THE IMPACT OF INSTITUTIONS ON MOTHERHOOD AND WORK

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ABSTRACT

In this paper, we aim to explore the impact of social policies and labour market characteristics on the woman's joint decisions of working and having children, using data from the European Community Household Panel (ECHP). We include in the analysis, beyond personal characteristics, variables related to the childcare system, parental leave arrangements, and labour market flexibility. Results show that a non negligible portion of the differences in participation and fertility rates across women from different European countries can be attributed to the characteristics of these institutions.

NON-TECHNICAL SUMMARY

Over the last decades women participation rates have increased remarkably in the European Union countries, while fertility declined in most advanced countries and is now below the replacement rate. These phenomena carry some positive and negative implications for the ability of countries and the European Union itself to meet a variety of social and economic targets. On one hand, the increased number of workers helps to pay pension obligations to current retired, while on the other the declining population levels make it less likely that the current form of European pension systems can be sustained. The employment goals established by the European Union - the so-called Lisbon target - of 60% of women participation to the labour market, imply the design and implementation of social policies especially in Southern Europe, which necessitates an increase in female employment rates of nearly twenty percentage points. How to pursue the implementation of policies designed to raise women's employment rates without diminishing fertility rates? An understanding of this relationship, in different contexts, has encouraged researchers to consider fertility and labour market participation as a joint decision, which depend not only on prices and income but also on the institutional environment.

In this paper we selected seven of the fifteen countries of the dataset, representative of the different geographical areas of Europe: Italy and Spain (Southern European countries), France, Belgium and the Netherlands (Central West-European countries), Denmark (a Northern European country) and the U.K. (a Northern European country, characterised by a more liberal welfare regime).

Our results show availability of part-time jobs has a positive effect on women's work decisions in South Europe. While in the countries where part-time is widespread, it often reflect low-qualified/poorly paid job and mostly temporary positions, in countries where is very limited, is characterized by similar job protection and social benefits as full-time jobs and it consists mainly of permanent positions and middle-level job qualifications. Childcare availability positively affects the probability of working (indicating potential availability of other social services), while it is not significant in the fertility equation. The generosity the optional parental leave has a positive effect on the probability of having a child, but a negative effect on the probability of working. This can be related to the demand-side effect: employers are less willing to hire a woman if they know that they have the opportunity to stay at home for long period after childbirth. Moreover, a longer leave may negatively affect woman's human capital accumulation, making more difficult and less likely to re-enter the labour market after the break.

1. Introduction

Over the last decades women participation rates have increased remarkably in the European Union countries, while fertility declined in most advanced countries and is now below the replacement rate. These phenomena carry some positive and negative implications for the ability of countries and the European Union itself to meet a variety of social and economic targets. On one hand, the increased number of workers helps to pay pension obligations to current retired, while on the other the declining population levels make it less likely that the current form of European pension systems can be sustained.

Other important negative implications concern lower economic growth, lower savings, and greater number of people with few immediate family ties which will increase demand for provision of services.

The countries that currently have the lowest levels of fertility (Spain, Italy and Greece) are those with relatively low levels of female labour force participation, while the countries with higher fertility levels (Denmark, France) have relatively high female labour force participation rates. These important differences indicate that different countries are in different stages of development and are constrained by specific social and economic factors. In spite of similar standard of living, in fact, European countries differ for several institutional characteristics.

How to pursue the implementation of policies designed to raise women's employment rates without diminishing fertility rates? An understanding of this relationship, in different contexts, has encouraged researchers to consider fertility and labour market participation as a joint decision, which depend not only on prices and income but also on the institutional environment.

In this paper, besides personal characteristics, we take into consideration variables related to the childcare system, the parental leaves schemes, and the labour market flexibility. We describe how these policies work across Europe in Section 2, with the most relevant literature regarding their influence on working and fertility decisions and the difficulties of comparative analyses. The methodological framework is presented in Section 3, and the dataset and the variables used in Section 4. The results of the empirical analysis are in Section 5. Conclusions follow.

