CHILDCARE COSTS AND SPANISH MOTHERS'S LABOUR FORCE PARTICIPATION [*]

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ABSTRACT

In Spain, female labour force participation is among the lowest in Europe. This paper analyzes the extent to which female labour force participation is affected by the cost of formal childcare. Both decisions, labour force participation and formal childcare use, are jointly considered by means of a bi-variate probit model that accounts for the sample selection. Based on data from the Spanish Time Use Survey, the study indicates that Spanish mothers' labour force participation is very elastic to changes in childcare costs.

Keywords: Childcare costs, female labour participation.

JEL classification: J13, J22, C35

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1. Introduction

Recent European Union employment policies have emphasized the role of childcare decisions. In fact, the European Council of Barcelona (March 2002) stated that "member States should remove disincentives to female labour force participation and strive (…) to provide childcare by 2010 to at least 90% of children between 3 years old and the mandatory school age and at least 33% of children under 3 years of age" (European Council, 2002).

This statement stresses that, for mothers of preschool-age children, the decision to engage in paid employment typically implies the concurrent choice of a childcare arrangement. From this point of view, the labour force participation of mothers of young children may exhibit sensitivity to the cost, the quality or the availability of childcare.

Childcare issues have been object of study since the 1970s in the United States, United Kingdom and Northern Europe. Previous studies have analyzed the impact of childcare costs on employment participation (Heckman, 1974), on the use of formal childcare (Ribbar, 1992), on the type of care (Hofferth and Wisoker, 1992) or on the quality of care (Blau and Hagy, 1998).

In Spain the subject has been relatively neglected until very recently.[1] The aim of this paper is to provide Spanish evidence on the role that childcare costs play in the decision of mothers of preschool-age children to participate in the labour market. To our

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[1] The scarce literature has focused on parents' time devoted to childcare from a household division of labour perspective as García and Molina (1999) or Fernádez and Sevilla-Sanz (2006). Data limitations may explain this relative lack of interest.

knowledge, this is the first Spanish study that has examined the impact of childcare costs on labour supply decisions. The decision to become employed is jointly modelled with the decision to use formal childcare, and is considered to be influenced not only by conventional determinants, such as wages and non-labour income, but also by the expected costs of childcare. Thus, the paper concentrates on the aspect of the affordability of childcare services, ignoring the variability of this good along the quality dimension.

Using primarily data from the Spanish Time-Use Survey, our results show that Spanish mothers' labour force participation is very elastic to childcare prices.

The paper is organized as follows. Section 2 provides a literature review. In Section 3, we present the institutional setting in which Spanish families make their choices and discuss the data and summary statistics. Section 4 outlines the econometric model and estimation procedure issues. Section 5 presents empirical results. Finally, Section 6 concludes with a discussion of the interpretation of the results and policy implications.

2. Literature review

Female labour employment decisions have been studied extensively (Killinsworth and Heckman, 1986). In this literature, the presence of preschool-age children has been identified as a crucial determinant of labour supply (Nakamura and Nakamura, 1992, Carrasco, 2001, and Grossbard and Amuedo-Dorantes, 2007, among others).

On the other hand, during the past two decades, social scientists have analyzed various aspects of child-care decisions. Some studies have examined the influence of costs or availability of care services on fertility decisions (Blau and Robbins, 1989, Anderson, Duvander and Hank, 2004). And a separate set of research has explored the factors affecting parent's choice of type of care (Hofferth and Wissoker, 1992, 1996, Johansen, Liebowitz, and Waite, 1996).

Recently research has focused on the relationship between childcare and female labour supply. Most studies have estimated a discrete choice participation probit with childcare costs and wages as key explanatory variables. Measures of expected childcare cost have been constructed, as childcare costs are usually available only for those who purchase childcare. These measures have been based on average cost in the community (Blau and Robbins, 1988) or selectivity corrected cost estimates (Connelly, 1992, Powell, 1997, Kimmel, 1998).

Other empirical studies have combined qualitative labour supply choices with childcare mode choices to form distinct combinations of labour supply and childcare that are estimated in a multinomial framework. Ribbar (1995), Powell (2002), Blau and Hagy (1998) or Kornstad and Thoresen (2006), though following this approach, differed in the econometric estimation strategy.

