta) - G(n, d, h, \eta)$$

$$x' = \Gamma(x, h)$$

$R_m(\zeta)$ are male's earnings.

5 Calibration

In this Section the function specifications and the strategy of calibration are presented. Some of the parameters are measured directly in the data, the others are chosen to match some statistics.

5.1 Function Specifications

Utility function is the following:

$$u(c, h) = \frac{c^{1-\sigma}}{1-\sigma} - \alpha(h, e)$$

So, individuals derive utility from individual consumption and disutility from working. Disutility from working depends on hours worked and on agent's education. Household equivalence of scales from the OCDE are used to transform household total consumption, C, into individual consumption, c. According to them, first adult counts as 1.0, second adult as 0.7 and each dependent as 0.5.

Utility derived from descendants at home is as follows

$$A(n) = (\delta - \phi I_{h=full}) \ln n$$

When the mother work full-time in the labor market the utility she derives from their dependents is reduced by ϕ. Such assumption is needed to reproduce differences in fertility across educational groups. Conesa (1999) assumes uncertainty on labor earnings to have observed differences in fertility by education, however his model fails to reproduce that high educated work more. In this paper there is no such a way of uncertainty. Erosa, Fuster and Restuccia (2001) assume that women devote a fix amount of time to care their dependents, preventing them to work during that time in the labor market. With such assumption it's possible to reproduce differences in fertility across educational groups because the opportunity cost of staying at home caring dependents is higher for educated mothers than for not educated mothers. Regalía and Ríos-Rull (2001) assume that the costs of rearing dependents are increasing in mother's education. They justified this assumption as a way of getting differences in fertility across educational groups. This paper assumes that chid care can be bought, as it happens in the real world, and then it's not strictly necessary that women stay at home caring their dependents. What it seems a more plausible assumption is that mothers working don't enjoy as much their dependents as when they stay at home. For that reason parameter ϕ is used.

5.2 Parameter Values

In the model each period is equivalent to one year in the real life.

Probabilities of Aging. For individuals alive probability of surviving to the following period, p, is set equal to 0.025, so that average duration of adult life be 40 years. q_B is set equal to 0.180, so that average duration of baby stage be 3 years; q_C, is set equal to 0.031, so that average duration of child stage be 9 years, and lastly, q_Y is set equal to 0.003, so that average duration of young stage be 12 years.

Earnings. For all the information concerning wages and earnings the Panel de Hogares Europeo, 1996 is used (it's assumed that relative wages by education and sex and returns to experience have remained constant since then). Three different types of females are distinguished according to her education (distribution of education is exogenously taken from the data). To

measure the effect of experience and the effect of work interruptions on wages male data is used. A wage equation is estimated for each educational level with the following explanatory variables: experience, squared experience and a dummy indicating if individual worked during the previous year. In Table 16 in the Appendix it's shown the coefficients of the regressions for each group of education. Returns to experience are decreasing with education, and quite low in the case of individuals with low education. The penalty of labor market interruptions is higher the higher is the education. In the model the effect of experience on women's wages is determined by this equation. The probability π of losing all the experience when female doesn't work is calibrated to match the average decrease of wage per hour that a male loses when he stops working for one year (by education, 0.88, 0.76 and 0.33).

For male earnings type three groups of education are distinguished, and, for each educational level, four types of individual according to their earnings. So there are 13 possible values for variable z.

Marital Status Transitions. Marital dissolution probability is taken from the data (2.1% for 1998). The probability of marriage when woman has dependents with her (so she was married before), $p_m^{n>0}$, is different from the probability of married when she hasn't, $p_m^{n=0}$. These two parameters are calibrated to the proportion of married and divorced women observed in the data, 90.0% and 5.0%, respectively. The idea is that is not only necessary that the model reproduce the marital dissolution rate, but also some measure of the durability of the single state, that would affect the cost of coming divorce. Marriage sorting in education is taken from the data.

Child Care Costs. It's assumed that only women working full-time have to face child care costs. This could be justified if you think that women working part-time are more likely to do some kind of job at home or some kind of job out of home when the husband is in charge with the dependents. It's also assumed that these costs don't depend on the number of dependents. This last assumption could be partially justified if you think in a baby-sitter that charge a fix amount per hour independently of the number of dependents and some kind of fixed costs associated with child raising. However, if you think of nurseries' fees is not very reasonable. Child care cost

per hour is assumed to be equal to the wage of a woman with low education and no labor market experience. Hours needed for a dependant depend on its type. Figures provided by Hotz and Miller (1988) are used. However, as it's known, some women don't face child care cost because, for instance, their mothers look after their dependents. This behavior is quite extended in Spain at this moment. It's not easy to measure the proportion of women that have this child care facility. For example, if the proportion of employed women that don't face child care cost is measured , the figure is probably not a good measure of the proportion of women that don't face child care cost in the whole population because women with child care facilities are more likely to work. Instead, it's assumed that there is a proportion ω of women that don't face child care costs when decide to work full-time. ω is calibrated to match mothers full-time employment rate.