2. The determinants of fertility and female labour market participation

When we consider the correlation between female participation and fertility across European countries in the last thirty years, we observe that it has changed from negative to positive since the late 1980s, implying that countries with more women employed are also countries where women have more children. However there are important differences especially between the Northern and Southern European countries. These differences reflect the fact that only Nordic countries (and France) have

implemented institutional structures that enable them to balance women work and childbearing while in Southern Europe very little welfare state support concerns working mothers (Kohler *et al.* 2002, Billari and Kohler 2004)

The possibility to combine work and childrearing depends strongly on the occupational structure and working arrangements. Changes in the occupational structure, especially for part-time employment, have expanded employment opportunities for women. However, the development of the service sector and the part-time opportunities has not increased equally in all advanced countries. While in the North European countries a high proportion of women work in the tertiary sector and are employed part-time, in the South of Europe the tertiary sector is less developed and part-time employment is very limited. Married women who choose to work tend to have full-time work commitments, which is not compatible with having large numbers of children. The positive link between part-time jobs and women's participation in the labour market has been shown in studies based on cross-country analyses. Empirical analyses of several countries show that being a mother (compared with being childless) decreases the probability of choosing full-time work and increases the probability both of not working or working part-time (Bardasi and Gornick 2000). In countries where part-time opportunities are scarce, married women are forced to choose between not working or working full-time, neither of which is necessarily their preferred option. The low proportion of part-time opportunities, in fact, does not seem to be consistent with self-reported preferences: a large number of women who are unemployed or do not participate in the labour force report that they would actually prefer to work part-time. Even among the employed, more people state a preference for working fewer paid hours than for working longer hours at the given hourly wage (European Economy, 1995).Therefore, greater opportunities for part-time employment by reducing the opportunity costs of having children have a positive impact on fertility rates. In countries where part-time opportunities are higher, fertility rates are also higher (Netherlands, Denmark, U.K., Sweden).

In spite of recent institutional changes, the Southern European labour market still remains a highly regulated one, with strict regulations concerning the hiring and firing of workers and the types of employment arrangements permitted. Strict labour market regulations and unemployment discourage exits from the labour market and makes re-entry a difficult enterprise. Women who decide to bear a child, despite employment uncertainty and rigidity in working hours, either do not withdraw from the labour market or never re-enter after childbirth.

The presence of children affects mothers' preferences with respect to non-market time versus market time. Social policies directed at reducing the costs of children by increasing the availability, quality and affordability of childcare may affect fertility and participation rates. Studies on temporal patterns have shown that the increased availability of childcare is one possible explanation for the

change in fertility over time and for the observed changes in the relation between women's participation and fertility (Ahn and Mira 2001, Englehardt and Prskawetz 2002). Childcare availability also has important effects on fertility, while childcare costs do not seem to be an important factor (Del Boca, Locatelli Vuri 2005, Del Boca Vuri 2006).

Table 1. Child Care in Europe

	Infants		*Pre school aged children*	
	Coverage (*) (%)	*Opening hours (per day)*	*Coverage (*) (%)*	*Opening hours (per day)*
Austria	10	7	70	6
Belgium	30	9	99	7
Denmark	55	10.5	90	10.5
Finland	23	10	42	10
France	39	10	87	8
Germany	9	10	73	6
Greece	3	9	48	4
Ireland	2	9	50	4
Italy	6	9	87	8
Luxemburg	3	9	76	5
Netherlands	2	10	66	7
Portugal	12	7	72	5
Spain	5	5	77	5
Sweden	40	11	72	11
UK	2	8	60	5

(*) Percentage of slots per 100 children. Source: De Henau J. *et al.* (2006)

The decisions to work and have a child are positively influenced by the available supply of public childcare (Del Boca, 2002), which can explain in part the change in the correlation between fertility and female employment (Ermisch, 1989; Ahn and Mira, 2002). Differences emerge among European countries in terms of availability and flexibility in the service offered: in Southern Europe the percentage of children under three who are in childcare is quite low compared with Nordic countries such as Sweden and Denmark and it is characterized by greater rigidity in the number of weekly hours available. On the contrary, the proportion of children over three in childcare is relatively high in Southern European countries, even compared to Northern European countries (Table 1). The role of the extended family is very important in South Europe where it represents an important substitute for formal childcare, affecting positively both participation and fertility (Del Boca, Pasqua and Pronzato, 2005; Pronzato, 2006).