In between these two approaches, some research has considered the interrelatedness of childcare choice and labour market behaviour but without incorporating choice of care mode (Cleveland et al., 1997; Viitanen, 2005; Del Boca and Vuri, 2006). These studies have usually estimated a bi-variate probit of labour force participation and paid childcare use, incorporating childcare costs and wages as key explanatory variables.

The empirical evidence gathered across these studies has generally supported the theoretical expectation that higher costs of childcare have a negative effect on the probability of participating in the labour market. Nonetheless, the range of elasticities has been large (from -0.14 (Viitanen, 2005) to -0.92 (Kimmel, 1998)), probably due to the different methodologies –probit, multinomial logit, bi-variate probit– or sample characteristics –married/single mothers, age of youngest child,… However, as Herbst and Barnow (2008) state, there appears to be a recent convergence of estimates centering on -0.40.

3. The childcare system in Spain

For the last two decades, Spain has witnessed a progressive accession of women to the labour market. Its female labour participation rates have risen about fifteen percentage points to reach above 61% in 2006, as shown in Table 1. Nevertheless, the figure is still weak compared to that of Northern European countries or United States that show participation rates of 75%, approximately. Also, Spanish women have mostly full-time jobs. Part-time employment among Spanish women scarcely represents 21% of total employment. That may explain the relatively low employment rates for mothers. Nonetheless, even if in 1990 just 36% of mothers with at least one child under six were employed, by 2002, Spanish mothers' employment rates had risen to 51% (Table 1).

TABLE 1

Simultaneously, an increase in the demand for non-parental care of preschoolers has taken place. Data are difficult to obtain: because of the different childcare arrangements, e.g. formal and informal, and also because utilization rates for each type of childcare arrangement vary considerably with the age of the child. Table 2 presents information from the OECD Family Database (2008), which brings together information from different OECD databases (for example, the OECD Social Expenditure database, the OECD Benefits and Wages database, or the OECD Education database).

TABLE 2

As can be inferred from the second column, the situation for three-year-olds differs a great deal from one country to another. A partial explanation to this can be found in the different education laws. In Spain, at three, children start what is called Infant Education, which precedes Primary School. And, even if it is not mandatory, public and private schools generally offer this cycle (3 to 5 years). The picture is not the same for children under three years of age. As the third column shows, in 2004, in Spain, as in

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many other European countries, only 36% of these children attended day-care centres or pre-schools. As our own findings will reveal, there remains the lack of an adequate provision of care services for children under three.

In this paper we will, therefore, study the work-childcare options of Spanish families with children under 3 years of age, that is, children not eligible for Infant Education. Coincident with the 'male breadwinner model' of Le Feuvre (1997), in Spain young children's responsibility and care relies on their mothers. They may decide to remain in the labour market after giving birth, in which case, non-parental care is generally needed. Usual arrangements are, in this order of importance: day care centres, care by relatives, schools, and baby-sitters. Nonetheless, even if the mother remains outside the labour market, help can be obtained in any of these ways.

4. Theoretical and empirical model

The behavioural model underlying the empirical work in this paper follows the work of Ribbar (1995), Blau and Hagy (1998), Del Bocca (2006) or Wrohlich (2006).

As Blau and Hagy (1998) women are assumed to be the principal caregivers in the household and, thus, employment decisions of family members other than the mother are taken as given. We also assume two forms of childcare: informal care provided by the mother, father, or other household members and formal, paid care, purchased in the market.

Following Ribar (1992) and Connelly (1992), mothers are assumed to maximize utility, which is a function of leisure time L, market goods/disposable income Y, and childcare quality Q. The constraints in this maximization problem include a production function for childcare quality, a money budget constraint and constraints on the mother's and children's time.

The maximization problem can be written as:

$$\max \quad U = U(Y,Q,L)$$
$$\text{subjet to} \, Q = Q(M,C)$$
$$Y = WH + N - P_C C \quad\quad\quad (1.)$$
$$M + H + L = 1$$
$$M + C < 1$$

where M is the time the mother spends with her children, H is her time spent working in the market and C is the time children spend in formal childcare. N denotes non-labour income, W is the mother's available hourly wage rate and P_C is the hourly cost of formal childcare.

