

# THE EFFECT OF FERTILITY ON THE DECISION OF ABANDONING THE LABOUR MARKET: THE CASE OF SPAIN

Preliminary version

May 2007

Ainhoa Herrarte-Sánchez<sup>(\*)</sup> Julián Moral-Carcedo<sup>(\*\*)</sup> Felipe Sáez-Fernández<sup>(\*\*\*)</sup>

***Abstract:** Taking into account the negative relationship between fertility and female labour participation due to the necessity of dedicating more time to childcare, in this paper we analyse, with a logit model and using microdata from the Spanish Labour Force Survey, the effect of having a newly born child on the woman's decision to abandon the labour market, considering household characteristics and other economic variables which affected their labour participation decision. Our results show that having a newborn increases the woman's probability of abandoning the labour market. We also find that this probability is reduced if there are any grandparents living in the household.*

**JEL Classification:** J13, D13

**Keywords:** female labour transitions to inactivity, fertility, household production, reconcile work and family

(\*) Dpto. de Análisis Económico: Teoría Económica e Historia Económica, Universidad Autónoma de Madrid. [ainhoa.herrarte@uam.es](mailto:ainhoa.herrarte@uam.es)

(\*\*) Dpto. de Análisis Económico: Teoría Económica e Historia Económica, Universidad Autónoma de Madrid. [julian.moral@uam.es](mailto:julian.moral@uam.es)

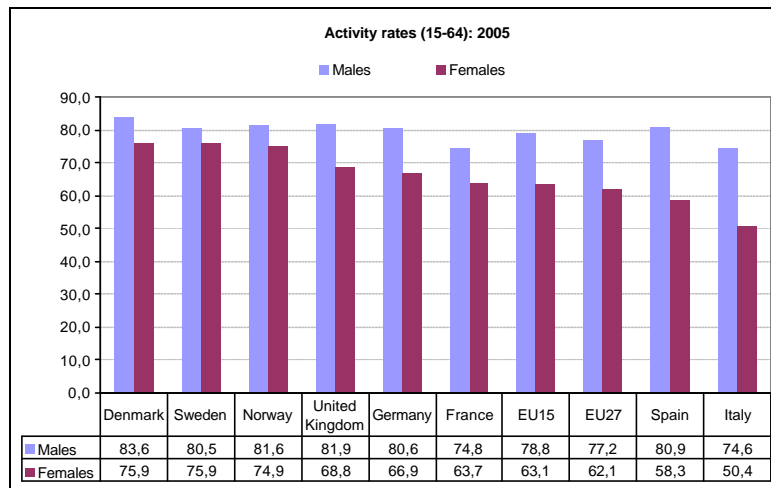
(\*\*\*) Dpto. de Análisis Económico: Teoría Económica e Historia Económica, Universidad Autónoma de Madrid. [felipe.saez@uam.es](mailto:felipe.saez@uam.es)

## 1. Introduction

All the developed countries have experienced an important increase in the female labour market participation during the second half of the twentieth century. This feature has also affected Spain, but the Spanish female labour participation is already lower than the rest of developed countries. In the case of Spain, an increase of almost 30% has been observed since the mid-seventies.

Graph 1 shows the activity rates by gender in some European Union countries. As can be seen, males have higher activity rates than women in all the countries represented. Nevertheless, the differences between males and females are smaller in some countries like Sweden, Norway and Denmark, where this difference in the participation rate is lower than 10%; on the contrary, countries like Italy and Spain have differences higher than 20%. In the case of Spain the male's activity rate is 80.9% in 2005 while the female's is 58.3%. These large differences are usually explained by the traditional role of women in society and especially within the households, because traditionally women have carried out the household production, taking care of children and other housework (Lehrer and Nerlove (1986)).

**Graph 1. Males and females activity rates in some European Union countries: 2005**



Source: Eurostat, Regio database

In any country the main reason which explains the large increase in the female labour participation is related to the rise in their educational level because their positive effect on higher wages, and consequently, on higher opportunity cost of working at

home. These changes have led to increases in the time that women want to offer in the labour market and, logically, to reductions in the time they want to dedicate to household production. Nevertheless, the rise in the female labour market participation is not only related to personal characteristics. Productivity increases in housework due to the higher technology has had a positive effect on the labour supply because it allows spending less time in the household production and taking into account that these activities have been carried out usually by women, the rise in technology has affected positively the female labour supply and consequently their activity rates.

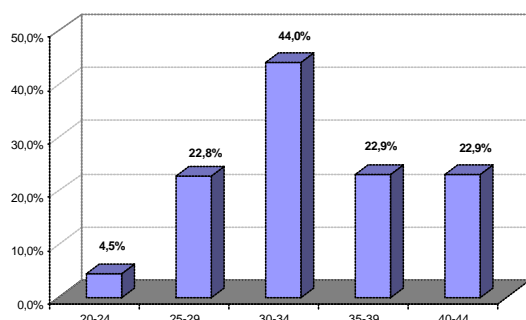
The gradual incorporation of women into the labour market has affected their role in society and politicians have recently realised their relevance in the economy and have promoted a change in their policies. At this moment every developed country has designed measures whose aim is to increase women's activity rates and to reconcile work and family.

Despite these measures to reconcile work and family and progress in the sharing of housework between men and women ("Ley de Igualdad", approved in march 2006), fertility has yet a clear negative effect on female labour participation as it implies the necessity of dedicating more time to children care (Willis (1987), Novales and Mateos (1990), Bover and Arellano (1995), Hotz et al. (1997), Fernandez-Val (2003), Kornstad and Thoresen (2006), Herrarte and Saez (2007), among others).

Some simple descriptives confirm that view. Graph 2 represents the percentage of Spanish women who have a newborn. As can be seen, more than 85% of these women are between 26 and 38 years old, although the highest percentage is for women between 30 and 34 years who represent 44%. Looking at graph 3, can be also observed a reduction of the female activity rate for the most fertile groups of ages: activity rates for women from 25 to 29 years is 79.8% while this percentage falls until 67.3% for women from 40 to 44 years.

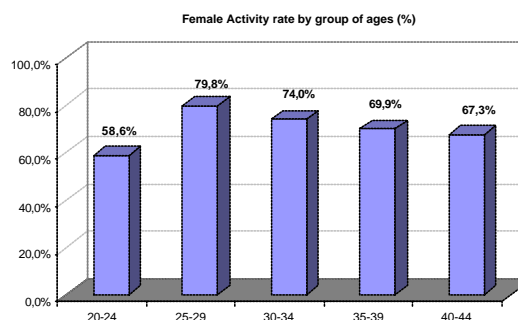
## Graphs 2 and 3

**G2. Spanish women<sup>(\*)</sup> who have newborn babies (< 1 year). 2004.Q2**



(\*) Only householders or partners  
Source: Main calculations, Spanish Labour Survey

**G3. Female activity rates by groups of ages, 2004.Q2**



Source: Spanish Labour Survey

Comparing to women from 25 to 29 years, the fallen in activity rates of older women indicates that a portion of women who were working when they were between 25 and 29, abandon the labour market some years after. One of the main reasons that could make a woman leave the labour market is fertility, since the necessity of dedicating more time to children care and due to the difficulties to reconcile work and family.