Another important social policy that has an impact on balancing work and child rearing is the parental leave. Parental leave arrangements seem to be important to help women in reconcile motherhood and work: longer maternity leave, in fact, alleviates the tension between the conflicting

responsibilities women may face as mothers and as workers. Under EU law, employed women are entitled to a maternity leave of 14 weeks and to a parental leave of 3 months, which can be shared with the partner. This law sets minimum guaranteed levels of protection, and member states can choose to extend these minimum requirements (Table 2). Member states are also free to decide on how to apply this protection in national law.

Maternity leave is likely to have a positive impact on women's employment rate since more women would enter employment if they knew they had access to leave. A relatively strong correspondence between the generosity of child-related policies of maternal employment (including maternity leave) and women's employment profiles emerges from cross-country comparison. In Northern European countries, where policies are more generous, female participation in the labour market is higher.

Table 2. Maternity leave and parental leave in Europe

	Maternity leave		*Parental leave*	
	Period (weeks)	*Average replacement rate (%)*	*Total leave duration (months)*	*Paid period (% of the total leave)*
Austria	16	100	36	100
Belgium	15	77	6	100
Denmark	18	62	11	70
Finland	18	66	36	100
France	16	100	36	100
Germany	14	100	36	67
Greece	17	50	7	0
Ireland	18	70	7	0
Italy	22	80	12	55
Luxemburg	16	100	12	100
Netherlands	16	100	6	0
Portugal	17	100	6	8
Spain	16	100	36	0
Sweden	14	80	18	79
U.K.	18	43	8	0

Source: De Henau J. *et al.* (2006)

Quite different results, however, have been reported for the U.S. During the period 980-1990 the labour supply of new mothers did not increase more in States where maternity laws were enacted. After 1993, when the FMLA Act was introduced, the effect of maternity leave appears limited probably because a 12-week is such a short period, the coverage is not universal and in many cases leave is unpaid (Klerman and Leibowitz 1994). The expected effect of the duration of leave is in fact

ambiguous: in theory, the longer women stay out of the labour force, the greater the loss they incur in terms of skill deterioration and lost opportunities for promotion and training.

Ruhm and Teague (1997) examine the association between leave policies and indicators of macro economic conditions and found that paid leave is associated with increased employment and reduced unemployment.

In our analysis of women's decision to both work and have children, we take into account personal characteristics, like age, education and non-labour income, and we analyze their interactions with the institutional environment. Previous empirical findings are quite consistent with the implications of microeconomic analysis and indicate that female wages have a negative effect on fertility and a positive effect on participation. Male wage coefficients instead have the opposite sign and are positive on fertility and negative on women's participation. Bratti (2001) explains women's participation decisions in the period surrounding a birth event, estimating the effect of education and several economic variables on the decisions to give birth and to participate in the labour market. He found that education increases women's commitment to work. In particular, highly educated women continue to work in the period surrounding a birth event, and therefore education induces fertility postponement. His results imply that policies aiming at increasing women's education would have a positive effect on participation, but an uncertain effect on fertility, given evidence of a U-shaped pattern of fertility with education, interpreted in terms of the prevalence of income over substitution effects due to education and by more access to private childcare for highly educated women.

3. The Econometric Specification

In our model, the relationship between participation and fertility depends not only on prices, incomes, and household characteristics, but also on variables related to the characteristics of the environment the households face. In this empirical analysis we attempt to determine empirically the extent to which different combinations of currently existing social and labour market policies (e.g., part-time employment opportunities, subsidised childcare provision, parental leave) affect the decisions to participate in the labour market and to have children.

In order to estimate the effects of individual's, household's and environmental characteristics on the joint decision to work and to have a child we use a bivariate probit model that allows to estimate the joint probability to work and to have a child in the year considered.

