The impact of childbirth on Spanish women's decisions to leave the labor market

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Abstract   The present paper analyzes the effect of childbirth on Spanish women's decisions to withdraw from paid work, defined here as the transition from employment to out of the labor force due to the requirements of household production. Decisions regarding fertility and labor market participation are interrelated and depend on individual and household characteristics, as well as external variables such as the availability of childcare services. We postulate that a female's decision to leave the labor market is taken in a household context, and thus is the outcome which maximizes household welfare after taking into account the employment and earnings characteristics of all household members. We pay special attention to the effect of the male partner's characteristics upon the female's decision to withdraw from the labor market. Our empirical results show that in order to better define social and labor market policies on work and family reconciliation, increased attention should be paid to the job characteristics of males given their effect on the optimal assignment of tasks within the household following childbirth.

Keywords   Labor market withdrawal · Employment transitions · Maternity decisions · Work and family reconciliation · Labor market policy · Childcare services

JEL Classification   J22 · J08 · D13

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1 Introduction and background

The gradual incorporation of women into the labor market characterized all developed economies during the second half of the twentieth century, leading to a continuous increase in female employment rates. The rise in the educational levels of women and, consequently, the higher opportunity cost of household production, are the main explanation for this secular trend. Not only have employment rates been affected by higher investment in female human capital, but also other social transformations have occurred. The postponement of marriage and maternity or the fall in fertility rates demonstrate that the increasing rate of return of female paid work has a far-reaching impact on modern society.

While the increasing female employment rate has helped to reduce the existing gender gap, some key differences still persist, particularly when we explore male and female employment rates across the life cycle from a household perspective. According to Eurostat figures for the EU-25,[1] the employment rate for childless women aged 20–49 is 75 %, but for women with children under 12 months this rate is only 60 %. By contrast, the employment rate for childless men is higher (86 %); a rate that is even higher (91 %) if they have children under 1 year old.

These figures can be explained coherently by the fact that some women leave the labor market following childbirth (Becker 1965). This "return to the home" may be related to strong female preferences for children as some authors have pointed out (Carrasco 2001; Alvarez-Llorente 2002; De la Rica and Ferrero 2003; Gutiérrez-Domènech 2008). Nevertheless, in most cases the explanation lies in the difficulties involved in reconciling work and family following childbirth (see OECD 2007, 2011; Eurostat 2007).

In this paper we explore the factors surrounding this "return to home" decision. We aim to analyze the effect of childbirth on women's decision to leave the labor market not as an isolated choice but as the result of a collective decision of a couple that reallocates their time after maternity. In particular, we study the effect of childbirth on the probability of transition from employment to out of the labor force[2] due to housework reasons as these are the only ones related with the production of home services and thus the only reasons that could be associated to difficulties in reconciling work and family.

Among the determinants of women's probability of leaving the labor market, we pay special attention to the effect that the male partner's job characteristics could have on this probability. As Mincer (1962) originally pointed out, the relative characteristics of the partners' employment have a relevant effect on women's decisions regarding their labor market participation. Nonetheless, to the best of our knowledge, these characteristics have not been sufficiently explored in the empirical literature.[3] Regarding such characteristics, we not only consider husband's wage as

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[1] See Alliaga (2005).

[2] Transitions from employment to unemployment, which represent 4 % of total employment flows, are not considered in this analysis.

[3] Other authors have also pointed out the lack of empirical literature analyzing the effect of male partners' job characteristics on women's labor market decisions (see, for instance, Esping-Andersen et al. 2007; Baizán 2007; Ahn and Mira 2001).

is common in the literature, but also analyze the effect of some covariates related to the existence of restrictions on the time that partners can dedicate to household production. Our initial hypothesis is that, after controlling for other relevant variables, the partner's job characteristics will have a non-negligible effect on the female's employment decision following maternity.

The interdependencies of decisions taken within the household have received increasing attention in theoretical and empirical economics since the seminal work of Mincer (1962) and the introduction of the collective approach to household behavior by Chiappori (1988, 1992, 1997) and Apps and Rees (1988). Under the collective model of household behavior, once the decision to have a child has been taken, both members must decide how much time should be reallocated to labor market activities, household production and leisure time in order to maximize household utility. As having a child increases the consumption of household resources, previously optimal decisions of household members regarding time allocation will be altered by the birth decision. As Rapoport et al. (2011) and Rizavi and Sofer (2010) point out, the impact of a child on the reallocation of time in a collective model among household members is not identical. When children are present, mothers and fathers increase their total hours of work (paid and unpaid work). Nonetheless, women strongly reduce market work, while fathers do not. One possible outcome of intra-household time reallocation is that one parent withdraws from the labor market and dedicates all of his (her) non-leisure time to household production (childcare). The findings of Fernandez-Val (2003) for the Spanish case confirm this view. Specifically, he shows that fertility variables are highly significant for women and have a negative impact on the female labor supply, but are not significant for men. It seems clear that, following childbirth, men and women re-evaluate their previous decisions concerning paid and unpaid work in an asymmetric manner.

The way that household members reallocate their time (among paid and unpaid activities) after maternity bears a close relationship with the gender wage gap. When there are wage differences between members of a household it may be fully rational that the individual with lower earnings will leave the labor market following maternity, while his (her) partner will increase his (her) time in paid work. This is the original idea of Mincer (1962), who argues that it is more likely that the wife will leave her job after childbirth if the male partner's income is higher. Nonetheless, other authors such as Rizavi and Sofer (2010) have raised an interesting issue. They find that the more a woman's partner earns relative to her, the less housework she performs. In addition, as these authors remark, the woman's wage also has a positive and significant impact upon external help. One possible reason for their result is that as the intensity of women's investment in their career increases, housework is substituted partially by men and partially by some kind of external paid help.

Although in a partial equilibrium analysis with exogenous wages the higher the wage gap, the more likely a woman is to drop out of the labor force following childbirth, the logical question is what causes it. Unsurprisingly, one of the most commonly cited causes of the gender wage gap is the transition from employment to out of the labor force following childbirth. As Apps and Rees (2005) note,

differences in earnings and employment between the sexes can be due to life cycle variations in time use (paid/unpaid work). In a similar vein, Gunderson (1989) argues that the differing childcare responsibilities of males and females may produce gender wage discrimination. Waldfogel (1997) states that such gaps can be partially explained by a human capital argument. Since women with children spend longer periods out of the labor market, their labor market experience and hence their level of human capital accumulation declines. The empirical literature shows that wage gaps are also observed between females with and without children. For instance, Molina and Montuenga (2009) compare the wages of mothers and non-mothers in the same period of time and find a wage penalty of about 9 % among mothers even after controlling for unobserved heterogeneity. Using data from the Spanish Continuous Sample of Working Histories, Fernández-Kranz and Rodrí-guez-Planas (2010) find that "mothers to be" compared to non-mothers present relevant increases in their wages several years before their first child, while their earnings after giving birth decrease in a significant manner.

Once the decision to have a child has been taken, other variables affect the optimal decisions regarding intra-household time allocation, namely the availability and cost of externally provided childcare services and the institutional characteristics of the labor market affecting job security.

The availability and cost of childcare services significantly affect women's decisions concerning non-market time versus time spent on paid work. One of the most commonly adopted social policy measures aimed at reducing gender inequalities is the provision of greater opportunities to combine market work and childbearing. Such policies reduce the cost of childcare services directly via subsidies or public childcare services, and indirectly through flexible working arrangements (part-time work, telework, etc.), thus allowing households to reduce their need for external childcare services while simultaneously maintaining the parents' sources of income. The explanatory power of these social policies have been demonstrated in empirical models of female labor supply. Del Boca et al. (2009) highlight that social policy differences across European countries partially explain the differences observed in women's labor market participation. Moreover, Kögel (2004) states that the increase in the availability of childcare services has been an important factor in converting the relationship between women's participation and fertility rates from negative to positive. Additionally, it has an effect not only on female labor supply, but could also affect fertility decisions. In this sense, Baizán (2009) finds that the availability of childcare services has a positive effect on the probability of having a child in Spain.