Transfers. $B(n, \varepsilon)$ is set equal to 20% of the earnings of the dependents's father (previous spouse of the mother). There is no regulation about this issue in Spain, but some sources point that is never higher than 30%[2]. T is calibrated to match the employment rate of single women.

There are still some parameters to be determined. β is set equal to 0.96, according to the macro literature. $\alpha(h, e)$, δ and ϕ are calibrated to some statistics in the data: married women's full-time and part-time employment rate by education, average number of dependents per women and average number of dependents per women with low education.

A logarithmic utility function is used, so parameter σ in the utility function is set equal 1.0. Erosa, Fuster and Restuccia (2001) assume a linear utility function, Caucutt, Guner and Knowles (2001) assume a value of 0.50, the same as in Greenwood, Guner and Knowles (2000). In Aiyagari, Greenwood and Guner (2000) a logarithmic utility function is assumed. In Regalía and Ríos-Rull (2001) is calibrated a value for the parameter of 0.44. They point out that a value of this parameter lower than 1.0 is needed to account for the negative correlation between earnings and fertility. In this paper it's found that, in fact, for values of the risk aversion parameter bigger than 1.0, the model is not able to reproduce the negative relationship between women's education and average number of dependents. This must be related to the slope of the marginal utility from consumption. Results are discussed for values of σ lower than 1.0.

[2]See Revista Consumer, number 23 (Marzo, 2000).

6 Results

This Section shows the effects of changes in marital dissolution risk. Firstly, in Section 6.1 it's shown the calibration of the model economy stationary state equilibrium to year 1998 (baseline economy). In Section 6.2 properties of the baseline economy are presented. Secondly, keeping all the parameters and inputs of the model as in the baseline, except the marital dissolution rate -now equal to 0.5%, as it was at the beginning of the eighties-, the equilibrium is recomputed and results are shown in Section 6.3. The effect of this change on employment and fertility rates is measured. Lastly, in Section 6.4 the same exercice than in Section 6.3is done, but in an economy without transfers from divorced fathers to divorced mothers.

6.1 Baseline Model Economy

The model economy is calibrated to the Spanish economy in 1998. There are 10 parameters and then 10 statistics are chosen from the data. Table 7 shows the calibration.

Table 7: **Baseline Economy Calibration, Statistics, 1998**

	Data	Model
Full-time empl Rate of High Edu	0.43	0.42
Full-time empl Rate of Medium Edu	0.34	0.34
Full-time empl Rate of Low Edu	0.19	0.19
Part-time empl Rate of High Edu	0.33	0.29
Part-time empl Rate of Medium Edu	0.17	0.16
Part-time empl Rate of Low Edu	0.14	0.14
Average Number of dependents	1.66	1.68
Average Number of dependents of Low Edu	1.87	1.81
Full-time empl Rate of Women with dependents	0.24	0.24
Empl Rate of Single Women	0.71	0.77

There are still some problems to get the exact average number of dependents of low educated women, but the approximation is good enough.

Table 8 shows the values of calibrated parameters

Table 8: **Baseline Economy Calibration, Parameters, 1998**

$\alpha(full, h)$	0.43
$\alpha(full, m)$	0.46
$\alpha(full, l)$	0.47
$\alpha(part, h)$	0.34
$\alpha(part, m)$	0.38
$\alpha(part, l)$	0.38
δ	0.60
ϕ	0.16
ω	0.29
T	0.09

A comment on the value of the parameters estimated would be worth. Firstly, the calibrated disutility from working full-time or part-time is almost the same for medium and low educated women. In the case of high educated women, the calibrated disutility is a bit lower both for full-time and part-time workers. This could be interpreted in the following way: the aspects of women's decision process on work and fertility that have been considered in the model allow to explain differences in employment rates across educational groups without having differences across educational groups in disutility from working. Only in the case of high educated women is necessary a lower disutility from working with respect to the average to explain the employment rates. Secondly, according to the calibration, the proportion of women that don't face child care cost when they decide to work full-time is 71%. Thirdly, the role of parameter ϕ is checked. When its value is set equal to 0.0 and the rest of the parameters are kept as in the baseline calibration average number of dependents increases to 2.55, and is the same across educational groups. So it seems clear that it's playing the expected role.