The econometric specification of the fertility and labour supply decision rules are assumed to be quasi-reduced form representations of the demand functions representing the solutions to the optimisation problem. A latent variable structure is assumed for both decisions. To illustrate this, we consider a two equation system. Let the net value of being employed in period t be given by:

$$P_{1,t}^{*} = H_{i,t}\beta_1 + Y_{i,t}\beta_2 + E_{i,t}\beta_3 + u_{i,t}$$

The latent variable representing the net returns to an additional child in period *t* is given by:

$$B_{1,t}^{*} = H_{i,t}\delta_1 + Y_{i,t}\delta_2 + E_{i,t}\delta_3 + v_{i,t}$$

where $H_{i,t}$ is the row vector containing the observed variables measuring the household *i* woman's human capital at time *t*, $Y_{i,t}$ is the vector of household's income at time *t* and it includes the husband's earnings and $E_{i,t}$ is the vector of variables describing the economic environment (labour market characteristics and social policies). The term $u_{i,t}$ is a disturbance term. And the disturbance term $v_{i,t}$ is not assumed to be distributed independently of $u_{i,t}$.

Define the variable $d_{i,t}^{p} = 1$ if the woman in the household *i* participates to the labour market in period *t*, and set $d_{i,t}^{p} = 0$ if not. Define the birth outcome in a similar way, that is, let $d_{i,t}^{f} = 1$ if there is a birth in household *i* during period *t* and set it equal to zero if this is not the case. Then we have that

$$d_{i,t}^{p} = 1 \Leftrightarrow P_{i,t}^{*} > 0 \qquad \text{and} \qquad d_{i,t}^{f} = 1 \Leftrightarrow B_{i,t}^{*} > 0$$

Assume that $d_{i,t}^{p\,*}$ and $d_{i,t}^{f\,*}$ are normally distributed with unit variance, therefore we have that:

$$P(d_{i,t}^{p} = 1) = \Phi(H_{i,t}\beta_1 + Y_{i,t}\beta_2 + E_{i,t}\beta_3) \text{ and } \quad P(d_{i,t}^{f} = 1) = \Phi(H_{i,t}\delta_1 + Y_{i,t}\delta_2 + E_{i,t}\delta_3)$$

Once specified the marginal probabilities of $d_{i,t}^{p}$ and $d_{i,t}^{f}$, the multivariate model is completed when we specify the joint probability $P(d_{i,t}^{p} = 1, d_{i,t}^{f} = 1)$ which is determined if the joint distribution of $d_{i,t}^{p\,*}$ and $d_{i,t}^{f\,*}$ is specified. If $d_{i,t}^{p\,*}$ and $d_{i,t}^{f\,*}$ are jointly normal with a correlation coefficient ρ, thus

$$P(d_{i,t}^{p} = 1, d_{i,t}^{f} = 1) = F_{\rho}(H_{i,t}\beta_1 + Y_{i,t}\beta_2 + E_{i,t}\beta_3, H_{i,t}\delta_1 + Y_{i,t}\delta_2 + E_{i,t}\delta_3)$$

where F_ρ is the bivariate normal distribution function with zero means, unit variance and correlation ρ. Therefore in this model the marginal probabilities are first specified and then a joint probability consistent with them is found.

4. Data and variables

For our empirical analysis we use the European Community Household Panel (ECHP), a longitudinal survey co-ordinated and supported by the Eurostat. The survey involves a representative sample of households and individuals interviewed for eight years (1994-2001) in each of the 15

countries[1]. The standardized methodology and procedure in data collection yield comparable information across countries, making the ECHP a unique source of information for cross-countries analyses at the European level. The aim of the survey, in fact, is to provide a comparable information on EU population, representative both at the longitudinal and the crosswise level. The data collected cover a wide range of topics on living conditions (income, employment, poverty and social exclusion, housing, health, migration, and other social indicators). Therefore the ECHP survey allows for analyses of how individuals and households experience change in their socio-economic environment and how they respond to such changes, and for analyses of how conditions, life events, behaviour, and values are linked each other dynamically over time.

The unit of analysis of the ECHP are the families and, within the households, all individuals older than 16, even if it is possible to have information (mainly demographic information) also on children under 16. In almost every country the concept of family is based on the two criteria of the sharing of the house and on the common daily matters. A *household* is therefore defined as "one person living alone or a group of persons (not necessarily related) living at the same address with common housekeeping – i.e., sharing a meal on most days or sharing a living or sitting room" (Eurostat, 1999, p. 25).