Additionally, when we look at people's main reasons of inactivity (Table 1), we can observe that for men between 20 to 44 years the main reason of inactivity is "be student" (61.8%), while for women is "dedicating to housework" (64.7%). Furthermore, this reason is especially high for women in the most fertile ages, for whom this percentage is higher than 80%.

**Table 1. Reasons of inactivity. %, 2004.Q2**

	Males						Females					
	20-24	25-29	30-34	35-39	40-44	Total	20-24	25-29	30-34	35-39	40-44	Total
Students	89,6%	67,8%	22,5%	5,2%	0,9%	61,8%	80,6%	34,5%	7,0%	3,7%	2,7%	27,5%
Retired	0,0%	0,1%	0,8%	1,4%	10,1%	1,2%	0,0%	0,0%	0,0%	0,0%	0,3%	0,1%
Housework	1,1%	4,1%	7,0%	8,6%	8,0%	3,7%	14,5%	57,3%	<b>84,0%</b>	<b>88,9%</b>	<b>86,8%</b>	64,7%
Disabled	2,6%	9,4%	28,8%	41,6%	49,4%	14,9%	1,1%	2,5%	2,9%	3,3%	4,2%	2,8%
Beneficiaries	0,3%	1,1%	4,7%	8,2%	9,8%	2,6%	0,2%	0,7%	1,9%	1,9%	3,6%	1,7%
Others	6,5%	17,4%	36,2%	35,0%	21,8%	15,9%	3,6%	5,1%	4,2%	2,1%	2,3%	3,3%
Total	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%	100,0%

Source: Spanish Labour Force Survey

Moreover, table 2 shows how employed people distribute children care. As can be seen, in the case of employed men, their wives are those who take care of children in 50% of the cases, while this percentage is only 11% when we look at women. Moreover, women employed take care of children themselves in 34.4% of the cases, while this percentage drops to 20% amongst men.

**Table 2. Employed people between 16 and 64 years old who have one child or more, by childcare services. Thousands people and %, 2005**

	Males		Females	
	Total	%	Total	%
<b>Total</b>	3791,70	100,0%	2499,70	100,0%
<b>Specialized centres</b>	628,00	16,6%	676,70	27,1%
<b>Partner</b>	<b>1900,90</b>	<b>50,1%</b>	<b>292,50</b>	<b>11,7%</b>
<b>Family</b>	475,30	12,5%	652,20	26,1%
<b>Themselves</b>	762,00	20,1%	859,90	34,4%
<b>Don't know</b>	25,60	0,7%	18,40	0,7%

Source: Spanish Labour Force Survey, Reconcile work and family special module

All these data reflected clearly that women are who dedicate more time to the household production, and consequently, in many cases, they have to renounce to work in the labour market, abandoning the labour market after having children. This claim can be observed more clearly looking at labour transitions flows data. Table 3 represents transitions flows between 2004 and 2003 and data show that more than 20% of women who were employed or unemployed in 2003 are inactive in 2004 if they have a newborn; this percentage is near 7% if they don't. However, men who have a newborn change to inactivity from 2003 to 2004 only in 1.6% of the cases. Additionally, near 18% of women who were working one year ago leaves their work after having a newborn; the percentage is 1.2% between men.

**Table 3. Labour transitions flows. Spanish Males and females from 20 to 45 years cohabiting with their partner. 2004.Q2**

			Current labour situation (2004.Q2 week of reference)				
			Employed	Unemployed	Inactive	Total	
Females	No newborn	Labour sit. 1year ago	Employed	91.1%	4.6%	4.3%	100%
			Unemployed	35.0%	45.5%	19.5%	100%
			Active	81.4%	11.7%	<b>6.9%</b>	100%
			Inactive	7.9%	5.9%	86.2%	100%
	Newborn	Labour sit. 1year ago	Employed	78.6%	3.5%	17.8%	100%
			Unemployed	30.4%	27.9%	41.6%	100%
			Active	73.8%	6.0%	<b>20.2%</b>	100%
			Inactive	5.0%	2.7%	92.2%	100%
Males	No newborn	Labour sit. 1year ago	Employed	96.7%	2.7%	0.6%	100%
			Unemployed	59.2%	34.8%	5.9%	100%
			Active	94.8%	4.3%	<b>0.9%</b>	100%
			Inactive	28.8%	6.1%	65.1%	100%
	Newborn	Labour sit. 1year ago	Employed	96.6%	2.2%	1.2%	100%
			Unemployed	66.9%	23.8%	9.3%	100%
			Active	94.9%	3.4%	<b>1.6%</b>	100%
			Inactive	51.2%	0.0%	48.8%	100%

Only men and women who are householders or partners  
Source: Main calculations, Spanish Labour Force Survey (EPA)

Our main objective is to analyse how fertility affects this labour decision. Any study which analyses the female labour market participation decision has to include the existence of children in the household and the age of these children as explanatory variables. Nevertheless it is well known that women usually take care of children not only by their traditional social role but also due to their preferences for children. In this sense many recent studies (Carrasco (2001), Alvarez-Llorente (2002), De la Rica and Ferrero (2003), Gutiérrez-Domènech (forth.), among others) point out that fertility is also an endogenous variable which depends on the activity rate. In other words, there are some unobservable characteristics that affect the fertility rate and the participation decision: probably women that participate in the labour market have fewer preferences for children than women that do not.

Particularly, in the case of Spain the rise in the female activity rate has led to an important reduction in the fertility rate (De la Rica and Ferrero (2003), Gutiérrez-Domènech (forth.)), despite the recent increase due to the rise in the immigrant ratio.

The majority of Spanish studies on the effect of fertility on female labour participation focus on women's participation decision. In this study we attempt to analyse how giving birth affects female labour market flows. In other words, knowing

that some women leave work when they have a newborn as we showed in table 3, we want to analyse the effect of having a newborn, if it exists, on the decision of leaving the labour market.

The paper is organized as follows. Section 2 discusses the theoretical aspects of household labour decision models with home production. Section 3 describes the data used in the empirical model, section 4 presents the econometric model and the estimations results and Section 5 concludes.

## **1. Household labour supply: theoretical foundations**

Female participation in the labour market must be analysed in the more general setting of household labour decision models. In this field, collective models (Chiappori, 1988 and 1992) constitute the more generally accepted approach to dealing with the theoretical study of individual labour decisions within the household, since the failure of the unitary model to explain some empirical facts, as pointed out by Blundell, et al. (2007). In contrast to the unitary model, which assumes that the household is the decision unit, the collective model considers that each household member has their own egoistic preferences but acts cooperatively, leading to Pareto efficient outcomes. Early versions of collective models (Chiappori, 1988, 1992) do not contemplate the existence of household production, hence, the non-participation of females in the labour market is interpreted as a large consumption of leisure which is, obviously, unrealistic, as is pointed out by Apps and Rees (1997). When one household member is highly specialized in household production, Chiappori (1997), a low level of market labour supply can reflect a reallocation of time from market labour to household production, instead of higher levels of leisure consumption.