Finally, variables related to job security are also likely to affect female labor market participation and maternity decisions. These variables have received increased attention in recent empirical literature. Among them, the type of contract is the most cited (see for example Ahn and Mira 2001; De la Rica and Iza 2005; Esping-Andersen et al. 2007; Baizán 2009; Garcia-Ferreira and Villanueva 2007). Besides being more unstable, jobs with fixed-term contracts are usually paid less, thus reducing the opportunity cost of renouncing this type of jobs. In such cases, we would expect that women working with a temporary contract would be more likely to leave the labor market, especially after giving birth. This is particularly relevant

in Spain due to its highly segmented labor market.[4] For the same reasons we could expect unstable labor situations to have a negative effect on maternity decisions. The clearest evidence of this feature for the Spanish case was found by De la Rica and Iza (2005), who illustrated that childless women with fixed-term contracts delay their entry into maternity longer than those with permanent contracts.

In summary, we analyze the effect of childbirth on female labor market withdrawal decisions taking into account all these factors. The empirical analysis is based on microdata from the Spanish Labor Force Survey, which is the most appropriate statistical source for the analysis of labor market characteristics in Spain. This survey offers highly detailed information on the employment situation of all family members, as well as very rich information on household characteristics.

Furthermore, in order to account for the possible endogeneity surrounding the decision to have a child (see, among others, Bover and Arellano 1995; Carrasco 2001; Alvarez-Llorente 2002; De la Rica and Ferrero 2003; Gutiérrez-Domènech 2008; Baizán 2009; Angrist and Evans 1998), we follow Del Boca et al. (2009) and jointly estimate labor market withdrawal and maternity decisions using a bivariate probit model.

The paper is structured as follows. Following this introduction, Sect. 2 explains the database and variables and Sect. 3 presents a descriptive analysis of the job withdrawal decision. Sections 4 and 5 describe the econometric approach and discuss the empirical results, respectively. Lastly, Sect. 6 concludes.

2 Data and variables

The empirical analysis presented in this paper is based on microdata from the Spanish Labor Force Survey (*Encuesta de Población Activa*, EPA hereafter). The EPA is a quarterly survey which targets households and is the most important statistical database for the analysis of labor market characteristics in Spain. The sample comprises 60,000 households per quarter and involves approximately 180,000 individuals. Consequently, the EPA contains highly comprehensive information on the personal and labor characteristics of each household member and on household characteristics (see Garrido et al. 2000). The majority of the information in the EPA refers to the reference week, but the survey also includes several retrospective variables concerning the labor situation and job characteristics in the previous year.

The database comprises a pool of cross-sectional data corresponding to four waves of the second quarters of the EPA from 2001 to 2004. We have selected this period in order to obtain a sufficient number of observations as well as a homogenous sample. Due to Eurostat requirements, in 2005 there was a relevant methodological change in the EPA which affected the estimation of different labor

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[4] See, among others, Bentolila and Dolado (1994), Jimeno and Toharia (1993), Toharia and Malo (1999), Davia Rodríguez and Hernanz Martín (2004) and Dolado et al. (2002).

situations in a significant manner.[5] In addition, the business cycle changed in 2007, which restricted the potential period of analysis only to the years 2005 and 2006. For these two reasons we finally decided to analyze the period 2001–2004.

Our subsample consists of Spanish women aged 20–44 years cohabiting with their husbands (or partners) as either the householder or the householder's partner. As we have mentioned previously, we are interested in the effect that the male partner's job characteristics have on women's labor market withdrawal decisions. Thus, we only consider women whose partner is employed during the reference week (t), which represents 93 % of the initial subsample.[6] In addition, this selection allows us to guarantee that there is at least one labor income in the household.

We consider that a woman has decided to leave the labor market if she is out of the labor force due to housework reasons in the reference week of the survey (period t) and she declares that she was working 1 year ago (period $t - 1$). It is necessary to mention that individuals who are on parental leave during the reference week are considered to be employed in the Spanish Labor Force Survey. As we pointed out previously, we only focus on housework reasons because these are the only reasons that can be associated to the existence of difficulties in reconciling work and family. As the EPA contains very rich information about the possible reasons for not being in the labor force, we have excluded dropouts for reasons such as retirement, disability or studies from the analysis. In any case, housework is the main reason for women to leave their jobs. The final subsample consists of 29,534 women[7] with the characteristics mentioned above.

The variables used in the empirical analysis are summarized in Table 1 and classified into six categories: personal characteristics, having a newborn and other household characteristics, male partner's job characteristics, women's job characteristics and the availability of childcare services.

Personal characteristics include age (5 categories) and educational attainment (primary or less, secondary and tertiary). Having a newborn is a binary variable that is equal to 1 if we observe in period t that a woman has a child under 12 months of age and zero otherwise. This implies that for women with a newborn in period t, the childbirth occurred between period $t - 1$ (1 year prior) and period t (reference week).

Among household characteristics, we consider the existence of other children and their ages as well as a dummy indicating if there are grandparents cohabiting with

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[5] For a detailed description of the methodological changes introduced in 2005 see http://www.ine.es/daco/daco42/daco4211/menuepa05.htm.

[6] As we would expect, previous versions of the model presented here show that if the male partner is unemployed or out of the labor market, their wives would be less likely to leave the labor market. This result is coherent with previous studies such as Heckman and MaCurdy (1980, 1982) or Stephens (2002), who find that husbands' unemployment has a positive effect on female labor supply.

[7] If we were to consider all the reasons for being out of the labor market, our subsample would comprise 29,740 women (206 additional women). This implies that 0.69 % of employed women at $t - 1$ are out of the labor market in t for reasons other than household production (studying, retired, disability, being a pensioner and others). As a check of robustness we have also estimated the model considering all possible reasons for being out of the labor force. The results are in line with those presented in this paper (see "Appendix 2").

Table 1 Variables and definitions

	Variable definition
Personal characteristics (*t*)	*Age* (5 dummies)
	20–24
	25–29
	30–34
	35–39
	40–44
	Educational attainment (3 dummies)
	Primary or less
	Secondary
	Tertiary
Newborn (*t*)	*Have a newborn baby* (dummy variable equal to 1 if the woman has a child under 12 months in the reference week of the survey)
Household characteristics (*t*)	*Other children*
	Youngest child aged 1–2 (dummy variable equal to 1 if the youngest child is aged 1–2 years old)
	Youngest child aged 3–5 (dummy variable equal to 1 if the youngest child is aged 3–5 years old)
	Youngest child aged ≥6 (dummy variable equal to 1 if the youngest child is aged 6 years old and over)
	No children (dummy variable equal to 1 if the woman has no children)
	Married couple (dummy variable equal to 1 if the woman is married)
	Grandparents in the household (dummy variable equal to 1 if there are grandparents living in the household)
Partner's job characteristics (*t*)	*Estimated earnings* (6 dummies)
	<€15,000
	€15,000–€25,000
	€25,000–€35,000
	€35,000–€45,000
	€45,000–€60,000
	>€60,000
	Restrictions on time to dedicate to household production
	Long working hours (dummy variable equal to 1 if the husband has long working hours)
	Working in another region (dummy variable equal to 1 if the husband works in a region other than that of residence)
Women's job characteristics (*t* − 1)	*Occupation (4 dummies)*
	High earnings
	Moderate earnings
	Low earnings
	Very low earnings
	Class of worker (3 dummies)
	Private sector workers
	Public sector workers
	Non-employees

Table 1 Variables and definitions

	Variable definition
	Industry (4 dummies)
	Agriculture
	Manufacturing
	Construction
	Services
	Job security
	Seniority (years of seniority in the firm)
	Regional rate of jobs with fixed-term contracts for women aged 20–44 (52 regions, percentage)
	Regional unemployment rate for women aged 20–44 (52 regions, percentage)
Childcare services (*t*)	Regional rate of public and private kindergarten places for children aged 0–2 (percentage)

the couple. We also include marital status as a proxy of the degree of mutual commitment to the union.