It has to be noted that statistics that are averaged over all education groups are affected by the distribution of education, that has changed a lot along the period considered, with an increase in fraction of women with high education.

6.2 Properties of the Baseline

Predictions of the model in some dimensions that have not been calibrated are checked. Table 9 shows the average number of dependents by education (notice that the average number of dependents per women and the average number of dependents per women with low education have been calibrated). Because the average number of dependents per women with low education is not exactly calibrated to the number in the data, both the average number of dependents per women with medium and high education are overpredicted. However, the model still predict the variability by education.

Table 9: **Average Number of Dependents by Education**

	Data, 98	Model
High Edu	1.28	1.40
Medium Edu	1.41	1.61
Low Edu	1.87	1.81

Table 10 shows the distribution of number of dependents in the model economy and in the data. There are many possible distribution of number of dependents across females that deliver the same fertility rate, but these distributions can have different implications for female employment. For this reason it's important that the baseline economy delivers a plausible distribution of number of dependents across females. The performance of the model is quite good. The fraction of women having two dependents is overpredicted and the fraction of women having four dependents is underpredicted.

Table 10: **Distribution of Number of Dependents**

	Data, 98	Model
no dependents	0.14	0.13
1 dependent	0.26	0.20
2 dependents	0.44	0.54
3 dependents	0.12	0.13
4 dependents or more	0.04	0.00

Table 11 shows employment rate by the age of the descendents. It's interesting to note that the aging of the dependents doesn't push mothers into the labor market. Predictions of the

model are very good in this case.

Table 11: **Employment Rate by Dependents Age**

	Data, 98	Model
0-3	0.40	0.40
3-12	0.42	0.42
≥ 12	0.45	0.45

Lastly, Table 12 shows full-time employment rates for women with dependents by education. In the data, the variability of employment rate across education groups still remains when we look only at married women with dependents. The model predicts this variability quite well.

Table 12: **Full-time employment rate of Married Women with dependents by Education**

	Data, 98	Model
High Edu	0.41	0.36
Medium Edu	0.31	0.29
Low Edu	0.18	0.18

So, given that predictions of the model in all of these dimensions are quite good, the model seems a good framework to ask what would be the effect on women's employment and fertility rates of changes in the marital dissolution rate.

6.3 Reduction of Marital Dissolution Rate

The effect on employment rates and fertility implied by a reduction of the marital dissolution rate are in Table 13.

As it's shown, the effect on full-time employment rates of the decrease of the marital dissolution rate is really small, and there is no effect at all in the case of women with low education. Given that educated women's returns to experience and cost of labor market interruptions are both quite low, it's understandable that the impact of an increase of the marital dissolution rate was zero for this group. It's more surprising the small effect on employment rates of the other two groups. In the case of high educated women the increase of full-time women's employment

Table 13: **Experiment: reduction of marital dissolution rate**

	Model, 98	Model, 80	Data, 80	Model Change*
Full-time empl Rate of High Edu	0.42	0.40	0.32	5%
Full-time empl Rate of Medium Edu	0.34	0.31	0.23	10%
Full-time empl Rate of Low Edu	0.19	0.19	0.14	0%
Part-time empl Rate of High Edu	0.29	0.26	0.35	-
Part-time empl Rate of Medium Edu	0.16	0.16	0.14	-
Part-time empl Rate of Low Edu	0.14	0.22	0.07	-
Average Number of dependents	1.68	2.14	3.22	-21%
Average Number of dependents of Low Edu	1.81	2.30	?	-
Full-time empl Rate of Women with dependents	0.24	0.23	?	-
Empl Rate of Single Women	0.77	0.92	0.66	-

rate that is explained by the increase of marital dissolution rate is 15% of the observed change, whereas for the medium educated women is 44% of the observed change. However, it's observed a quite important effect on the average number of dependents. The decrease of the average number of dependents per women that is explained by the increase of marital dissolution rate is 45% of the one observed. When marital dissolution rate is equal to the one at the beginning of the eighties, women have more incentives to have dependents, because biparental household enjoy more resources and take advantage of scale economies. On the other hand, in low divorce rate scenarios, women spend less fraction of their lifes on the labor market and then they enjoy children more (because utility from children is lower when women work full time). It could be the case that the increase in the average number of dependents is what push low educated women to increase part-time employment rate in the model economy, because of the necessity of feeding more people at home (this is not observed in the data, maybe because of the lack of availability of these type of contracts during the eighties). So at least, part of the decrease of the fertility rate observed in Spain during the last twenty years could be related with the increase in the uncertainty of marital relations.