This distinction between leisure time, household production time, and labour market time is a key issue in order to explain observed differences in wage elasticity of labour supply of household members, much larger for wives than for husbands. As Mincer (1962) points out, these differences rest on the divergences in the distribution of time of each partner. Since for wives, household production is the major alternative to market work, and both are more substitutable activities than leisure (the main alternative for full-time market activity of husbands), it is more likely that wage elasticity would be higher for wives than for husbands.

Another non-trivial question related to household production, as Chiappori (1997) remarks, is whether household production is marketable or not, and thus, whether a market price can be assigned to the commodity produced internally. If so, it opens the possibility of partial production, buying a certain quantity in the market, or excess production, selling in the market any possible excess.

There are several examples of types of household production relevant to the analysis of household market labour supply, particularly in the labour supply of females. One of the most cited in the literature is the case of childcare (Mincer, 1962, Chiappori, 1997 among others). Having a child is a costly decision; the cost of a child is not only the value of the consumption of market and others domestically produced goods (house cleaning, meal preparation, laundry services,) but also the value of the parental time spent in child care. As Apps and Rees (2000) remark, the time costs of childcare and domestic work is largely those of the female partner, so having a child is reflected mainly in the female market labour supply. The findings of Fernandez-Val (2003), among others, in the Spanish case confirm that view, showing that fertility variables are highly significant and have a negative impact on female labour supply, while for men they are not significant.

Having a child is important, not only in terms of household production and time distribution of household members, but also in terms of household welfare, since having a child must be a decision that reports utility to their parents, making it a desirable choice. Children are usually considered as a public good, so the time spent in their care by one of the partners benefits both of them, so it could be considered as the main source of interdependence in the preferences of spouses. Spanish Labour Market Survey data confirms that view, as we showed in Table 1, where it is illustrated that the main reason for inactivity of women between 30 and 44 years is childcare.



## 2.1. A collective model with household production of a public good

The theoretical model that we discuss here is a variation of the collective model of Chiappori (1997), where we introduce household production of a public good. The individual utilities for household member,  $i$ , is represented by  $U^i(x_i, y_i, l_i)$ , where,  $x_i$ , is the consumption of composite market good of member  $i$ ,  $y$ , represents consumption of the public good “childcare” that can be produced internally by the household, and,  $l_i$ , leisure of member  $i$ .

As is usual in collective models, we assume that the household decisions are Pareto efficient, so they can be represented through the solutions of the following problem,

$$\text{Max } H(x_1, x_2, y, l_1, l_2, t_1, t_2) = (1 - \lambda)U^1(x_1, y, l_1) + \lambda U^2(x_2, y, l_2) \quad [1.]$$

Where  $\lambda$ ,  $0 < \lambda < 1$ , is the relative weight of member  $i$  in the household, or alternatively, the measure of bargaining “power” distribution between the husband and wife.

The allocation of time and consumption decisions of household members is subject to the following set of constraints:

- Allocation of time constraint (total time available is normalized to one)

$$1 = h_i + t_i + l_i, \quad \forall i, j \quad [2.]$$

Where  $h_i$  is the amount of time allocated in labour market activities,  $t_i$  the time employed in household production and  $l_i$  is leisure time.

- Budget constraint

$$x_1 + x_2 + py = \sum_i (w_i h_i + m_i) + ph(t_1, t_2) \quad [3.]$$

where  $w_i$  is the wage of member  $i$ ,  $m_i$  is the non-labour income of member  $i$ ,  $p$  is the market price of public good  $y$  (the price of good  $x$  is set to unity),  $h(t_1, t_2)$  is the function of production of public good  $y$ , where we assume that  $h$  exhibits constant returns to scale (Chiappori, 1997) .

- Non negativity constraints

$$h_i, t_i, l_i \geq 0 \quad [4.]$$

- Minimum level of « child care »

$$y \geq y^* \quad [5.]$$

This later constraint reflects the minimum level of household production that must be achieved in order to guarantee an acceptable level of “child care”. This minimum level can be thought of as a function that depends on several variables, such as child number, child age (newborns need more intensive care), socioeconomic status, etc. Imposing this constraint could lead to changes in optimal allocations if the minimum level of “childcare” is an active or binding constraint, but this type of sensitivity analysis is not the objective of including this equation. That minimum level of childcare can be seen as a previous and exogenous decision relative to the optimal number of children that the couple has decided to have. Every possible decision has a minimum level of associated childcare named  $y^*$ , given that level, the couple solves the program [1] subject to [2] to [4].

Assuming that the bargaining power are the same for both members of the household ( $\lambda=0.5$ ), and that both members share the same utility function, first order conditions on consumption of goods  $x$ ,

$$\frac{\partial U^1}{\partial x_1} = \frac{I}{(1-I)} \frac{\partial U^2}{\partial x_2} \quad [6.]$$

It follows that, assuming that utility functions and preferences<sup>1</sup> are the same for both members, the level of  $x$  consumption would be the same for the husband and the wife, so any differences in private consumption indicates a non-equal distribution of power inside the household.

Bargaining power also affects the household labour market supply, but from first order maximization conditions it follows that, irrespective of bargaining power, disparity in working time can be caused by differences in wages, as equation [7] shows.

---

<sup>1</sup> Some authors remarks that preferences are not the same for wives and husbands, in particular for children. Divergences in marginal utilities, regardless of bargaining power, also lead to differences in optimal consumption, as shows equation [6].

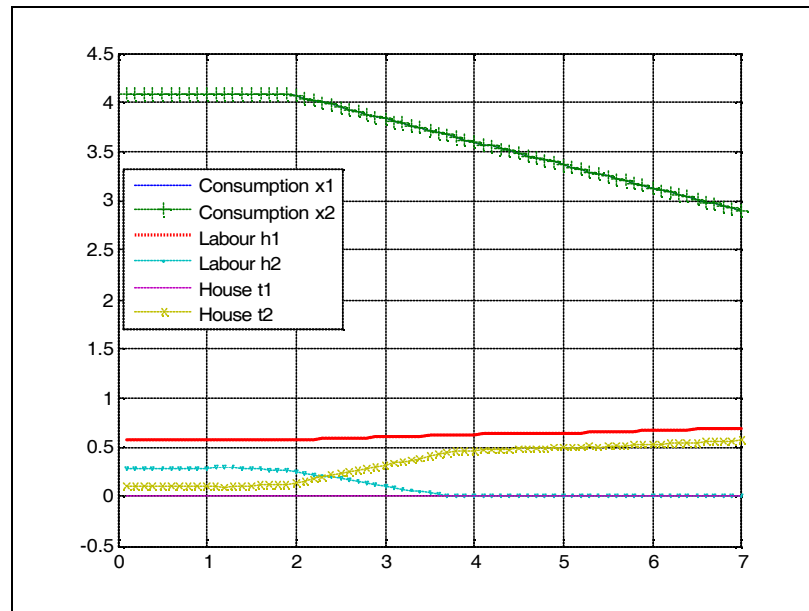
$$\frac{\partial U^1}{\partial h_1} = \frac{1}{(1-I)} \frac{w_1}{w_2} \frac{\partial U^2}{\partial h_2} ; \quad [7.]$$