Our analysis primarily focuses on the effect that the male partner's job characteristics have on the probability of a woman deciding to leave the labor market. Among these characteristics we consider two types of variables: the male partner's income and some covariates related to the existence of restrictions on the time that they can dedicate to childcare and housework. As the EPA unfortunately offers no information regarding wages, we estimate the male partner's earnings as a wage equation using microdata from the Spanish Structure of Earnings Survey (EES). As covariates, the estimated wage equation includes the male partner's age (and its square), detailed educational attainment, seniority, hours worked weekly, full-time or part-time worker, type of contract, workers of a private or public company, occupation (17 categories) and regional dummies (18 regions, Eurostat Nuts 2 level). After estimating the male partner's earnings, we group this variable into six categories.[8]

Two binary variables indicate if the male partner has time restrictions for household production: a dummy indicating whether the male partner has lengthy working hours (more than 40 h per week) and another dummy indicating if he works outside the region of residence (52 regions, Eurostat Nuts level 3).

Regarding women's job characteristics we include occupation (4 categories), class of worker (non-employees, public and private workers), industry (4 categories) and several variables related to job security, all of which refer to the previous year

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[8] To control for the potential distortions of this approach on the estimated coefficients, we also estimate the probability of labor market withdrawal by including variables which proxy the male partner's earnings. The results are available upon request from the corresponding author.

$(t − 1)$. Following a similar procedure[9] to the one proposed by Gutiérrez-Domènech (2005), we have classified occupation into four categories attending to the estimated earnings (high, moderate, low and very low). As regards job security variables, the empirical literature has shown that the type of contract is a very relevant variable in explaining withdrawal from the labor force. Nevertheless, type of contract is not included among the retrospective variables of the survey. Since the rate of permanent contracts grows exponentially with seniority, we use seniority[10] to proxy stable connection to employment, and hence job security. Regional rate of jobs with fixed-term contracts and regional unemployment rate are also included among the variables related to job security. Both variables are measured at the regional level (52 regions) for women aged 20–44.

Finally, as Baizán (2009), we measure the coverage ratio of childcare services in the place of residence as the ratio of total (public and private) kindergarten places for children aged 0–2 over the total number of children aged 0–2 in the region of residence (52 regions).

3 Descriptive analysis

In this section we explore the job withdrawal ratio among the different variables, focusing on the effect that having a newborn has on this ratio. The results are provided in Table 2, where columns 1 and 2 also show the main characteristics of the sample. Starting with these characteristics and as can be seen, 7.5 % of the women in our sample have a newborn baby (2,202 women), another 70.7 % have children over the age of 12 months, and the remaining 21.8 % are childless. The majority of the women are married and have tertiary studies, while a large number have only primary studies. Regarding male's job characteristics, the majority of the women's partners earn an estimated salary of €15,000–€25,000 euros, while only 15 % of them earn more than €35,000. As regards the male partner's time restrictions it is worth noting that one out of four works more than 40 hours a week, while only 3 % works in a province other than that of residence. In terms of women's job characteristics, most of them work as employees: 58 % in the private sector and another 27 % in the public sector. Nearly 40 % of women have less than 3 years of seniority and the majority of them work in low or very low paid

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[9] Using microdata from the Spanish Structure of Earnings Survey, we have estimated a wage equation for women aged 20–44. As covariates, the regression includes age, age squared, educational attainment, seniority in the firm, type of contract, and regional and occupation dummies. Using the estimated wage, we grouped the 66 occupations into four categories from "high earnings" to "very low earnings". We have used the classification derived from this procedure to group woman's occupation in $t − 1$ in the EPA. See "Appendix 3" for a detailed description of the classification.

[10] For those women that were working at $t − 1$ and continue working in t but in a different company (3 % of the entire sample), we do not know their exact seniority in the previous firm. In these cases we have used their seniority in t as their value for $t − 1$. This could imply that for these women, seniority could be under-measured. As the majority of workers who change companies are workers with short periods of seniority and also very high rates of temporary contracts, the potential under-measurement is very slight.

occupations. Finally, one out of three women lives in a region where the rate of kindergarten places is lower than 5 %.

Focusing now on the job withdrawal ratio (JWR hereafter), we have defined the JWR as the percentage of women who being employed in $t − 1$ have withdrawn from the labor market and are therefore out of the labor force in t. Columns 3–6 in Table 2 provide information on this JWR, which is close to 6 % for the entire sample. The last column shows the relative ratio between the JWR for women with a newborn baby and childless women. As we can see, the JWR is 19.2 % for women with newborns. This is almost 5 times higher than the JWR for childless women and nearly four times higher than mothers with children over 1 year old.

Examining this JWR along the different characteristics, we can observe in all cases that having a newborn significantly increases the percentage of women that withdraw from the labor market after having a child, but the intensity of the effect depends on the observed characteristics. In addition to the well-known effects that personal characteristics have on women's labor market decisions (the JWR decreases with age and education), other variables play a relevant role in women's decisions to leave the labor market.

Starting with the male partners' job characteristics, the descriptive analysis suggests an inverse relationship between the female JWR and male earnings. This effect is clear for the lowest-paid groups for which the female withdrawal ratio is over 10 % and falls to around 4 % for the rest of cases. Once more the JWR grows significantly when there is a newborn: in this case women whose partners have a low income display a JWR close to 30 %, which falls to 15–20 % for other wage groups. A priori, these figures contrast with the general finding in the economic literature of a negative relationship between male partners' earnings and women's labor market participation. As we will explain below in Sect. 5, several explanations could support this inverse relation. One possible argument is that if the husband's wages are high, the family income will increase and they will be more likely to pay for external childcare services and, as a consequence, women will not need to leave the labor market after childbirth.

In addition, the figures suggest that if husbands (or partners) have restrictions on the time they can dedicate to housework, this will affect women's decisions to leave the labor market. In general terms, withdrawal increases if the male partner works more than 40 hours per week or if he works in a province other than the one of residence. If they have a newborn, data show that women whose husbands have long working hours have a JWR which is 9 percentage points higher than women whose partners work less than 40 hours a week. This difference is especially relevant if we take into account that around one out of four of households in the sample are in this situation. If the husband works outside the region of residence, having a newborn increases the JWR to nearly 26 %. Once more, the figures are important, although this characteristic only affects 3 % of households. In any case, when focusing on the relative JWR, the effect of childbirth seems to be higher if the husband has long working hours than if he is working in another province.

Other variables seem to have a relevant effect on women's labor market withdrawals. The data on women's job characteristics show an inverse relation between wages (proxied by occupation) and labor market withdrawal, which can be

Table 2 Sample characteristics and job withdrawal ratio

	Sample		Job withdrawal ratio (JWR), (%)				Relative
	No. obs	%	Total	Newborn	Children >12 months	No children	JWR (4)/(6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total	29,534	100.0	5.8	19.2	4.9	4.0	4.8
Personal characteristics							
Women's age							
20–24	614	2.1	12.7	50.0	15.7	6.6	7.6
25–29	3,411	11.5	9.7	30.9	11.7	4.9	6.3
30–34	7,206	24.4	7.3	18.2	6.5	3.6	5.1
35–39	8,922	30.2	5.0	10.9	4.8	2.9	3.8
40–44	9,381	31.8	3.5	11.7	3.5	2.2	5.3
Women's education							
Primary or less	10,935	37.0	9.6	36.6	8.0	9.1	4.0
Secondary	6,779	23.0	5.0	19.3	3.8	3.9	4.9
Tertiary	11,820	40.0	2.7	10.4	2.0	1.5	6.9
Household characteristics							
No children	6,447	21.8	4.0	–	–	4.0	–
Newborn	2,202	7.5	19.2	19.2	–	–	–
Youngest child aged 1–2	3,586	12.1	5.9	–	5.9	–	–
Youngest child aged 3–5	4,659	15.8	5.1	–	5.1	–	–
Youngest child aged ≥6	12,640	42.8	4.5	–	4.5	–	–
Married	27,436	92.9	5.8	18.5	4.8	4.4	4.2
Non-married	2,098	7.1	5.3	31.2	7.1	2.7	11.6
Grandparents in the household	846	2.9	5.0	11.5	4.7	5.1	2.3
No grandparents	28,688	97.1	5.8	19.3	4.9	4.0	4.8
Male partner's job characteristics (t)							
Partner's estimated earnings							
<€15,000	5,506	18.6	10.1	28.6	9.4	6.4	4.5
€15,000–€25,000	13,677	46.3	5.3	16.5	4.7	3.2	5.2
€25,000–€35,000	6,013	20.4	4.1	15.8	3.4	2.8	5.6
€35,000–€45,000	2,158	7.3	3.8	15.5	3.0	3.3	4.7
€45,000–€60,000	1,279	4.3	4.1	22.7	3.3	1.8	12.6
>€60,000	901	3.1	4.4	20.9	3.8	2.3	9.1
Husband working more than 40 h/week	7,929	26.8	6.8	26.1	5.5	4.6	5.7
Husband working less than 40 h/week	21,605	73.2	5.4	16.8	4.7	3.8	4.4
Husband working in another province	871	2.9	7.9	25.7	6.4	6.2	4.1
Husband working in the same province	28,663	97.1	5.7	18.9	4.8	3.9	4.8
Woman's job characteristics (t − 1)							
High earnings occupation	3,565	12.1	1.5	4.3	1.3	0.6	6.8
Moderate earnings occupation	8,080	27.4	2.7	8.7	2.3	1.8	4.9
Low earnings occupation	9,159	31.0	6.2	23.4	4.8	4.6	5.1
Very low earnings occupation	8,730	29.6	9.9	36.4	8.3	7.9	4.6