The ECHP has many advantages: it covers the whole population, including non-working persons; as a household data set, it includes a lot of useful and harmonised information (number and age of children, marital status for example). Moreover, it is possible to link household-level information to individual data so that it allows to study, for example, the labour supply decisions of the female partner in a couple accounting for her own personal characteristics but also for those of the male partner.

For our empirical analysis we selected seven of the fifteen countries of the dataset, representative of the different geographical areas of Europe: Italy and Spain (Southern European countries), France, Belgium and the Netherlands (Central West-European countries), Denmark (a Northern European country) and the U.K. (a Northern European country, characterised by a more liberal welfare regime). For these countries we consider the data relative to the year 1999. The information given by the ECHP dataset has been integrated with information taken from REGIO (a Eurostat dataset providing regional data) about the characteristics of the "environment" in which the women live. Both the choice of the year and the choice of the countries have been therefore constrained by the availability of regional data on relevant aspects of the labour market (in particular

[1] Austria (from 1995), Belgium, Denmark, Finland (from 1996), France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden (from 1997) and U.K..

the availability of part-time jobs and relative importance of the services sector) and of the childcare services.

We selected all households in which women is in the age range 21-45, married or cohabitant, in order to exclude those women who might be still enrolled in school or may be already retired. For the analysis of fertility the age restriction helps to ensure that women included in the final sample will have a high probability of being fecund.

Our aim is to estimate simultaneously the probability for a woman to work and to have a child. The dependent variables used in our analysis are therefore whether the wife is working at the time of the interview and whether she has had a child in the year of the interview.

The independent variables we use to explain women's decisions can be divided in five main groups:

Personal characteristics

- wife's age (and squared age)
- wife's education: we use three dummies variables (third level of education, second level of education and less than second level of education. The last is the excluded one)

Household's characteristics

- presence of children (three different age groups: 0-3, 4-14, older than 14)
- presence of grandparents (*i.e.* presence in the household of either the wife's or of the husband's parents)
- wife's non-labour income, that include all household sources of income but wife's labour income and social transfers (in euros and divided by 1000)
- social transfers to the household, that represent income from public transfers (in euros and divided by 1000)

Labour market characteristics

- regional availability of part-time jobs, obtained as the ratio between part-time workers and total employed at regional level (from the dataset REGIO)
- regional availability of jobs in the services sector, obtained as the ratio between workers in the services sector and total employed at regional level (from the dataset REGIO)

Social policies

- availability of childcare, obtained as the percentage of children 0-3 using childcare facilities (from the dataset REGIO)[2]
- generosity of the parental leave arrangement, a variable constructed by multiplying the length of the optional parental leave by an indicator of length of the period paid (see Table 2): 1 for the U.K., the Netherlands and Spain, 2 for Denmark and Italy and 3 for Belgium and France.

Dummies variables for the geographical area of residence

- North if the household lives in Denmark
- Central-West if the household live in France, in Belgium or in the Netherlands
- South if the household lives in Italy or in Spain
- U.K if the household live in the U.K (dummy excluded)

Table 3. Descriptive statistics

	Denmark	*France*	*Belgium*	*Netherlands*	*Italy*	*Spain*	*U.K.*
% of working women	81.3	62.0	74.3	61.2	49.9	45.0	69.8
% of women that had a child in the year	8.9	9.6	7.5	6.1	8.2	8.1	7.1
Women's age	33.9	34.2	35.0	32.3	35.4	34.8	34.0
% of women with tertiary education	33.4	34.0	47.7	17.7	8.5	23.8	40.0
% of women with secondary education	47.0	39.9	33.4	49.5	44.7	21.7	14.8
% of women with primary education	19.6	26.1	18.9	32.8	46.8	54.5	45.2
Woman's non-labour income (euro, PPP)	17,960	18,394	20,524	21,148	15,900	14,697	19,540
Social transfers to the HH (euro, PPP)	4,888	3,450	4,478	2,233	1,245	1,542	2,260
Presence of grandparents in the HH (%)	0.9	1.0	1.6	0.3	6.2	8.8	2.8
% regional employed part-time	20.8	17.6	16.2	37.3	7.7	8.3	25.3
% regional employed in the services sector	69.7	69.2	72.6	70.6	63.3	58.3	70.0
% regional childcare availability	64.0	12.1	12.1	18.0	7.3	5.7	2.8
Number of observations	787	1,834	964	1,830	2,295	1,909	1,668