Divergence in market wages between household members also matters with respect to the time devoted to household production. Maximizing [1] with respect to  $t_i$  gives the condition

$$\left[ \frac{\partial H}{\partial y} + \mathbf{q} \right] \frac{\partial F}{\partial t_i} + \mathbf{m} w_i = 0 ; \quad [8.]$$

Where  $\theta$  is the Kuhn-Tucker multiplier associated to constraint [5]. From this equation, it follows that the relative wage,  $\frac{\partial F}{\partial t_1} / \frac{\partial F}{\partial t_2} = w_1 / w_2$ , must be equal in the optimum, to the ratio of marginal productivities in household production. If there is no difference in productivities, and the function of home production exhibits decreasing returns, equation [8] implies that the non-market time would be higher in the member with a lower wage.

**Graph 4. Model simulation**



Note: This figure presents the optimal decisions on variables of model defined by [1] to [5] when level  $y^*$  is increasing linearly from 0 to 7. The utility function employed is separable and of Cobb-Douglas type,

$$H(x_1, x_2, y, l_1, l_2, t_1, t_2) = (1-I)[\mathbf{a} \log x_1 + \mathbf{b} \log l_1 + \mathbf{g} \log y] + I[\mathbf{a} \log x_2 + \mathbf{b} \log l_2 + \mathbf{g} \log y]$$

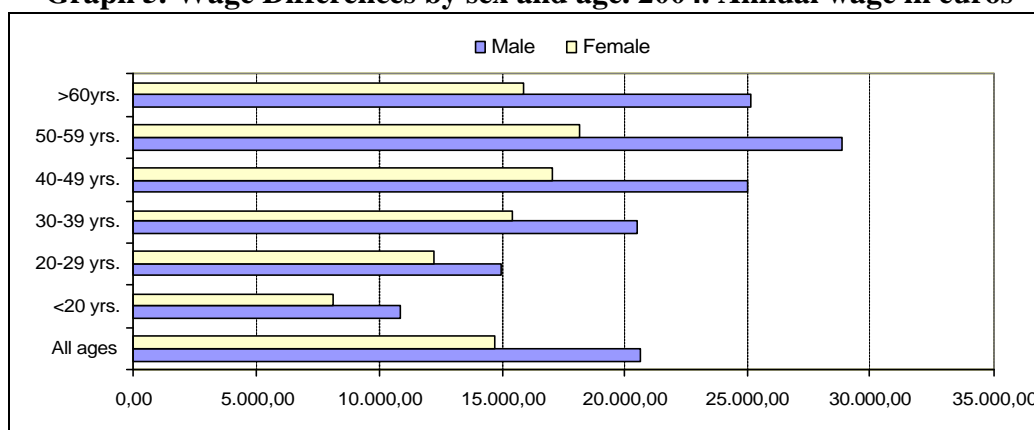
With  $1 = \mathbf{a} + \mathbf{b} + \mathbf{g}$ ; ( $\alpha = .4$ ,  $\beta = .5$ ). The home production function exhibits constant return to scale and is defined by

$$F(t_1, t_2) = A(t_1 + t_2) \text{ with } A=4. \text{ For calculations the following values of parameter have been used, } \lambda=.5, w_1=12, w_2=0.7 w_1, p=1/8 w_2, m_1=m_2=0.$$

Having a child, in the framework presented in this section, imposed a minimum level of consumption of goods  $y$  that modifies the initial optimal allocation of time resources and consumption decisions when constraint is [5] binding. With  $w_1 > w_2 > p$  and no differences in bargaining power, member 2 would reduce their labour supply while member 1 increases it. For certain assumptions<sup>2</sup> and values of  $w_1$ ,  $w_2$ , and  $p$  the member would quit the labour market and spend all of their non-leisure time in home production. This is the transition we are interested in.

In the model presented here, this transition can be caused by several variables, such differences in preferences, wages, marginal productivities in home production, etc. Because of limitations explained in the next section, in the available data we focus our analysis on the variables that can affect the minimum level of household production (having a newborn, number of children, other household members, etc.), and the differences in bargaining power and wage between husbands and wives.

**Graph 5. Wage Differences by sex and age. 2004. Annual wage in euros**



Source: Spanish Statistical Institute (Annual Wage Survey, 2004).

## 2. Data and variables

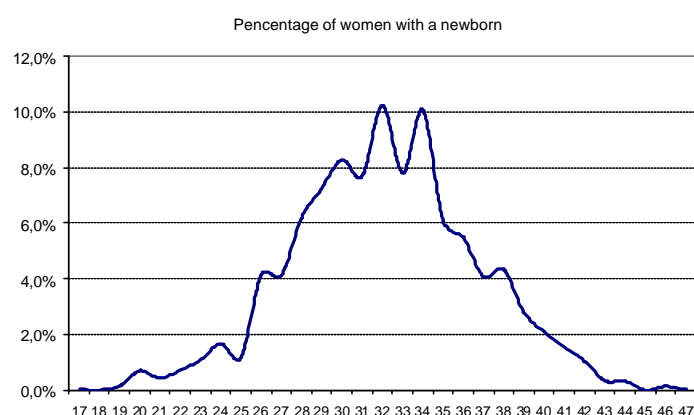
The data consists of microdata coming from the Spanish Labour Force Survey and the analysed period is 2004, second quarter. The main reason for choosing these data is because the Spanish Labour Force Survey is the best statistic to analyse the labour market situation of the persons and, given the sample, about 160,000 individuals,

<sup>2</sup> In graph 4 we detail the assumptions and parameters, for a particular case, that can lead to the transition to inactivity of the member with lower wage. We assume no differences in preferences or bargaining power and a home production function with constant returns to scale and constant marginal productivities.

the representativity of this statistic is probably the best. Nevertheless, the Spanish Labour Force Survey has an important inconvenience because it gives no information on income or wages and salaries. In this study we have replaced the income variable by the husband's occupation and the educational level of women which determines the wage she could receive offering her time in the labour market.

The sample analysed consists of 16,720 women who represent 2,953,499 women. We have only analysed women who cohabit with their partner (husband or couple), between 20 and 45 years of age and whose position in the household is the householder (the reference person) or the partner/wife. Given that foreigners, men or women, have higher activity rates than Spanish people we have preferred to analyse only Spanish women instead of including the nationality as an exogenous variable. Graph 6 shows women who have newborn babies (younger than one year) by women's age. Taking into account the more fertile ages we have decided to analyse women with ages between 20 and 45 years.