Table 2 continued

	Sample		Job withdrawal ratio (JWR), (%)				Relative
	No. obs	%	Total	Newborn	Children >12 months	No children	JWR (4)/(6)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Class of worker							
Non-employees	4,649	15.7	4.3	13.1	4.0	2.6	5.0
Public sector workers	7,888	26.7	2.3	7.6	2.0	1.4	5.4
Private sector workers	16,997	57.6	7.8	25.2	6.7	5.0	5.0
Industry							
Agriculture	940	3.2	10.9	44.2	9.0	11.1	4.0
Manufacturing	3,582	12.1	8.2	25.8	6.9	6.5	4.0
Construction	475	1.6	4.8	18.6	4.7	0.8	24.6
Services	24,537	83.1	5.2	17.7	4.4	3.6	5.0
Job security: seniority							
<6 months	4,511	15.3	8.2	29.1	8.1	5.0	5.8
6–12 months	1,775	6.0	19.8	46.7	20.6	8.9	5.2
1–3 years	4,716	16.0	8.9	24.7	8.6	4.7	5.3
3–10 years	9,269	31.4	4.0	13.5	3.2	2.3	5.9
≥10 years	9,263	31.4	2.1	9.9	1.5	3.0	3.3
Job security: % of fixed-term contracts							
<30 %	4,884	16.5	2.8	13.1	2.3	1.1	11.9
30–50 %	20,365	69.0	5.8	19.7	4.7	4.5	4.4
≥50 %	4,285	14.5	9.1	23.0	8.3	5.9	3.9
Job security: unemployment rate							
<10 %	6,019	20.4	5.2	19.9	4.3	3.3	6.0
10–15 %	8,812	29.8	4.8	16.1	4.1	3.3	4.9
15–25 %	10,709	36.3	6.1	19.7	5.1	4.6	4.3
≥25 %	3,994	13.5	7.9	22.6	6.7	5.9	3.8
Childcare services							
Kindergarten places (0–2 years)							
<5 %	10,832	36.7	7.4	20.7	6.6	5.5	3.8
5–10 %	5,873	19.9	5.8	22.2	4.5	4.5	4.9
10–25 %	6,760	22.9	4.9	16.9	4.1	3.8	4.4
≥25 %	6,069	20.5	3.6	15.8	2.9	1.9	8.3

Source Spanish Labor Force Survey for principal calculations and Ministry of Education for kindergarten places

explained by the higher opportunity cost of leaving the labor market for those women with high wages. As in the other cases, the JWR increases significantly when there is a newborn, and is higher than 36 % for women working in very low paid jobs. Nevertheless, when we compare women with newborns to childless women the JWR increases in a relevant manner (almost seven times higher even when the women work in a high paid job). Concerning the class of worker, and consistently with the feature that public sector working conditions are more compatible with childbearing, we observe that public sector workers display the

lowest JWR. For women with newborns, the difference between private and public sector workers is far greater: over 25 % for the former and less than 8 % for the latter. Considering seniority, women with less than 1 year of seniority have the highest JWR, although it is also high for women whose seniority is between one and 3 years.[11] This is consistent with what we would expect as lesser seniority is related to a lack of job security and, consequently, higher unemployment risk. In all cases, the JWR increases significantly for women with a newborn, especially for shorter periods of seniority.

Finally, we can also see that job withdrawal falls as the ratio of regional kindergarten places increases, thus suggesting that a higher provision of childcare services could allow women to remain employed and better combine paid work and family.

To summarize, the descriptive analysis presented here shows that having a newborn baby greatly increases the percentage of women that leave their jobs after childbirth. Apart from women's personal characteristics, the figures suggest that husbands' job characteristics have a non-negligible effect on women's decisions to leave the labor market. Specifically, women appear to be less likely to leave their jobs if their husbands' earnings are high, probably because this would allow them to buy external childcare services. On the other hand, if their husbands work long hours or if they work outside the region of residence, their wives will also be more likely to leave their jobs. The effects of women's job characteristics are the expected ones as higher wages or better working conditions reduce the job withdrawal ratio. In addition, the greater availability of childcare places appears to reduce the job withdrawal ratio.

4 Econometric approach

The empirical model we estimate in this section establishes that a woman's decision to leave the labor market depends on observed individual characteristics, having or not a newborn and other household composition variables. From a household perspective and taking into account the relevant effect that the male partner's job characteristics could have on females' labor market decisions, the model also considers husband's earnings and variables related to restrictions on the time they can dedicate to household production as covariates. Finally, woman's job characteristics (especially those associated to job security and working conditions) and the availability of childcare services are included as explanatory variables.

In particular, the female decision to withdraw from the labor market is defined by the latent variable J_i^* as:

$$J_i^* = V_i\beta^V + B_i\beta^B + H_i\beta^H + P_i\beta^P + E_i\beta^E + C_i\beta^C + \varepsilon_{1i} \tag{1}$$

where V_i is the row vector of personal characteristics, B_i is the variable indicating if the female has a newborn in period t, H_i comprises factors regarding household composition, P_i is the vector including the male partner's job characteristics and E_i

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[11] During the period of analysis the maximum duration of a fixed-term contract in the Spanish legislation was 3 years.

the ones related to a woman's job characteristics at $t-1$. Finally, C_i denotes the availability of childcare services and ε_{1i} is an error term.

We define the indicator variable as $J_i = 1$ if the latent variable $J_i^* > 0$ for cases in which an employed woman in $t-1$ is out of the labor force (due to household production reasons) in period t, and as $J_i = 0$ if she remains employed. In such cases we estimate $\Pr(J_i = 1) = V_i\beta^V + B_i\beta^B + H_i\beta^H + P_i\beta^P + E_i\beta^E + C_i\beta^C$, where the parameter β^B measures the effect of childbirth on this transition from employment to out of the labor force.

As having a baby is not an exogenous decision, in order to control for the potential endogeneity of the variable B_i, the empirical model includes another specification for the childbirth decision. As in standard models of fertility, the explanatory factors included in the equation for the maternity decision comprise personal, household characteristics and male partner's earnings. However, as we pointed out in the introduction, there exists empirical evidence about other variables affecting childbirth decisions. Thus, the specification of a woman's decision to have a baby also includes other covariates related to job security as well as other woman's job characteristics and the availability of childcare services. Finally, the specification for the maternity decision also includes other job aspects of the male partners.

Thus, the childbirth decision is defined by the latent variable B_i^* as:

$$B_i^* = V_i\gamma^V + H_i\gamma^H + P_i\gamma^P + E_i\gamma^E + C_i\gamma^C + \varepsilon_{2i} \tag{2}$$

where V_i, H_i, P_i, E_i and C_i are the vectors of the variables explained above and ε_{2i} is an error term.

Regarding Eq. (2) we define the indicator variable as $B_i = 1$ if the latent variable $B_i^* > 0$ when a woman i has a newborn baby in the reference week of the survey and $B_i = 0$ otherwise. Then, for the decision to have a child we estimate $\Pr(B_i = 1) = V_i\gamma^V + H_i\gamma^H + P_i\gamma^P + E_i\gamma^E + C_i\gamma^C$.