The information concerning income has been made comparable using PPP specific coefficients provided by Eurostat in the ECHP dataset. In our empirical analysis we consider the effect of all variables above mentioned on the probability for a woman to work and to have a child. Table 3 reports the descriptive statistics for the sample for the countries considered.

[2] From previous results and from Table 1 we know in fact that childcare facilities for children between 3 and school age are higher and more similar across the different European countries.

The descriptive statistics show a picture quite coherent with the empirical evidence discussed in the previous sections. The percentage of women working is higher in Denmark, in Belgium and in the U.K., while it is much lower in Italy and Spain.

The comparison of the labour market characteristics and social policies indicates that the percentage of part-time workers is particularly low in the Southern European countries, while part-time is widespread in the Netherlands and in the U.K.

Other differences concern the childcare availability for children between 0 and 3 years which is extremely low in the Southern European countries (and in the U.K.), and very high in Denmark.

The family structure shows different features across countries: the percentage of households where we observe a co-residence between married children and their parents is relevant only in Southern European countries where the lack of public services makes the role of the extended family important (here considered with the variable 'presence of grandparents in the household'). Finally, public transfers to the household are much higher in Northern and Central West-European countries than in Southern European ones.

5. The Empirical Results

We estimate the probability of working and having a child with a bivariate probit model. The estimates are presented in Table 4.

The presence of children in the household decreases the probability of working and having another child, but the effect is different according with the age of the children. In fact, younger children have a stronger negative impact on the probability of being employed, while are the older children who most negatively affect the probability of having an additional child. The presence of grandparents in the household has a positive coefficient in the working equation. This can be interpreted in two ways. On one hand parents when co-residing may be able to facilitate women to work, helping in the household in various chores and compensating for the rigidities of childcare schedules. On the other hand it could be an additional economic burden that requires women to provide additional income, by working in the labour market.

We now turn to the discussion of the environmental variables impact. The availability of part-time jobs has a negative effect on the probability of working (but the coefficient is not significant). As we have discussed in the previous sections, comparative analyses have posed a series of issues regarding the different structure and nature of social polices in different welfare states. Del Boca, Pasqua and Pronzato (2005) find for example that the availability of part-time has a positive impact only in Italy, which is consistent with the more appealing characteristics of the part-time opportunities. To take this into account we introduce also in the empirical estimation interaction terms between part-

time and living in the South of Europe. In fact, when we consider the interaction between the variables "part-time" and "South" the sign becomes positive and significant. This seems to confirm the important differences between the characteristics of part-time in the Northern and Central West-European countries and the Southern European ones. While in the countries where it is widespread, part-time often reflect low-qualified/poorly paid job and mostly temporary positions, in countries where is very limited, is characterized by similar job protection and social benefits as full-time jobs and it consists mainly of permanent positions and middle-level job qualifications.

Table 4. Bivariate probit estimates

	Probability of working	Probability of having a child
Women's age	.160** (.025)	.376** (.044)
Squared women's age	-.002** (.000)	-.007** (.001)
Tertiary education	.813** (.037)	.137** (.053)
Secondary education	.382** (.031)	.013 (.048)
Woman's non-labour income	-.005** (.001)	-.000 (.002)
Social transfers to the HH	-.060** (.003)	-.007 (.006)
Children 0-3	-.586** (.045)	-.264** (.055)
Children 4-14	-.537** (.041)	-.214** (.051)
Children >14	-.338** (.059)	-.720** (.183)
Presence of grandparents in the HH	.471** (.076)	-.170 (.128)
Part-time	-.011 (.007)	.000 (.010)
Part-time*South	.035** (.017)	.014 (.026)
Service sector	-.009** (.003)	.011** (004)
Childcare availability	.018** (.002)	.003 (.004)
Generosity of the optional parental leave	-.005** (.001)	.002* (.001)
North	-.390** (.128)	-.071 (.184)
Center-West	.052 (.080)	.026 (.110)
South	-1.103** (.232)	.110 (.330)
Constant	-1.300** (.507)	-7.170** (.816)
Number of observations	10,321	
Log likelihood	-8525.236	
Rho	-.017 (.029)	