**Graph 6. Spanish women (\*) cohabiting with her partner/husband who have newborn babies (< 1 year) by women's age**



(\*) Only women who are the householders or partners/ wives  
 Source: Main calculations, Spanish Labour Survey

The endogenous variable refers to two different moments of time: the current labour situation (2004.Q2) and the labour situation one year ago. To determine the current labour situation, we have considered the classification determined by the Spanish Statistical Institute in the week of reference in 2004, second quarter, and to determine the labour situation one year previous the reference week, we have considered the information offered by the individuals themselves about their labour

situation one year ago in the variable “*Situation one year ago*”, which response alternatives are: a) working, b) unemployed, c) studying d) retired, e) disabled, f) dedicated to housework, g) social work (without remuneration) and h) others.

Taking into account this information, we have considered that a woman was participating in the labour market one year ago if she answers that she was working or unemployed one year ago. So, our endogenous variable takes the value of 1 if the woman is inactive in the reference week and she answers that she was working or unemployed one year ago. The endogenous variable takes the value of 0 if the woman is active in the reference week and she was working or unemployed one year ago. As can be seen, we have only considered women that were active one year ago. So:

$$Y_i = \begin{cases} 1 & \text{if the woman abandon the labour market} \\ 0 & \text{otherwise} \end{cases}$$

This endogenous variable depends on having a newborn and other characteristics (such as personal, labour and regional characteristics). A priori we would expect to find a positive effect of having a newborn on the probability of abandoning the labour market, because the percentage of women who abandoned the labour market after birth is 20.2%, while this percentage is 6.9% for those women who are either child less or have older children. Moreover, the percentage of women that were working before giving birth and abandoning their work after birth is 17.8% while this percentage is 4.3% for those women that do not give birth.

The probability of leaving the labour market is also affected by personal characteristics such as age, educational level, the past labour market situation of the woman (if she was employed or unemployed) and her past professional labour situation (if she was an employer, a public sector employee, a private sector employee, etc.), some household characteristics, such as having other children distinguished by child's age, if there is any grandparent living in the household, the labour situation of the spouse or partner, distinguishing his labour occupation to capture income effects and finally regional characteristics. To capture regional characteristics such as employment growth, unemployment rate, percentage of partial-employment, percentage of

employment in the services sector, gross domestic product per head, etc., we have include a dummy variable for each Spanish region (Comunidades Autónomas).

Table 4 shows the sample distribution of the endogenous variable for different characteristics and gender. The first feature we can observe is that women have, for all the analysed characteristics, higher labour market abandonment rates (LMAR) than men. For the global sample, the percentage of women who abandon the labour market during the period of analysis is 7.9%, while this percentage is 1% for men. Looking only at women, it can be observed that the LMAR is much higher when a woman has a newborn, 20.2% vs. 6.9%. The LMAR is higher for those women between 25 and 29 years of age and between 30 and 34 years of age. Also, the LMAR is higher for those women with a lower educational level: women with primary studies have a LMAR much higher than women with tertiary studies. If the woman was unemployed one year previous, the probability of being inactive in the period of analysis is higher: the LMAR is 20.5% in this case. If a woman has a child who needs childcare, children between 1 and 3 years of age or children between 5 and 6 years of age, the LMAR increases. The professional situation one year ago shows that if the woman was unemployed the probability of abandoning the labour market is higher (20.5%). If there is a grandmother or grandfather living in the household, the LMAR is reduced nearly 2%. Finally, we can see that the LMAR is higher for some husband's occupations and in some Spanish Comunidades Autónomas.

**Table 4. Descriptive statistics**

		Males		Females		
		Stay in the LM Yi = 0	Abandon the LM Yi = 1	Stay in the LM Yi = 0	Abandon the LM Yi = 1	Sig. (1)
Total	Total	99,0%	1,0%	92,1%	7,9%	***
	No of cases	3.637.567	35.598	2.719.515	233.983	
Newborn	No	99,1%	0,9%	93,1%	6,9%	***
	Yes	98,4%	1,6%	79,8%	20,2%	***
Age	20-24	96,7%	3,3%	92,4%	7,6%	***
	25-29	99,1%	0,9%	90,2%	9,8%	***
	30-34	99,0%	1,0%	90,6%	9,4%	***
	35-39	99,0%	1,0%	92,4%	7,6%	***
	40-45	99,1%	0,9%	93,9%	6,1%	***
Educational level	Primary	98,6%	1,4%	88,1%	11,9%	***
	Secondary	99,2%	0,8%	93,1%	6,9%	***
	Tertiary I (vocational and first grade university)	99,5%	0,5%	93,8%	6,2%	***
	Tertiary II (second grade university and others)	99,5%	0,5%	96,4%	3,6%	***
Past labour situation	Unemployed	93,8%	6,2%	79,5%	20,5%	***
	Employed	99,3%	0,7%	94,6%	5,4%	***
Children 1 to 2 years old	No	99,1%	0,9%	93,2%	6,8%	***
	Yes	98,9%	1,1%	87,6%	12,4%	***
Children 3 to 5 years old	No	99,1%	0,9%	92,1%	7,9%	***
	Yes	98,9%	1,1%	92,1%	7,9%	***
Children 6 and more	No	99,0%	1,0%	91,7%	8,3%	***
	Yes	99,1%	0,9%	92,7%	7,3%	***
Past Professional labour situation	Employer	99,7%	0,3%	96,8%	3,2%	***
	Familiar business	97,6%	2,4%	95,9%	4,1%	***
	Public sector employee	99,3%	0,7%	97,1%	2,9%	***
	Private sector employee	99,2%	0,8%	93,2%	6,8%	***
	Unemployment	93,8%	6,2%	79,5%	20,5%	***
Grandparents living in the household	No	99,0%	1,0%	92,0%	8,0%	***
	Yes	99,0%	1,0%	93,9%	6,1%	***
Partner's occupation	Managerial	-	-	92,7%	7,3%	
	Scientists	-	-	96,2%	3,8%	
	Technicians	-	-	95,3%	4,7%	
	Administrative	-	-	94,2%	5,8%	
	Services workers	-	-	92,7%	7,3%	
	Skilled agriculture	-	-	89,3%	10,7%	
	Skilled industry and construction	-	-	90,8%	9,2%	
	Stationary engine operators	-	-	90,0%	10,0%	
	Unskilled workers	-	-	89,1%	10,9%	
	Military	-	-	94,1%	5,9%	
Partner's labour situation	Employed	-	-	92,4%	7,6%	
	Unemployed	-	-	89,8%	10,2%	
	Inactive	-	-	85,6%	14,4%	
Region (Spanish Comunidades Autonomas)	Andalucía	98,9%	1,1%	87,3%	12,7%	***
	Aragón	99,2%	0,8%	92,1%	7,9%	***
	Asturias	97,9%	2,1%	94,9%	5,1%	***
	Baleares	99,7%	0,3%	94,4%	5,6%	***
	Canarias	97,4%	2,6%	88,8%	11,2%	***
	Cantabria	100,0%	0,0%	96,0%	4,0%	***
	Castilla-León	98,5%	1,5%	92,8%	7,2%	***