As the labor market withdrawal decision and the maternity decision are interrelated, we assume that both ε_{1i} and ε_{2i} are identically distributed as a standard bivariate normal distribution with correlation ρ. This correlation reflects the interrelations between labor market participation decisions and childbirth decisions. As the two error terms ε_{1i} and ε_{2i} are correlated, we estimate the joint probability of labor market withdrawal and childbirth by Eq. (3):

$$\begin{aligned}\Pr(J_i = 1, B_i = 1) = F_\rho(&V_i\beta^V + H_i\beta^H + P_i\beta^P + E_i\beta^E + C_i\beta^C + B_i\beta^B \\ &+ V_i\gamma^V + H_i\gamma^H + P_i\gamma^P + E_i\gamma^E + C_i\gamma^C) \end{aligned} \tag{3}$$

where F_ρ is the bivariate normal distribution function with zero means, unit variance and correlation ρ.

5 Results

In this section we discuss the results of the joint estimation of the female job withdrawal decision and the maternity decision expressed by Eq. (3). These results are given in Table 3. For each equation, the first two columns report the regression

coefficients and their robust standard errors. The rest of the table details the marginal effects calculated for the univariate predicted probability of deciding to leave the labor market [$Pr(J_i = 1)$, column 3] and of deciding to have a child [$Pr(B_i = 1)$, column 6]. The last column of the table shows the marginal effects calculated for the predicted conditional probability of labor market withdrawal, which is, in fact, the probability we are interested in [$Pr(J_i = 1|B_i = 1)$].

In general terms, the econometric results point in the same direction as the descriptive analysis. Even after controlling for other observed variables affecting women's decisions to leave the labor market, having a newborn significantly increases the probability that a woman will decide to leave her job. While the descriptive analysis showed that childbirth increased the job withdrawal ratio, the econometric results show that, once we take into account other factors, the difference in the probability between women who have a newborn and childless women remains positive and quite significant. As can be seen in Table 3 (columns 3 and 7), the estimated marginal probability of withdrawal is 6.2 percentage points higher for women with newborns than for childless women, and rises to about 10 percentage points if we consider the marginal effects on the conditional probability, thus reinforcing the convenience of considering the endogeneity of having a baby. These results are consistent with previous studies of the Spanish female labor supply. For example, De la Rica and Ferrero (2003) find that female labor participation is lower for women with newborns, but the effect is much higher when they take into account the endogeneity of the fertility variable. In addition, women with children over 1 year old are also more likely to leave their jobs. Furthermore, it can be seen that the younger the child, the more likely women are to withdraw from labor force. Regarding the childbirth decision, as expected, the existence of other children in the household has a negative and highly significant effect on the probability of giving birth, and is stronger as the number of other children increases.

Concerning the other factors surrounding both probabilities and for expositional purposes, we first describe the main findings related to husbands' job characteristics and then those referred to the women's job characteristics as well as childcare services. Finally, we briefly discuss the effects of the other variables.

In line with the descriptive analysis, the results confirm that male partners' earnings have a negative effect on female labor market withdrawal. This result contrasts with Mincer (1962), who postulated that the higher the male partner's income, the more likely the wife would be to withdraw from her job after childbirth. Two possible explanations can account for the inverse relation we observe between male wages and female participation. On the one hand, if the husband's wages are high, the household income will increase and they will be more likely to pay for external childcare services. Consequently, women will not need to leave the labor market as the household childcare needs can be covered by means of paid external help.

On the other hand, an alternative explanation could follow from the assortative mating theory. As women and men are matched positively in couples, women in couple with men who earn more are also likely to earn more, making women more prone to remain in the labor market after childbirth. Focusing on the specific estimated marginal effects and taking as the reference category households with the

Table 3 Joint estimation of women's job withdrawal decision and maternity decision (bivariate probit model)

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c] $p(J_i = 1 \mid B_i = 1)$
	Coef.	Robust SE	Marginal effects[c] $p(J_i = 1)$	Coef.	Robust SE	Marginal effects[c] $p(B_i = 1)$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household characteristics (H_i)							
No children (ref.)							
Having a newborn (B_i)	0.49	(0.167)***	0.062	–	–	–	0.104
Youngest child aged 1–2	0.26	(0.054)***	0.027	–	–	–	0.048
Youngest child aged 3–5	0.14	(0.053)**	0.013	–	–	–	0.023
Youngest child aged ≥6	0.07	(0.051)	0.006	–	–	–	0.011
Number of children: 1	–	–	–	−0.22	(0.029)***	−0.049	0.007
Number of children: 2	–	–	–	−1.08	(0.043)***	−0.147	0.044
Number of children: 3 or more	–	–	–	−1.01	(0.085)***	−0.144	0.041
Married	0.13	(0.059)**	0.010	0.53	(0.054)***	0.100	0.003
Grandparents in the household	0.03	(0.083)	0.003	–	–	–	0.005
Male partner's job characteristics t (P_i)							
Partner's estimated earnings: <€15,000 (ref.)							
€15,000–25,000	−0.11	(0.033)***	−0.010	0.01	(0.033)	0.004	−0.019
€25,000–35,000	−0.03	(0.048)	−0.002	0.08	(0.045)*	0.021	−0.007
€35,000–45,000	−0.07	(0.068)	−0.005	0.14	(0.060)**	0.037	−0.013
€45,000–60,000	−0.09	(0.082)	−0.007	0.01	(0.078)	0.003	−0.013
>€60,000	−0.07	(0.094)	−0.005	0.08	(0.093)	0.021	−0.012
Husband working in another province	0.22	(0.071)***	0.022	−0.04	(0.070)	−0.009	0.040
Husband working more than 40 h/week	0.09	(0.034)***	0.008	−0.03	(0.033)	−0.008	0.015
Personal characteristics (V_i)							
Women's age: 25–29 (ref.)							
20–24	0.02	(0.075)	0.001	0.04	(0.077)	0.011	0.001
30–34	−0.06	(0.043)	−0.005	0.20	(0.036)***	0.053	−0.014
35–39	−0.14	(0.047)***	−0.010	−0.01	(0.043)	−0.003	−0.018
40–44	−0.23	(0.056)***	−0.016	−0.72	(0.058)***	−0.121	−0.011
Women's education: secondary (ref.)							
Primary studies	0.24	(0.035)***	0.024	−0.03	(0.035)	−0.009	0.044
Tertiary studies	−0.14	(0.043)***	−0.010	0.07	(0.033)**	0.018	−0.021
Woman's job characteristics t − 1 (E_i)							
Occupation classification: very low earnings (ref.)							
High earnings	−0.55	(0.072)***	−0.028	0.13	(0.048)***	0.034	−0.057
Moderate earnings	−0.33	(0.043)***	−0.020	0.04	(0.038)	0.009	−0.040
Low earnings	−0.16	(0.031)***	−0.015	0.03	(0.033)	0.006	−0.028
Professional status: private sector employee (ref.)							
Employer/self-employed	−0.14	(0.042)***	−0.010	−0.03	(0.040)	−0.008	−0.019
Public sector employee	−0.24	(0.042)***	−0.016	0.04	(0.032)	0.010	−0.031

Table 3 continued

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c] p ($J_i = 1 \mid B_i = 1$)
	Coef.	Robust SE	Marginal effects[c] p ($J_i = 1$)	Coef.	Robust SE	Marginal effects[c] p ($B_i = 1$)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Job security							
Years of seniority in firm	−0.05	(0.003)***	−0.004	0.01	(0.002)**	0.001	−0.007
Percentage of fixed-term contracts[a]	0.01	(0.002)***	0.001	0.00	(0.002)	0.000	0.002
Unemployment rate (%)[b]	−0.01	(0.003)**	−0.001	0.00	(0.003)	0.000	−0.001
Childcare services (C_i)							
0–2 years Kindergarten places: less than 5 % (ref.)							
5–<10 %	−0.08	(0.069)	−0.006	0.02	(0.069)	0.006	−0.013
10–<25 %	−0.19	(0.081)**	−0.019	−0.07	(0.078)	−0.017	−0.031
25 % and more	−0.24	(0.103)**	−0.016	−0.07	(0.095)	−0.017	−0.029
Rho		0.27					
Number of observations		29,534					

Wald test of rho = 0; chi2 = 9.71398; prob > chi2 = 0.0018; log pseudolikelihood = −12,001.04

The regressions include a constant term, 3 dummies for industry, 16 regional dummies and 3 dummies for period

* Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level

[a] Measured at regional level (provinces, Nuts3) for women aged 20–44

[b] Measured at regional level (provinces, Nuts3) from Ministry of Education (www.mec.es)

[c] Reference group in the marginal effects calculations: No children, married, no grandparents in the household, partner's estimated earnings €15,000–€25,000, partner working in the same province of residence and under 40 h per week, 25–29 years old, secondary studies, low-income occupation, private sector employee, working in service sector, 7.4 years of seniority in the firm (mean), living in a region (Nuts3) with 40 % fixed-term contracts and an unemployment rate of 16 %, living in a region (Nuts3) with a 10–25 % ratio of 0–2 year kindergarten places. The reference region (Nuts2) and period of reference are Andalusia and 2001, respectively

lowest estimated income, the estimations show that for all other income groups women are less likely to withdraw, although the difference is only significant for partners with an estimated salary lower than €25,000.