The maximization of this utility function subject to the constraints yields the primary estimating equations, representing the demand for leisure (labour supply) and the demand for paid childcare services.

$$H = f(W, P_C, other \ factors) \quad\quad\quad (2.)$$

$$C = f(W, P_C, other \ factors) \qu\quad\quad\quad (3.)$$

Because the participation in the labour market (not the continuous labour supply decision) is the focus of this paper, the above equation is estimated with the dichotomous labour force participation (LFP) as dependent variable. Similarly, instead of the continuous demand for paid childcare services, we consider the dichotomous paid-childcare use (CCU). As Kimmel (1998) states, the hourly wage W and the hourly price of care P_C are entered in the equations as two distinct terms because the total number of hours worked per week is not constrained to be equal to the number of paid childcare hours. In other words, the model allows mothers to purchase more or less hours of childcare than their working hours and even using childcare when they are not working.[2]

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[2] See below the discussion on the endogenous variables for the Spanish data (Section 5).

Following Cleveland et al. (1996), Viitanen (2005) and Del Bocca and Vuri (2007), we will simultaneously estimate the labour force participation and the use of formal childcare equations by means of a bi-variate probit (Heckman, 1978). Because the price of childcare is not observed for those who did not purchase childcare, and the wage is not observed for those who did not engage in paid employment, the econometric procedure requires prior estimation of prices and wages for all the observations in the sample.

In particular, the primary model is composed of:

$$LFP = \alpha_L + \beta_L \hat{W} + \chi_L \hat{P}_C + \delta_L X_L + \varepsilon_L \tag{4.}$$

$$CCU = \alpha_C + \beta_C \hat{W} + \chi_C \hat{P}_C + \delta_C X_C + \varepsilon_C \tag{5.}$$

where $\hat{W}$ is the expected hourly wage of the mother; $\hat{P}_C$ is the expected price of childcare; X_L is a vector of other determinants of the decision to engage in paid employment as age, non-labour income, household composition,…; X_C is a vector of other usual determinants of the decision to purchase paid childcare as age of the child, availability of alternative care arrangements, presence of other children,…; finally, ε_L and ε_C are the error terms, distributed bi-variate normal with mean 0, variance 1 and covariance ρ (Viitanen, 2005).

Nonetheless, before estimating equations (3) and (4), we must calculate expected prices and wages for all the observations in the sample. The expected wage, $\hat{W}$, is based on parameter estimates from the subsample of wage earners, adequately corrected for selection bias as first suggested by Heckman (1976). The wage equation is identified with variables that affect the mother's reservation wage but do not determine her wages, such as non-labour income.

Similarly, the expected price of market childcare, $\hat{P}_C$, is based on parameter estimates from the sub-sample of formal, paid childcare users, likewise corrected for sample selection.[3] The childcare price equation is identified with variables that are correlated with the decision to use formal childcare but do not affect the price paid for it, such as the presence of other adults in the household.

The key parameters of interest in equations (3) and (4) are the coefficients of the predicted wage and the predicted price of childcare. Those will allow the calculation of the corresponding elasticities with respect to labour force participation and childcare use.

5. Data and variable construction

The study uses primarily data from the Spanish Time-Use Survey (INE, 2003a). Basically the survey offers data on the primary and secondary activities realized considering hours and minutes as basic units of measurement (INE, 2003b). Technically it is a nationally representative sample of the population. Even if it is not specifically intended for studying childcare and labour supply, the survey provides interesting information on households' childcare arrangements and on the employment status of household members.

For our study, out of the 20,603 sample total, 1,970 households were initially selected for which the youngest child was less than four years old and non-eligible for Infant Education. Lack of data on critical variables led to a reduction in sample size of 369 observations. Because the focus of this study on the elasticity of female LFP to

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[3] It should be mentioned that most studies using North-American or UK data employ a double selection model. Most authors argue that childcare costs are only observed for households where the mother is employed. Therefore in addition to the selection regarding utilization, employment selection is also controlled for. However, in Spain (see Table 4), as in Italy (see Del Boca and Vuri, 2006) or Germany (see Wrohlich, 2004), the link between employment and childcare use is not so strong and, therefore, a single sample selection correction term is adequate.

childcare costs, children primarily cared for at public schools or by relatives were also excluded.[4]. Table 3 summarizes the data selection and hence the final sample size.