	Males		Females		Sig. (1)
	Stay in the LM Yi = 0	Abandon the LM Yi = 1	Stay in the LM Yi = 0	Abandon the LM Yi = 1	
	Castilla-La Mancha	98,9%	1,1%	85,2%	
Cataluña	99,8%	0,2%	96,7%	3,3%	***
Com. Valenciana	98,6%	1,4%	92,3%	7,7%	***
Extremadura	97,4%	2,6%	79,7%	20,3%	***
Galicia	98,9%	1,1%	93,4%	6,6%	***
Madrid	99,2%	0,8%	93,6%	6,4%	***
Murcia	99,7%	0,3%	94,6%	5,4%	***
Navarra	99,7%	0,3%	93,6%	6,4%	***
País Vasco	99,7%	0,3%	94,3%	5,7%	***
La Rioja	100,0%	0,0%	93,3%	6,7%	***
Ceuta y Melilla	97,9%	2,1%	84,2%	15,8%	***

(1) Statistical differences, Chi2 test

Source: Main calculations, Spanish Labour Force Survey

#### 4. Econometric model and results

In this section we present the main results of the estimations. Our objective is to analyse the effect of a newborn on women's probability of abandoning the labour market. We have defined that a woman abandons the labour market if she is inactive in the week of reference and she was employed or unemployed one year ago. This probability can be expressed by the equation [9]:

$$\Pr(Y_i = 1 | \text{Newborn}, X) \quad [9.]$$

where X represents other covariates which affect the probability of abandoning the labour market and includes some women's personal characteristics (age and education), household characteristics (if the woman has other children who need childcare, if there are grandparents living in the household), women's past labour situation (if the woman was employed or unemployed one year ago and her past professional labour situation: if she was an employer, a private sector employee, a public sector employee, etc.). The labour situation of the husband or partner is also included as an explanatory variable. This variable distinguishes between different professional occupations; whether or not he is employed (unemployed or inactive).

Taking into account that our endogenous variable is a binomial variable which takes the value of 1 if the woman abandons the labour market and zero if she stays, we

have estimated the model by logit regressions so the results of the parameters can be interpreted as a probability.

Given that, the logit model to estimate is defined by equation [10]:

$$\Pr(Y_i = 1) = \frac{1}{1 + e^{-b_0 - b_1 \text{Newborn} - b_j X_i}} + \mathbf{e}_i \quad [10.]$$

$$i=1, \dots, N \quad N = 2,953,499$$

where  $\mathbf{e}_i \rightarrow N(0, \mathbf{s}^2)$

The meanings of the explanatory variables are explained in table 5.

**Table 5. Explanatory variables**

<i>Newborn</i>	1: Yes 0: Otherwise (includes having children older than 11 months)
<i>Age</i>	Woman's age: <ul style="list-style-type: none"> <li>▪ 20-24</li> <li>▪ 25-29</li> <li>▪ 30-34 (level of reference)</li> <li>▪ 35-39</li> <li>▪ 40-45</li> </ul>
<i>Education</i>	Educational level of the woman <ul style="list-style-type: none"> <li>▪ Primary</li> <li>▪ Secondary (reference level)</li> <li>▪ Tertiary 1 (VT and first level University)</li> <li>▪ Tertiary 2 (Second level University and others)</li> </ul>
<i>Past labour situation</i>	Past labour market situation of the woman <ul style="list-style-type: none"> <li>▪ 1: Employed</li> <li>▪ 0: Unemployed</li> </ul>
<i>Children 1 to 3</i>	Have children from 1 to 2 years old <ul style="list-style-type: none"> <li>▪ 1: Yes</li> <li>▪ 0: Otherwise (no children or children older or younger)</li> </ul>
<i>Children 3 to 5</i>	Have children from 3 to 5 years old <ul style="list-style-type: none"> <li>▪ 1: Yes</li> <li>▪ 0: Otherwise</li> </ul>
<i>Children 6 and older</i>	Have children 6 or older <ul style="list-style-type: none"> <li>▪ 1: Yes</li> <li>▪ 0: Otherwise</li> </ul>
<i>Past professional situation</i>	Past professional labour situation of the woman <ul style="list-style-type: none"> <li>▪ Employer</li> <li>▪ Familiar business</li> <li>▪ Public sector employee (reference level)</li> <li>▪ Private sector employee</li> <li>▪ Unemployed</li> </ul>

<i>Grandparents</i>	Grandparents living in the household <ul style="list-style-type: none"> <li>▪ 1: Yes</li> <li>▪ 0: No</li> </ul>
<i>Husband's labour situation</i>	Husband's labour situation 1-10 Employed 1: Managerial 2: Scientists 3: Technicians 4: Administrative 5: Services workers 6: Skilled agriculture 7: Skilled industry and construction (referent level) 8: Stationary engine operators 9: Unskilled workers 10: Military 11 Unemployed or inactive
<i>CCAA</i>	Region of residence (Spanish Comunidades Autonomas) 1: Andalucía (referent level) 2: Aragón 3: Asturias 4: Baleares 5: Canarias 6: Cantabria 7: Castilla-León 8: Castilla-La Mancha 9: Cataluña 10: Com. Valenciana 11: Extremadura 12: Galicia 13: Madrid 14: Murcia 15: Navarra 16: País Vasco 17: La Rioja 18: Ceuta y Melilla

The estimation results are shown in Table 6. As we can see, all the variables are statistically significant and have the expected sign a priori.

The variable which measures the effect of having a newborn on the probability of abandoning the labour market shows a positive sign indicating that when a woman has a newly born child the probability of abandoning the labour market increases. In this case, the marginal effect indicates that the probability of transition to inactivity is 13.3% higher for those women who have a newborn than those who do not have one. This result is consistent with previous studies for the Spanish case, for example, De la Rica and Ferrero (2003) found that participation in the labour market is lower for those women who have had a newborn (between 17% and 39% lower depending on the hypothesis of endogeneity or exogeneity of the fertility variable).