Single women's employment rate in the model economy with high divorce risk is lower than in the one with low divorce risk. This is reasonable due to a composition effect: the fraction of single that are mothers is smaller than in the high divorce risk scenario. Data employment rate

of single women in the eighties is not comparable with the one obtained in the model because the distribution of education in the model is the same in both divorce risk scenarios (the one at the end of the nineties), whereas it's known that during the last two decades average level of women´s education has increased.

Some possible explanations for the low effect on employment are explored below.

Firstly, it could be though that the low effect on employment rates is related to the curvature of the utility function. In fact, the higher is the curvature the lower is the increase in the utility provided by labor market experience in terms of higher future wages and then the lower the incentives to work to accumulate experience. A different value for the risk aversion parameter, $\sigma = 0.75$, is used but it's found that the effects are still very small.

Secondly, the small effect on employment rates could be due to a high value of T, estimated in the calibration process. To check this possibility the model economy is calibrated keeping $T = 0$ and then eliminating one of the targets (employment rate of single women). Under this new calibration, single women work with probability 1.0, even those with dependents that are receiving the transfer from their ex-husbands. The effects on full-time employment rates and fertility rates are more or less the same as in Table 13, when T was calibrated to 0.09.

Lastly, the possibility of women expecting a higher marital dissolution rate after the introduction of the Divorce Law is explored. It could be the case that women expected Spanish marital dissolution rates reached European levels. For that case, we recalibrate the baseline economy with a marital dissolution rate of 6%, the one that predominates in the rest of countries of the European Union. In Table 14 the calibration and the effects of the decrease of the marital dissolution rate to 0.5% are shown. In this case, the performance of the model in statistics not calibrated is very similar to the one in the case with a baseline marital dissolution rate of 2%.

As it's shown, and it was expected, the effect on full-time employment rates is now higher. Under the hypothesis that women are working in 1998 as if they though that European marital dissolution rate was the one for Spain, the impact on employment decisions of the reduction of

Table 14: **Experiment: reduction of marital dissolution rate**

	Model, 98	Model, 80	Data, 80	Model Change
Full-time empl Rate of High Edu	0.44	0.36	0.32	22%
Full-time empl Rate of Medium Edu	0.34	0.27	0.23	26%
Full-time empl Rate of Low Edu	0.19	0.17	0.14	12%
Part-time empl Rate of High Edu	0.36	0.26	0.35	-
Part-time empl Rate of Medium Edu	0.24	0.20	0.14	-
Part-time empl Rate of Low Edu	0.15	0.14	0.07	-
Average Number of dependents	1.66	2.20	3.22	-25%
Average Number of dependents of Low Edu	1.86	2.33	?	-
Full-time empl Rate of Women with dependents	0.24	0.20	?	-
Empl Rate of Single Women	0.65	0.93	0.66	-

marital risk is higher. The fraction of the observed increase of women's full-time employment rate explained by the model is now 65% for high educated women, 54% for medium educated women and 38% for the low educated. The fraction of the decrease of the average number of dependents per women explained by the model is 52%, similar to the one in which the baseline economy was calibrated with a marital dissolution rate of 2%.

So changes of marital risk really affect employment decisions of married women. However, changes of women's employment in Spain during the past twenty years can be partially predicted by changes of marital risk, only if women have overestimated this source of risk. In any case, the increase of marital risk plays a role in explaining the decrease of fertility rate.

6.4 No transfers for children in case of divorce

In this Section it's explored the effect of a marital dissolution rate reduction in an economy in which divorce women don't receive money from their children's fathers. Results are shown in Table 15

The increase of the divorce rate can explain 42% of the observed reduction in fertility, similar to the case in which there is a transfer of income from men to divorce mothers. It should be taken