Standard error in brackets

Finally we discuss the effects of services and family policies. Childcare availability positively affects the probability of working (indicating potential availability of other social services), while it is not significant in the fertility equation.

The generosity the optional parental leave has a positive effect on the probability of having a child, but a negative effect on the probability of working. This can be related to the demand-side effect: employers are less willing to hire a woman if they know that they have the opportunity to stay at home for long period after childbirth. Moreover, a longer leave may negatively affect woman's

human capital accumulation, making more difficult and less likely to re-enter the labour market after the break.

Finally the correlation coefficient (ρ) is negative, but not significant. In other related analyses (Del Boca, Pasqua and Pronzato, 2005) correlation between fertility and participation differs quite remarkably across countries, being negative in Italy, positive in France and not significant in the U.K.

We further investigate if the environmental variables differently affect women's decisions about working and having children according to their level of education. Table 5 reports the estimated coefficient of the bivariate probit run separately for women with tertiary, secondary and primary levels of education.

Childcare availability has a positive effect on the probability of working for women with all level of education, but the effect seems to be stronger for more educated women. On the contrary the effect of the presence of grandparents cannot even be estimated for highly educated women due to the too small percentage of cases of women leaving with the parents or with the parents-in-law. On the contrary the presence of grandparents has a positive impact on the probability of working of middle and low educated women (and the coefficient is bigger for lower educated ones). This seems to indicate the poorly educated women most often have to rely on the help of the extended family to be able to work, probably because of the cost and constraints in terms of opening hours imposed by the childcare services.

If we look at labour market characteristics, part-time seems to decrease the probability of working. However, when we interact the variable part-time with the dummy South, a positive and significant effect emerges both for high and for middle educated women. Finally, part-time has a positive (and significant) effect on the probability of high educated women to have children.

Table 5. Estimated coefficients of selected variables by level of education

	Women with primary education	*Women with secondary education*	*Women with tertiary education*
		Probability of working	
Presence of grandparents in the HH	.695** (.103)	.442** (.143)	-
Part-time	.005 (.012)	-.004 (.012)	-.032** (.014)
Part-time*South	-.026 (.027)	.075** (.031)	.097** (.039)
Service sector	-.013** (.004)	-.007 (.005)	-.001 (.006)
Childcare availability	.022** (.004)	.021** (.004)	.120** (.005)
Generosity of the optional parental leave	-.002 (.001)	-.003** (.001)	-.008** (.001)

	Probability of having a child		
Presence of grandparents in the HH	-.046 (.174)	-.108 (.221)	-
Part-time	-.011 (.0190)	-.024 (.018)	.038** (.017)
Part-time*South	.062 (.043)	-.025 (.045)	.048 (.052)
Service sector	.012* (.006)	.005 (.006)	.021** (.008)
Childcare availability	-.003 (.007)	-.005 (.006)	.016** (.006)
Generosity of the optional parental leave	.004 (.002)	.002 (.001)	.001 (.001)

Standard error in brackets

The variable related to services positively affects the probability of having a child for women with low and high education, and the coefficient is greater for better educated women. Finally the generosity of the parental leave arrangements seems to negatively affect the probability of working, but the coefficient is significant only for middle and high educated women, confirming the interpretation from the demand side previously offered.

6. Conclusion

The employment goals established by the European Union - the so-called Lisbon target - of 60% of women participation to the labour market, imply the design and implementation of social policies especially in Southern Europe, which necessitates an increase in female employment rates of nearly twenty percentage points.

The results we discussed above show how a sizeable increase in participation could be obtained through family policies that reduce the burden on women of household and family responsibilities (i.e. greater flexibility in the employment arrangements, improvements in childcare availability and quality).