With respect to the maternity decision, the effect of husbands' labor income shows a positive effect on the maternity decision. This is in line with the theoretical and empirical literature as having a child is a costly decision and, all else being equal, a higher income would allow families to have more children. Nevertheless, the estimated coefficient is only significant for earnings under €45,000.

A noteworthy result is that male partners' working conditions have a very significant effect on women's decisions to withdraw from the labor market. Our empirical results show that male partners' working conditions have an important and highly significant effect on the probability of the female partner leaving the labor market as these working conditions determine the amount of time that male partners can dedicate to childcare and housework. Obviously, the time that husbands spend on childcare depends on their preferences, but also on their job characteristics.

As we stated earlier, our analysis focuses on the time that male partners cannot dedicate to childcare due to family-unfriendly jobs.

Specifically, the econometric results indicate that if the male partner has long working hours, the probability of the wife withdrawing increases by about 1.5 percentage points. This effect increases if he works outside the region of residence, as in this case his wife will be 4 percentage points more likely to withdraw. These results reinforce the conviction that family policies must take into account not only working women, but also the male population as tough working conditions for men negatively affect women's possibilities for reconciling work and family, thus prompting women to quit their jobs. Nonetheless, neither a husband with long working hours nor one working in another region has a significant effect on maternity decisions.

As concerns women's job characteristics and consistently with the higher opportunity cost of leaving the labor market when earning high wages, the probability of withdrawal is lower as the wage increases, and is very significant for all the occupational groups. The class of worker has an important and strongly significant effect on the probability of labor market withdrawal. Compared to private sector workers, public sector and non-employees are less likely to withdraw. The marginal effect in the conditional case for both of them is 3.1 percentage points over the reference group. This could be related to better working conditions in the public sector such as more flexible hours, which make it easier for people to combine work and family (see, for instance, Amuedo-Dorantes et al. 2010). For the same reason, we would expect that women working in the public sector would be more likely to have a newborn. Nevertheless, and despite the fact that the estimated coefficient is positive, it does not appear to have a significant effect on childbirth decisions. This finding is similar to that of Esping-Andersen et al. (2007) when determining the likelihood of second births.

As regards factors related to job security, our results point out, as expected, that higher levels of job security reduce the probability of leaving the labor market and increase the probability of having a child. Specifically, seniority in the firm has a negative effect on the likelihood of job quitting. The estimated marginal effect conditional to having a child predicts that a woman with five additional years of seniority will reduce her probability of labor dropout by 3.5 percentage points. In addition, higher levels of job security (longer periods of seniority) improve individuals' confidence about their future income, thus increasing the probability of having a baby, which is in line with the results of De la Rica and Iza (2005) as well as Ahn and Mira (2001). In the same vein, living in a region with a high percentage of fixed-term contracts increases the probability of job withdrawal. On the other hand, a high unemployment rate reduces the probability of women's labor market withdrawal. A possible explanation for this feature is that when the unemployment rate is high, women know that if they leave their jobs it will be more difficult to return to the labor market. This is a relevant issue as it indicates that in many cases the labor market withdrawals that we are observing are not permanent. In this sense, family policies such as maternity leave appear to be an accurate measure to allow temporary withdrawals and ensure labor market re-entry. In contrast, we do not find that the quantity of fixed-term contracts or the unemployment rate have any effect

on the probability of having a child. This coincides with the results of Ahn and Mira (2001), who find that the increase in the Spanish unemployment rate has had a negative effect on age at marriage, but a much lower effect on the probability of maternity.

Concerning the regional provision of childcare services, our empirical estimations show that a higher provision of childcare services decreases the likelihood of job withdrawal. Similar results have been obtained by Del Boca et al. (2009) for a panel of European countries. In our estimations, the effect is only significant if the percentage of kindergarten places is over 10 %. These results could have important implications: increasing the number of kindergarten places seems to be an effective measure, but only if it achieves a minimum rate, which we have estimated at around 10 %. Nonetheless, the marginal effect for regions with 10–25 and 25 % and over compared to the reference category is approximately the same, thus suggesting that a more than 25 % increase in the provision of childcare services will not reduce female labor market withdrawal. On the subject of how the availability of childcare services could affect the probability of having a child, similar to Del Boca et al. (2009) but contrary to Baizán (2009), we do not find a significant effect.

Focusing on the rest of the variables, the results regarding the effects of age and education are consistent with the well-known effects from previous literature (see, for instance, Dex et al. 1998; Gutiérrez-Domènech 2005). The probability of withdrawing from the labor market is reduced with age and education due to the higher opportunity cost of labor market withdrawal since human capital accumulates with both age (labor experience) and educational attainment.

Concerning the probability of having a child, our data show a positive effect of age for women under 35. This is in line with the postponement of marriage and maternity observed in most advanced economies, which is mainly explained by the increase in female labor force participation.[12] Regarding education, our estimations show an interesting result as women with higher levels of education appear to be more likely to have a child. Although this result contrasts with the traditional inverse relationship between education and fertility, it points in the same direction as some recent empirical evidence which claims that this relationship has become positive in several countries.[13] For instance, Baizán (2009) finds that women with a low educational level have significantly higher rates of first birth, while the effect is exactly the opposite for second and higher-order births.

Finally, being married has a small positive effect on the probability of leaving the labor market, while the stability of the couple represented by marriage has a clearly positive and highly significant effect on the childbirth decision.[14] Despite the results

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[12] Other authors, such as Oreffice (2007), have also highlighted the delay and reduction of fertility caused by birth control technologies and abortion laws.

[13] See Esping-Andersen et al. (2007), Kögel (2004) and Ahn and Mira (2002) for a review of the change in the relationship between fertility and education.

[14] We also have estimated the model for the subsample of married women and the results are very similar (see "Appendix 1"). Due to the lack of observations, we have not estimated the model for the subsample of non-married women.

of Alba-Ramirez and Alvarez-Llorente (2004) concerning the presence of grand-parents in the household, we do not find that this has a significant effect on the probability of job withdrawal. This non-significance could be related to the reduction in the percentage of grandparents cohabiting with their families, but also to the fact that we cannot consider whether there are grandparents living near the household but not in it.

Summing up, the analysis of the factors surrounding the decision of a woman to leave the labor market show that having a newborn continues to exert a clearly negative effect on women's employment situation, as women with newborns are much more likely to withdraw from the labor market. Several factors, such as the woman's personal and job characteristics, have a significant effect on this decision. In addition, once we control for all these factors, we find empirical evidence that the male partner's job characteristics have a significant effect on women's labor market decisions, especially if the husband has long working hours or if he works in a region different than the one of residence. If women's labor market decisions are affected by the non family-friendly working conditions of their partners, measures aimed at reconciling work and family should take account of both women and men.

6 Conclusions

In this paper we analyze the effect of childbirth on the probability that a woman will decide to leave the labor market in Spain. We use pooled, cross-sectional microdata for the period 2001–2004 drawn from the Spanish Labor Force Survey. In particular, we analyze the effect of having a child on the transition from employment to out of the labor force due to housework reasons since this transition is the only type which can be related strictly to difficulties in reconciling work and family. We pay special attention to the effect of the male partner's characteristics on withdrawal decisions. As childbirth is not an exogenous decision, we jointly estimate the probability of job withdrawal and the probability of giving birth using a bivariate probit model.