Table 15: **Experiment: reduction in marital dissolution rate**

	Model, 98	Model, 80	Data, 80	Model Change
Full-time empl Rate of High Edu	0.42	0.37	0.32	12%
Full-time empl Rate of Medium Edu	0.34	0.31	0.23	10%
Full-time empl Rate of Low Edu	0.21	0.14	0.14	50%
Part-time empl Rate of High Edu	0.29	0.29	0.35	-
Part-time empl Rate of Medium Edu	0.20	0.17	0.14	-
Part-time empl Rate of Low Edu	0.17	0.18	0.07	-
Average Number of dependents	1.75	2.18	3.22	-20%
Average Number of dependents of Low Edu	1.96	2.38	?	-
Full-time empl Rate of Women with dependents	0.20	0.18	?	-
Empl Rate of Single Women	0.84	0.95	0.66	-

into account that the dissolution of marriage implies not only less resources for the mother and their children, but also the lost of scales economies. Furthermore, the model is able to explain a considerable fraction of the increase of women´s employment for all educational groups (35%, 21% and 100% respectively). The lack of transfers to divorced women from the previous husband reduces available income in case of divorce and women decide to work more when divorce risk is higher. So uncertainty on the reception of transfers from the previous husband in case of divorce, that we are not considering, could by itself increase women´s employment when divorce rate increases.

7 Conclusions

In this paper it's found that the increase of marital dissolution induces a small increase of women´s employment rate, compared to what we observe in the data. If women have overestimated marital risk during the end of the nineties, a higher fraction of women's employment changes in Spain during the past twenty years could be predicted by changes of this source of risk. However, the increase of marital status uncertainty induces a considerable decrease of fertility rates. So part of the decrease of the fertility rate in Spain over the last twenty years can be explained for reasons other than the increase of women´s employment, that is the explanation

that it´s usually make to justify the decrease of fertility.

The model calibrated provides a good framework for making some policy experiments. In fact, at this moment in Spain, some policies are discussed as possible ways of reconciliating labor and family life and it´s necessary to evaluate the potential effects of them. So, the next project would be to use the model to measure the effects of certain policies, such as subsidies to child care, subsidies for children, subsidies to single mothers and others, on employment and fertility decisions.

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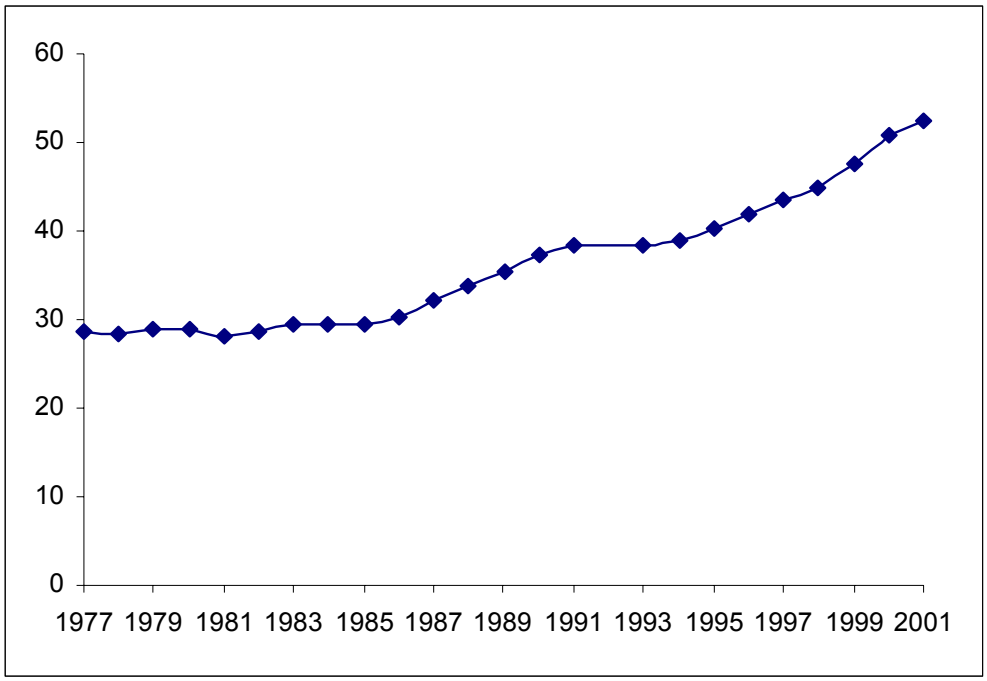
9 Appendix

9.1 Women's Employment Rate

Figure 1: Women's Employment Rate, 25-54



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9.2 Estimated Effects of Experience and Work Interruptions on Wages

Table 16: **Wage Equation**

	High Edu	Medium Edu	Low Edu
constant	705.0	610.0	610.0
exp	67.0	32.0	12.0
exp^2	-1.0	-0.3	.08
interruption	-700.5	-358.6	-245.0

European Household Panel, 1997.