**Table 6. Logit estimation**

	$\beta$	S.D.	Sig.	Exp( $\beta$ )	Marginal effect (1)
<i>Constant</i>	-1,3619	0,0105	***	0,2562	-
<i>Newborn</i>	1,5138	0,0088	***	4,5441	0,13308
<i>Age: reference level 35-39</i>					
20 to 24	-0,4235	0,0156	***	0,6548	-0,01718
25 to 29	0,1254	0,0079	***	1,1336	0,00632
30 to 35	0,1288	0,0065	***	1,1374	0,00641
40 to 45	-0,1105	0,0068	***	0,8954	-0,00525
<i>Education: reference level Secondary</i>					
Primary	0,3990	0,0061	***	1,4903	0,02020
Tertiary 1	-0,3238	0,0079	***	0,7234	-0,01454
Tertiary 2	-0,3660	0,0102	***	0,6935	-0,01582
<i>Employed one year ago</i>	-1,8131	0,0094	***	0,1631	-0,15713
<i>Children 1 to 3 years</i>	0,2218	0,0085	***	1,2483	0,01140
<i>Children 3-5 years</i>	0,1740	0,0083	***	1,1901	0,00889
<i>Children &gt; 5 years</i>	0,0915	0,0080	***	1,0958	0,00447
<i>Last professional situation: reference level Public sector employee</i>					
Employer	-0,1957	0,0138	***	0,8222	-0,00883
Ayuda familiar	-0,2333	0,0243	***	0,7919	-0,01022
Private sector employee	0,6579	0,0091	***	1,9306	0,03184
<i>Grandparents</i>	-0,2163	0,0168	***	0,8055	-0,00955
<i>Husband's labour situation : reference level Skilled industry and construction</i>					
Managerial	0,2826	0,0096	***	1,3266	0,01520
Scientists	-0,3848	0,0110	***	0,6806	-0,01641
Technicians	-0,3400	0,0097	***	0,7118	-0,01468
Administrative	-0,2070	0,0124	***	0,8130	-0,00923
Services workers	-0,2204	0,0094	***	0,8022	-0,00983
Skilled agriculture	0,2984	0,0126	***	1,3477	0,01640
Stationary engine operators	0,1461	0,0072	***	1,1573	0,00742
Unskilled workers	-0,0973	0,0087	***	0,9073	-0,00454
Military	-0,7289	0,0341	***	0,4825	-0,02583
Unemployed or inactive	-0,0229	0,0087	***	0,9774	-0,00110
<i>Spanish Comunidades Autonomas: reference level Andalucia</i>					
Aragón	-0,1187	0,0138	***	0,8881	-0,00546
Asturias	-0,6144	0,0201	***	0,5410	-0,02300
Balears	-0,8188	0,0169	***	0,4410	-0,02841
Canarias	0,0560	0,0103	***	1,0576	0,00277
Cantabria	-0,9743	0,0295	***	0,3775	-0,03142
Castilla-León	-0,3019	0,0112	***	0,7394	-0,01297
Castilla-La Mancha	0,3362	0,0100	***	1,3996	0,01873
Cataluña	-1,1498	0,0091	***	0,3167	-0,04197
Com. Valenciana	-0,3930	0,0085	***	0,6750	-0,01661
Extremadura	0,5212	0,0102	***	1,6841	0,03156
Galicia	-0,5157	0,0109	***	0,5971	-0,02049
Madrid	-0,3612	0,0087	***	0,6969	-0,01551
Murcia	-0,7496	0,0167	***	0,4726	-0,02673
Navarra	-0,2396	0,0217	***	0,7870	-0,01045
País Vasco	-0,4719	0,0124	***	0,6238	-0,01899
La Rioja	-0,2514	0,0301	***	0,7777	-0,01090
Ceuta y Melilla	0,6455	0,0350	***	1,9069	0,04189

\*statistically significant at the .10 level   \*\*at the .05 level   \*\*\*at the .01 level

(1) Marginal effect is for discrete change of dummy variable from 0 to 1

When we look at the woman's age and referring to women between 35 and 39 years old, it can be observed that women in the most fertile ages, between 25 and 34 years, have a higher probability of abandoning the labour market, while women between 20 and 24 of age and women from 40 to 45 have less probability of leaving the labour market<sup>3</sup>. The educational level, as would be expected, has a negative effect on the probability of transition from activity to inactivity: the higher is the woman's educational level, the lesser the probability of abandonment is. Compared to women with secondary studies, the probability of abandonment of women with only primary studies increases by 2%, while it decreases 1.5% if the woman has second level university studies. These results agree with those obtained by others authors like Dex et al. (1998) and Gutiérrez-Domènech (2005) for the Spanish case.

We have included three variables of control for the existence of more children different from the newborn. All these three variables have a positive coefficient, which implies that if a woman has children, the probability of abandoning the labour market increases. Nevertheless, the marginal effect of each variable is much higher when the children need childcare (1 to 3 years), while if they are older than 3, the marginal effect is only slightly positive: 0.9% for women with children between 3 and 5 years of age and 0.4% for women with children 6 years of age and older.

The woman's past labour situation also affects the probability of leaving the labour market. If the woman was employed instead of unemployed, the probability is reduced by 15.7%. Considering the past professional labour situation and referring to women who were working as employees in the public sector, we can observe that women who were employee in the private sector have a higher probability of abandoning the labour market (3.2%). On the opposite side, if the woman was an employer or if she was working in a familiar business, the probability of abandoning decreases.

Another important feature is related to other household's members: if the woman's parents or parents-in-law live in the same household, the probability of abandoning the labour market decreases. This characteristic is also pointed out by Alba and Alvarez-Llorente (2004). The main reason for a woman to leave the labour market

---

<sup>3</sup> Similar estimations but replacing the age by a dummy variable which takes a value of 1 for women with ages between 30 and 34 years and zero otherwise, shows also a positive effect ( $\beta=0.1377$  and  $\exp(\beta)=1.1476$ ) indicating that the probability of abandoning the labour market is 14.7 times greater if the woman is between 30 and 34 years of age, amongst other women.

after giving birth is that the newborn will need childcare that can be bought in the market or produced at home by household members. The later option could suppose that one member of the couple should abandon, at least temporarily, the labour market. Obviously, this problem is reduced if there are more people who can take care of the children, such as parents or parents-in-law, living in the household.

Related to the husband's labour situation, and taking as the reference level those women whose husbands are employed as *skilled industry and construction*, we observe that three occupations present a negative coefficient: managerial, stationary engine operators and unskilled workers. In the first case, a woman whose husband's occupation is managerial has a higher probability of abandoning the labour market. This could be explained by an income effect because managers have the highest wages, so as the household income is high, women have an incentive to leave the labour market and dedicate more time to other activities, such as leisure and childcare. In the case of stationary engine operators and unskilled workers, the positive sign of the coefficient could be explained by an educational effect. A strong correlation exists between the educational level of women and their husband's occupations; usually, the educational level of the two members of a couple is similar, so less-educated women usually live with less-educated men and, consequently, they usually work in low-skilled occupations. So we can find two effects: the low educational level of these women induces them to abandon the labour market, but also the low income of their husbands (or partner) induces them to stay in the labour market in order to increase the household income. Given that and observing the positive effect we can say that in these two cases, the educational effect predominates.

The remaining occupations show a negative impact. Nevertheless, the explanation is different depending on the occupations. For the most qualified occupations (scientists and technicians) we could interpret by educational level: women whose husbands' occupations are highly-qualified have a lower probability of abandoning the labour market because they are supposed to also be highly-qualified. On the contrary, other occupations with low wages imply a negative effect because women cannot renounce her wages because the household income is too low.

Finally, the transition to inactivity is 0.1% less probable for those women whose husbands or partners are unemployed or inactive. This feature is clearly explained by an

income effect. If the only income inside the household comes from the woman, it is less probable that they abandon the labour market.