TABLE 3

Of these 1078 mothers, 442 or 41.0 % are employed and 446 or 41.3% report using formal childcare (Table 4). Although we will consider these issues in detail later, we would like to underline two facts. The first one is that almost 25% of the surveyed non-working mothers use paid, formal care for their children. This fact has also been mentioned by Del Boca and Vuri (2006), for Italy, or Wrohlich (2006), for Germany. The second is that a non-negligible 35.7% of working mothers rely exclusively on parental care (that including care by any adult member living in the household).[5]

TABLE 4

Additionally, the Spanish Time-Use Survey contains detailed information on the income, labour market activities and socio-demographic characteristics of the household and its members, particularly relative to the infant and his mother. Table 5 defines and states the dimension of the relevant variables.

Likewise we can count on information relative to the autonomous region and municipality size of the city of residence of the family. In Spain, there are seventeen autonomous regions plus two autonomous cities. That accounts for 18 additional dummy variables. The survey offers six locality size categories, the first of which corresponds to capitols and the last one to rural towns of less than ten thousand inhabitants.

Unfortunately the Spanish Time-Use Survey does not provide information on the expenditure involved in childcare activities and, thus, data on prices for these services

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[4] Nevertheless, a sensitivity analysis was performed in section 6.3 including 269 observations pertaining to the relative care choice, along with the parental care no paid care option.
[5] This explains why we decided to include the category relative care among no care use in our sensitivity analysis of section 6.3.

are not available. Thus, information from other sources had to be collected. Concretely I relied on the Spanish Household Budget Survey (INE, 2005) for the same years (2002-2003). The Spanish Household Budget Survey (INE, 2005) provides detailed information on expenditures incurred by families in different headings of seven digits' COICOP/HBS[6], together with data on household income and information on regions and municipal sizes of the city of residence of the family. Following Del Boca et al. (2005), we merged the above two data sets using propensity-score matching methods (see Borra and Palma, 2008, for details in the procedure). The aim of this method is to match an individual of the Time-Use Survey with a similar individual of the Household Budget Survey, according to some chosen criteria, in order to collect relevant information from both surveys. Specifically, to calculate day care prices, we imputed Kindergarten Expenditures (1231208-COICOP-HBS) of an individual from the Household Budget Survey to a similar individual of the Time-Use Survey.[7] This procedure offered prices of day-care centre services for families using this arrangement. The final data set was completed by adding regional information on availability of childcare places from Anuario de Estadísticas Laborales y Asuntos Sociales (Ministerio de Trabajo y Asuntos Sociales, 2004), average wage rates of women working in the Personal Services Sector from Encuesta de Estructura Salarial (INE, 2004) and regional unemployment levels from Encuesta de Población Activa, Resultados Anuales (INE, 2004). Description of these variables is also provided in Table 5.

TABLE 5

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[6] The Classification of Individual Consumption by Purpose Adapted to the Needs of Household Budget Surveys (COICOP-HBS) is an international coding system designed for household budget surveys implemented in many countries (INE 2005).

[7] In order to compute the propensity score, we run a logit regression of the binary indicator taking value 1 for observations in the Time-Use sample (and 0 for the Household Budget sample) over the set of common household characteristics. We followed the algorithm proposed by Becker and Ichino (2002), which tests if the propensity score satisfies the balancing property. We ended up with five blocks in which the score was balanced across the treated units and controls. We also chose to use kernel-based matching (Heckman et al. 1998), associating a kernel-weighted average of the outcome of all donor-dataset units to the unit i of the recipient dataset.

6. Empirical results

Consistent with our estimation strategy, we first present the results from the supporting equations for wages and childcare costs. The second subsection discusses the estimation results from the labour participation/childcare use bi-variate probit.

6.1. Estimating wages and childcare costs

Table 6 presents a selectivity corrected log-wage model of the mother, where the selection concerns the decision to engage in paid employment. The results are consistent with those usually found in the labour supply literature. As reported for example by Powell (1997), increases in the mother's level of education and age have a significant positive effect on both participation and wages. Also, on average, immigrant mothers present lower participation rates and receive lower wages. As found by Viitanen (2005), the number of children under ten is associated with decreased labour participation. Regional unemployment rates, included to control for labour demand conditions, have the expected negative effect on both participation and wages (Kimmel, 1998). Household non-labour income is used to identify the model as it has a direct effect on the mother's reservation wage hence affecting her employment decision with no impact on her wage. Non-labour income has the expected negative effect on the employment probability (Viitanen, 2005). Consistent with model expectations, the sample selection term shows a significant positive impact, indicating that working mothers tend to obtain higher wages than non-working mothers.