Our first result is that despite recent improvements in the availability of facilities for women to reconcile work and family, having a newborn continues to have a negative and very significant effect on women's labor market decisions.

Among the factors affecting this decision, the male partner's job characteristics have a relevant effect on women's employment decisions. First, the empirical results show, in general terms, a negative relationship between husbands' income and women's probability of job quitting. This suggests that if the household income is high enough to afford the market price of childcare services, women will decide to continue in the labor market after childbirth. Another possible explanation is that as women and men are matched positively in couples, women in couple with men who earn more are also likely to earn more, thus increasing their opportunity cost of leaving the labor market.

Second, and as a confirmation of the interdependence of the labor supply decisions of household members, the results show an empirical connection between the time that male partners can dedicate to childcare and women's decisions to withdraw from the labor market. All other things equal, the results show that if the male partner works long hours or if he works outside the region of residence, his female partner will be more likely to leave the labor market. Attending to this result, family policies should focus greater attention on male working conditions.

As other authors have pointed out, women's job characteristics proved to be highly relevant and significant in determining the probability of job withdrawal. Women working in high paid jobs or in a family-friendly environment such as the public sector will be less likely to withdraw from the labor market since public sector employees in Spain are well protected and benefit strongly from reconciliation policies. Job security is another relevant issue for female workers. According to other studies, our empirical results show that women with longer periods of seniority, who are also more likely to have a permanent contract, have a lower probability of job withdrawal.

Finally, the estimations show that the availability of childcare services has a negative and significant effect on the probability of female labor market withdrawal. Nevertheless, the results we obtained suggest that increasing the availability of kindergarten places is not an accurate measure in all cases. Specifically, our results suggest that the effect on the probability of job withdrawal is only significant when the percentage of kindergarten places increases to 10 %, but increasing the places above 25 % does not lead to additional reductions in the probability of job withdrawal.

Appendix 1

See Table 4.

Table 4 Joint estimation of women's job withdrawal decision and maternity decision (bivariate probit model), married women

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c] p ($J_i = 1$ | $B_i = 1$)
	Coef.	Robust SE	Marginal effects[c] p ($J_i = 1$)	Coef.	Robust SE	Marginal effects[c] p ($B_i = 1$)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household characteristics (H_i)							
No children (ref.)							
Having a newborn (B_i)	0.474	(0.185)***	0.059	–	–	–	0.096
Youngest child aged 1–2	0.226	(0.056)***	0.023	–	–	–	0.039
Youngest child aged 3–5	0.111	(0.055)**	0.010	–	–	–	0.018
Youngest child aged ≥ 6	0.032	(0.053)	0.003	–	–	–	0.005
Number of children: 1	–	–	–	−0.236	(0.030)***	−0.054	0.007
Number of children: 2	–	–	–	−1.123	(0.044)***	−0.156	0.041
Number of children: 3 or more	–	–	–	−1.029	(0.086)***	−0.151	0.037
Married	–	–	–	–	–	–	–
Grandparents in the household	0.036	(0.084)	0.003	–	–	–	0.005
Male partner's job characteristics t (P_i)							
Partner's estimated earnings							
$<$€15,000 (ref.)							
€15,000–25,000	−0.118	(0.035)***	−0.011	0.008	(0.035)	0.002	−0.019
€25,000–35,000	−0.037	(0.049)	−0.003	0.077	(0.047)	0.021	−0.007
€35,000–45,000	−0.087	(0.071)	−0.007	0.121	(0.063)*	0.033	−0.015
€45,000–60,000	−0.077	(0.085)	−0.006	0.008	(0.081)	0.002	−0.011
$>$€60,000	−0.057	(0.096)	−0.005	0.070	(0.097)	0.019	−0.010
Husband working in another province	0.219	(0.073)***	0.022	−0.029	(0.071)	−0.007	0.039
Husband working more than 40 h/week	0.091	(0.036)**	0.008	−0.041	(0.034)	−0.010	0.016
Personal characteristics (V_i)							
Women's age							
25–29 (ref.)							
20–24	0.075	(0.088)	0.007	0.094	(0.088)	0.025	0.009
30–34	−0.076	(0.045)*	−0.006	0.191	(0.038)***	0.054	−0.015
35–39	−0.157	(0.049)***	−0.011	−0.020	(0.044)	−0.005	−0.020
40–44	−0.236	(0.059)***	−0.016	−0.738	(0.060)***	−0.129	−0.012
Women's education: secondary (ref.)							
Primary studies	0.247	(0.037)***	0.026	−0.055	(0.036)	−0.014	0.045
Tertiary studies	−0.121	(0.045)***	−0.009	0.086	(0.035)**	0.023	−0.018

Table 4 continued

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c] p ($J_i = 1$ | $B_i = 1$)
	Coef.	Robust SE	Marginal effects[c] p ($J_i = 1$)	Coef.	Robust SE	Marginal effects[c] p ($B_i = 1$)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Woman's job characteristics $t - 1$ (E_i)							
Occupation classification: very low earnings (ref.)							
High earnings	−0.546	(0.074)***	−0.028	0.141	(0.050)***	0.039	−0.054
Moderate earnings	−0.334	(0.045)***	−0.021	0.030	(0.040)	0.008	−0.039
Low earnings	−0.147	(0.032)***	−0.014	0.032	(0.035)	0.008	−0.025
Professional status: private sector employee (ref.)							
Employer/self-employed	−0.144	(0.044)***	−0.011	−0.044	(0.042)	−0.011	−0.018
Public sector employee	−0.250	(0.043)***	−0.017	0.021	(0.034)	0.005	−0.031
Job security							
Years of seniority in firm	−0.046	(0.003)***	−0.004	0.005	(0.003)**	0.001	−0.007
Percentage of fixed-term contracts[a]	0.010	(0.002)***	0.001	−0.002	(0.002)	0.000	0.002
Unemployment rate (%)[b]	−0.010	(0.004)***	−0.001	0.002	(0.003)	0.000	−0.002
Childcare services (C_i)							
0–2 years Kindergarten places: < than 5 % (ref.)							
5–<10 %	−0.101	(0.071)	−0.008	0.037	(0.071)	0.010	−0.015
10–<25 %	−0.228	(0.084)***	−0.023	−0.055	(0.081)	−0.015	−0.037
25 % and more	−0.274	(0.106)***	−0.018	−0.058	(0.099)	−0.015	−0.032
Rho	0.254						
Number of observations	27,436						

Wald test of rho = 0; chi2 = 6.85111; prob > chi2 = 0.0089; log pseudolikelihood = −11180.03

* Statistically significant at the .10 level; ** at the .05 level; *** at the .01 level

The regressions include a constant term, 3 dummies for industry, 16 regional dummies and 3 dummies for period

[a] Measured at regional level (provinces, Nuts3) for women aged 20–44

[b] Measured at regional level (provinces, Nuts3) from Ministry of Education (www.mec.es)

[c] Reference group in the marginal effects calculations: No children, no grandparents in the household, partner's estimated earnings €15,000–€25,000, partner working in the same province of residence and under 40 hours per week, 25–29 years old, secondary studies, low-income occupation, private sector employee, working in service sector, 7.4 years of seniority in the firm (mean), living in a region (Nuts3) with 40 % fixed-term contracts and an unemployment rate of 16 %, living in a region (Nuts3) with a 10–25 % ratio of 0–2 year kindergarten places. The reference region (Nuts2) and period of reference are Andalusia and 2001, respectively

Appendix 2

See Table 5.