The empirical results presented here illustrate the importance of analyzing jointly labour market and fertility choices in a framework which allows us to consider not only the impact of personal and household characteristics but also the characteristics of the environments where these choices are made. It also indicates the importance to take into account the qualitative differences of social polices across different welfare states.

Appendix

Table A1. Bivariate probit estimates for women with primary education

	Probability of working	Probability of having a child
Women's age	.117** (.037)	.238** (.067)
Squared women's age	-.002** (.000)	-.005** (.001)
Woman's non-labour income	-.005** (.002)	.003 (.003)
Social transfers to the HH	-.074** (.006)	-.004 (.010)
Children 0-3	-.707** (.077)	-.274** (.100)
Children 4-14	-.594** (.065)	-.215** (.086)
Children >14	-.295** (.086)	-.627** (.243)
Presence of grandparents in the HH	.695** (.103)	-.046 (.174)
Part-time	.005 (.012)	-.011 (.0190)
Part-time*South	-.026 (.027)	.062 (.043)
Service sector	-.013** (.004)	.012* (.006)
Childcare availability	.022** (.004)	-.003 (.007)
Generosity of the optional parental leave	-.002 (.001)	.004 (.002)
North	-.558** (.210)	.015 (.330)
Center-West	-.130 (.144)	-.277 (.260)
South	-.687* (.386)	-.625 (.596)
Constant	-.294 (.764)	-4.527** (1.260)
Number of observations	3,918	
Log likelihood	-3203.434	
Rho	-.074 (.051)	

Standard error in brackets

Table A2. Bivariate probit estimates for women with secondary education

	Probability of working	Probability of having a child
Women's age	.211** (.043)	.412** (.079)
Squared women's age	-.003** (.001)	-.007** (.001)
Woman's non-labour income	-.005** (.001)	.002 (.002)
Social transfers to the HH	-.059** (.006)	-.004 (.010)
Children 0-3	-.468** (.073)	-.359** (.093)
Children 4-14	-.555** (.067)	-.288** (.086)
Children >14	-.371** (.099)	-.953** (.374)
Presence of grandparents in the HH	.442** (.143)	-.108 (.221)
Part-time	-.004 (.012)	-.024 (.018)
Part-time*South	.075** (.031)	-.025 (.045)
Service sector	-.007 (.005)	.005 (.006)
Childcare availability	.021** (.004)	-.005 (.006)
Generosity of the optional parental leave	-.003** (.001)	.002 (.001)
North	-.665** (.234)	.617* (.365)
Center-West	-.069 (.151)	.217 (.237)
South	-1.277** (.403)	.299 (.597)
Constant	-2.267** (.873)	-7.023** (1.448)
Number of observations	3,714	
Log likelihood	-3177.715	
Rho	-.063 (.047)	

Standard error in brackets

Table A3. Bivariate probit estimates for women with tertiary education

	Probability of working	Probability of having a child
Women's age	.246** (.057)	.680** (.097)
Squared women's age	-.003** (.001)	-.011** (.001)
Woman's non-labour income	-.007** (.002)	-.006* (.003)
Social transfers to the HH	-.048** (.006)	-.023* (.012)
Children 0-3	-.621** (.088)	-.188* (.098)
Children 4-14	-.441** (.091)	-.125 (.097)
Children >14	-.073 (.176)	-.477 (.465)
Presence of grandparents in the HH(*)	-	-
Part-time	-.032** (.014)	.038** (.017)
Part-time*South	.097** (.039)	.048 (.052)
Service sector	-.001 (.006)	.021** (.008)
Childcare availability	.120** (.005)	.016** (.006)
Generosity of the optional parental leave	-.008** (.001)	.001 (.001)
North	-.036 (.251)	-.665** (.321)
Center-West	.260* (.142)	.235 (.165)
South	-1.452** (.472)	.483 (.613)
Constant	-2.328** (1.163)	-13.742** (1.790)
Number of observations	2,689	
Log likelihood	-2017,527	
Rho	.100* (.057)	

(*) Variable excluded because of the low percentage of women with tertiary education leaving with grandparents

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