The region of residence indicates that female labour flows are different depending on the characteristics of the regions. Given Andalusia as the reference level, it can be observed that only Canarias, Castilla-La Mancha, Extremadura and Ceuta and Melilla, have higher probabilities of abandoning the labour markets. This difference could be explained by differences in regional employment growth, the unemployment rate, the percentage of partial employment and the percentage of services employment. A priori, we could expect that those regions with higher employment growth, a lower unemployment rate and higher percentage of partial employment and services employment would have fewer female flows from the labour market.

## **5. Conclusions**

If we look at the data on labour market flows, we can observe that in the period of one year, eight out of one hundred women change from active to inactive. If we focus on women who have had a newborn, the number grows to twenty out of one hundred. These values are much smaller when we look at men: only two out of one hundred men who have a newborn abandon the labour market. As Spanish Labour Force Survey data shows, the main reasons of inactivity for women in the most fertile ages is domestic work: more than 80% of inactive women with ages between 30 and 44 years are dedicated to housework and childcare, while this percentage falls to about 8% for men. These empirical facts clearly signal the possible relation of fertility with the transition flow to inactivity of women.

Having a child is a costly decision, the cost of a child is not only the value of the consumption of market and others domestically produced goods (house cleaning, meal preparation, laundry services, etc.) but also the value of the parental time spent in child care. As others authors remarks, the time costs of child care and domestic work is largely those of the female partner, so having a child is reflected mainly in the female market labour supply. In some cases, women leave the labour market and employ entirely their non leisure time in non market activities. This transition from activity to inactivity can be explained by several variables, such as differences in preferences, wages, marginal productivities in household production, etc. In this paper we focus our

analysis in variables that can affect the household production needs (having a newborn, number of children, others household members, etc.), and variables which can explain disparities in bargaining power and wage between husbands and wives.

In concrete, we estimate, by a logit model and microdata from the Spanish Labour Force Survey, how fertility affects the transition from activity to inactivity for Spanish women with ages between 20 and 45 years. Our econometric model considers as explanatory variables, having a newborn, personal and household features, past labour situation, labour characteristics of the partner or husband, and other regional characteristics. Our main finding, in line with previous literature on fertility and female labour force participation, is that having a newborn has a positive effect on the probability of abandoning the labour market. Related to this, we also find that women in the most fertile ages have higher probability of transition to inactivity.

As it could be expected, women with tertiary studies have lower probability of leaving the labour market, while women with primary studies have higher probability. Also, the probability increases if the woman has more children, especially if they are younger than 3 years, but decreases if the woman's parents or parents-in-law live in the same household. Finally, and related to the partner's labour situation, the probability of leaving the labour market decreases if the partner is unemployed or inactive, which is explained by an income effect. If the husband is employed, we observe some differences in the probability of transition to inactivity depending on his occupation: women whose husband's occupation is managerial have higher probability of abandoning the labour market: as managers have the highest wages and the household income is high in this case, women have an incentive to leave the labour market and dedicate more time to others activities like leisure or childcare. We also find that women whose husbands' occupations are highly-qualified have lower probability of abandoning the labour market, which we interpret it because these women are supposed to also be highly-qualified and, consequently, the opportunity cost of leaving the labour market is higher. On the contrary, other occupations with low wages imply a negative effect because women cannot renounce her wages because the household income is supposed to be too low.



## Bibliography

- Alba-Ramirez, A. and Alvarez-Llorente, G. (2004): “Actividad laboral de la mujer en torno al nacimiento de un hijo”, *Investigaciones Económicas*, vol. 28, No. 3, pp. 429-60
- Alvarez-Llorente, G. (2002): “Decisiones de fecundidad y participación laboral de la mujer en España”. *Investigaciones Económicas*, vol.26, No.1, pp. 187-218
- Apss, P. F. and Rees, R. (1997): “Collective labour Supply and Household Production”, *The Journal of political Economy*, vol. 105, No.1, pp. 178-190
- Blundell, R., Chiappori, P.A., Magnac, T. and Meghir, C. (2007): “Collective labour supply: heterogeneity and non-participation”, *Review of Economic Studies*, vol.74, pp. 417-445
- Bover, O. and Arellano, M. (1995): “Female Labour Force Participation in the 1980s: The Case of Spain”. *Investigaciones Económicas*, vol.19, No.2, pp. 171–194
- Carrasco, R. (2001): “Binary Choice with Binary Endogenous Regressors in Panel Data: Fertility and Female Labour Force Participation”. *Journal of Business and Economics Statistics*, vol.19, No. 4, pp.385–394
- Chiappori, P. A. (1988): “Rational household labour supply”, *Econometrica*, vol.56, No.1, pp. 63-89
- Chiappori, P. A. (1992): “Collective labour supply and welfare”, *Journal of Political Economy*, vol. 100, pp. 437-467
- De la Rica, S. and Ferrero, M.D. (2003): “The effect of fertility on labour force participation: the Spanish evidence”, *Spanish Economic Review*, vol. 5, pp. 153-172
- Dex, S., H. Joshi, S. Macran y A. McCulloch (1998): “Women’s employment transitions around child bearing”, *Oxford Bulletin of Economics and Statistics* vol. 60, pp. 79-98
- Fernandez-Val, I. (2003): “Household labour supply: evidence for Spain”, *Investigaciones Económicas*, vol. 27, pp. 239-275
- Gutiérrez-Domènech, M. (2005): “Employment Transitions after Motherhood in Spain”. *Labour 19* (Special issue), pp. 123–148.
- “The impact of the labour market on the timing of marriage and births in Spain”, *Journal of Population Economics*, forthcoming.

- Herrarte, A. and Sáez, F. (2007): “Familia y mercado de trabajo”. En *Familia y Economía*, pp. 63-118. Madrid: Fundación Acción Familiar y Ediciones Cinca
- Hotz, V. J., Klerman, J. A., Willis, R. J. (1997): “The Economics of Fertility in Developed Countries”. In: Rosenzweig, M. R., Stark, O. (eds.), *Handbook of Population and Family Economics*, pp. 275–347. Amsterdam: Elsevier
- Kornstad, T. and Thoresen, T. (forth.): “A discrete choice model for labor supply and child care”, *Journal of Population Economics*, forthcoming.
- Lehrer E, and Nerlove M. (1986): “Female labor force behavior and fertility in the United States”, *Annual Review of Sociology*, vol. 12, pp. 181-204
- Mincer, J. (1962): “Labour force participation of married women: a study of labour supply”. In H.G. Lewis (Ed.) *Aspects of Labour Economics*. Princeton, NJ: Princeton University Press
- Novalés, A. and Mateos, B. (1990): “Empleo, Capital Humano y Participación Femenina en España”. *Investigaciones Económicas* vol. 14, pp. 457–478
- Rodríguez-Rodríguez, J.M. (2006): “Discriminación salarial y diferencias de género en la formación de capital humano”, en *Estudio sobre género y economía* (Coord. Vara, M.J.). Madrid: Akal Economía Actual.
- Willis, R.K. (1987): The family. What have we learned from the economics of the family? *American Economic Review*, vol. 77, No. 2, pp. 68-81