Table 5 Joint estimation of women's job withdrawal decision and maternity decision (bivariate probit model). All reasons of being out of the labor force

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c] $p (J_i = 1 |$ $B_i = 1)$
	Coef.	Robust SE	Marginal effects[c] $p (J_i = 1)$	Coef.	Robust SE	Marginal effects[c] $p (B_i = 1)$	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household characteristics (H_i)							
No children (ref.)							
Having a newborn (B_i)	0.463	(0.165)***	0.063	–	–	–	0.100
Youngest child aged 1–2	0.218	(0.051)***	0.024	–	–	–	0.041
Youngest child aged 3–5	0.092	(0.050)*	0.009	–	–	–	0.016
Youngest child aged ≥6	0.035	(0.048)	0.003	–	–	–	0.006
Number of children: 1	–	–	–	−0.221	(0.029)***	−0.050	0.007
Number of children: 2	–	–	–	−1.079	(0.043)***	−0.149	0.042
Number of children: 3 or more	–	–	–	−1.007	(0.084)***	−0.145	0.038
Married	0.131	(0.055)**	0.011	0.529	(0.053)***	0.101	0.004
Grandparents in the Household	0.014	(0.081)	0.001	–	–	–	0.002
Male partner's job characteristics t (P_i)							
Partner's estimated earnings: <€15,000 (ref.)							
€15,000–25,000	−0.103	(0.032)***	−0.010	0.014	(0.033)	0.004	−0.018
€25,000–35,000	−0.041	(0.046)	−0.004	0.077	(0.045)*	0.020	−0.009
€35,000–45,000	−0.039	(0.064)	−0.004	0.134	(0.060)**	0.036	−0.010
€45,000–60,000	−0.053	(0.078)	−0.005	0.013	(0.077)	0.003	−0.009
>€60,000	−0.061	(0.090)	−0.005	0.077	(0.093)	0.020	−0.012
Husband working in another province	0.172	(0.069)**	0.019	−0.038	(0.070)	−0.009	0.033
Husband working more than 40 h/week	0.088	(0.033)***	0.009	−0.028	(0.032)	−0.007	0.016
Personal characteristics (V_i)							
Women's age: 25–29 (ref.)							
20–24	0.043	(0.072)	0.004	0.046	(0.076)	0.012	0.006
30–34	−0.045	(0.041)	−0.004	0.194	(0.036)***	0.054	−0.012
35–39	−0.127	(0.045)***	−0.011	−0.007	(0.042)	−0.002	−0.018
40–44	−0.215	(0.054)***	−0.017	−0.720	(0.058)***	−0.123	−0.011
Women's education: secondary (ref.)							
Primary studies	0.214	(0.034)***	0.024	−0.038	(0.035)	−0.009	0.041
Tertiary studies	−0.107	(0.040)***	−0.009	0.070	(0.033)**	0.018	−0.018

Table 5 continued

	Job withdrawal decision ($J_i = 1$)			Maternity decision ($B_i = 1$)			Marginal effects[c]
	Coef.	Robust SE	Marginal effects[c] p ($J_i = 1$)	Coef.	Robust SE	Marginal effects[c] p ($B_i = 1$)	p ($J_i = 1$ | $B_i = 1$)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Woman's job characteristics $t - 1$ (E_i)							
Occupation classification: very low earnings (ref.)							
High earnings	−0.533	(0.066)***	−0.032	0.132	(0.047)***	0.036	−0.060
Moderate earnings	−0.328	(0.041)***	−0.023	0.037	(0.038)	0.009	−0.042
Low earnings	−0.150	(0.030)***	−0.016	0.027	(0.033)	0.007	−0.028
Professional status: private sector employee (ref.)							
Employer/self-employed	−0.170	(0.041)***	−0.014	−0.039	(0.040)	−0.010	−0.023
Public sector employee	−0.229	(0.039)***	−0.018	0.035	(0.032)	0.009	−0.032
Job security							
Years of seniority in firm	−0.046	(0.003)***	−0.004	0.005	(0.002)**	0.001	−0.008
Percentage of fixed-term contracts[a]	0.010	(0.002)***	0.001	−0.002	(0.002)	0.000	0.002
Unemployment rate (%)[b]	−0.008	(0.003)***	−0.001	0.002	(0.003)	0.000	−0.001
Childcare services (C_i)							
0–2 years Kindergarten places: < than 5 % (ref.)							
5–<10 %	−0.055	(0.067)	−0.005	0.027	(0.069)	0.007	−0.009
10–<25 %	−0.203	(0.078)***	−0.023	−0.062	(0.078)	−0.016	−0.035
25 % and more	−0.215	(0.098)**	−0.017	−0.068	(0.094)	−0.017	−0.028
Rho	0.248						
Number of observations	29,740						

Wald test of rho = 0; chi2 = 8.34324; prob > chi2 = 0.0039; log pseudolikelihood = −12,647.589

* Statistically significant at the .10 level ** at the .05 level *** at the .01 level

The regressions include a constant term, 3 dummies for industry, 16 regional dummies and 3 dummies for period

[a] Measured at regional level (provinces, Nuts3) for women aged 20–44

[b] Measured at regional level (provinces, Nuts3) from Ministry of Education (www.mec.es)

[c] Reference group in the marginal effects calculations: No children, married, no grandparents in the household, partner's estimated earnings €15,000-€25,000, partner working in the same province of residence and under 40 hours per week, 25–29 years old, secondary studies, low-income occupation, private sector employee, working in service sector, 7.4 years of seniority in the firm (mean), living in a region (Nuts3) with 40 % fixed-term contracts and an unemployment rate of 16 %, living in a region (Nuts3) with a 10–25 % ratio of 0–2 year kindergarten places. The reference region (Nuts2) and period of reference are Andalusia and 2001, respectively

Appendix 3

See Table 6.

Table 6 Occupation classification for women

Occupations with high earnings	
10 Senior officials and legislators	23 Legal professionals
11 Chief executives (≥10 employees)	24 Business and administration professionals
12 Retail and wholesale trade managers (<10 employees)	26 Science and engineering associate professionals
14 Other services managers (<10 employees)	27 Health associate professionals
20 Science and engineering professionals	61 Skilled ranching workers
21 Health professionals	70 Mining, manufacturing and construction supervisors
Occupations with moderate earnings	
13 Hotel and restaurant managers (<10 employees)	33 Finance and commercial support professionals
15 Retail and wholesale trade managers without employees	34 Other clerical support workers
16 Hotel and restaurant managers without employees	40 Numerical and material recording clerks
17 Other services managers without employees	63 Skilled fishery workers
22 Teaching professionals	73 Sheet and structural metal supervisors
25 Social and cultural professionals	75 Blacksmiths, toolmakers and related trades workers
28 Teaching professionals with higher education	80 Stationary plant and machine supervisors
29 Other associate professionals with higher education	82 Machine operators supervisors
30 Science and engineering associate professionals	
Occupations with low earnings	
31 Health associate professionals	72 Building finishers, painters and related trades workers
41 Librarians, archivists and curators	74 Workers in extractive industries
42 Office machine operators	76 Machinery mechanics and repairers
43 Other clerical support workers (no customer services)	77 Precision machinery mechanics, handicraft and printing trade workers
44 Other clerical support workers (customer services)	79 Wood working, garment and other craft and related trades workers
45 Travel consultants and clerks	81 Stationary plant and machine operators
46 Cashiers and ticket clerks	83 Machine operators
52 Protective services workers	84 Assemblers
53 Sales workers	85 Locomotive engine drivers and related workers
60 Market-oriented skilled agricultural workers	92 Cleaners and helpers
62 Skilled agricultural workers	95 Mining laborers
71 Building frame and related trades workers	
Occupations with very low earnings	
32 Early childhood educators and Ship and aircraft controllers and technicians	91 Domestic, hotel and office cleaners and helpers
35 Other associate professionals	93 Other elementary occupations in services
50 Cooks, waiters and bartenders	94 Agricultural, forestry and fishery laborers
51 Personal service workers	96 Construction laborers

Table 6 continued

78 Food processing and related trades workers	97 Manufacturing laborers
86 Car, van and motorcycle drivers	98 Transport and storage laborers
90 Elementary occupations (trade)	

Source Main classification from Spanish National Occupation Classification 1994 (CNO-1994)

Occupation classification procedure: Using microdata from the Spanish Structure Earnings Survey, we have estimated a wage equation for women aged 20 to 44. As covariates, the regression includes age, age squared, educational attainment, seniority in the firm, type of contract, and regional and occupation dummies. Using the estimated wage, we grouped the 66 occupations into four categories from "high earnings" to "very low earnings". We have used the classification derived from this procedure to group woman's occupation in $t - 1$ in the EPA

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