TABLE 6

Results of the selectivity corrected log-childcare costs model are shown in Table 7. The age of the child and the level of education of the mother have the expected impact on the use of childcare. As found in Powell (1997), having older children significantly

increases the likelihood of paying for care. Also, as reported by Viitanen (2005), more educated mothers are more likely to purchase childcare. Surprisingly, the presence of adults or other children under ten years of age in the household does not significantly affect the probability of using formal childcare.

As expected, the age of the child is a significant determinant of childcare prices. The regional wage rate, included to control for supply conditions, is significant and of expected sign. Contrary to intuition, the educational level of the mother is negatively related to childcare costs. Nonetheless, it should be kept in mind that less educated mothers are likely to use less hours of care, as they are probably not working, and possibly face higher hourly prices. Regional dummies, not shown for brevity, are also quite significant indicating the importance of regional variation in childcare costs. The coefficient on the selection term is negative and significant. This result suggests that families purchasing childcare face lower prices than non-users.

TABLE 7

6.2.   Bi-variate model results

Estimated coefficients for the primary LFP/CCU bi-variate probit equations are given in Table 8. The regressors in this equation include the predicted hourly wage and the predicted hourly price of childcare, along with other socio economic characteristics of the household already included in the previous supporting equations. Wages are estimated to have a significant positive effect on both labour force participation and paid childcare use, while the hourly cost of childcare also shows a negative significant impact on both decisions. In addition, the estimated correlation coefficient (rho) is positive and significant, indicating the adequacy of the simultaneous estimation of both equations. These results are all consistent with the underlying behavioural model.

TABLE 8

Controlling for the childcare costs, the presence of additional children in the household continues to have a significant negative impact on LFP, as also reported by Powell (1997). Consistent with the expected income effect, higher levels of income earned by other members of the family but the mother are found to affect labour participation decisions negatively.

As reported by Powell (1997) and Cleveland et al. (1996), though contrary to Viitanen's (2005) findings, when we control for both wages and childcare costs, the mother's immigrant status does not significantly affect her labour participation decision. On the contrary, labour market conditions, included through the regional unemployment rate, are still significant determinants of female labour participation.

With respect to the childcare use decision, one of the most significant determinants continues to be the age of the child, older children being more likely to be cared for at day-care centres. Once we control for the hourly price of childcare and the mother's expected wage, availability of informal modes of care, measured by the presence of adults in the household, has a significant negative effect on the probability of using market care, as also found in Cleveland et al. (1996). Additionally, compared to families with only one child, mothers are much less likely to rely on purchased care if they have more than one child under the age of 10.[8]

Surprisingly the regional availability rates of day-care places do not significantly affect the probability of using paid, formal care. Even if the positive sign of this variable is intuitively correct, better, more disaggregated data may have resulted in more accurate estimates.

Participation and childcare use elasticities, based on the estimation results in this paper, are reported in Table 9. Our main empirical finding is that the expected price of

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[8] Cleveland et al. (1996) report a similar result.

childcare exerts a statistically significant and quantitatively substantial negative impact on the decision to engage in paid employment. The elasticity of labour force participation with respect to the hourly price of care is -0.92, indicating that reducing childcare costs by 10% would lead to a 9% increase in the probability of engaging in paid employment. This figure lies within the upper end of the estimates found in previous literature which range from -0.14 in Viitanen's (2005) study for United Kingdom to -0.92 in Kimmel's (1998) study for the USA. [9]

The elasticity of labour force participation with respect to the mother's wage is 1.00. Previous estimates are quite similar (Cleveland et al. (1996), 0.81, Powell (1997), 0.85), with the exception of Kimmel's (1998) 3.25.

The elasticity of paid childcare use with respect to its own price is -0.98. This indicates that a 10% reduction is childcare costs would increase the probability of using market care by about 9%. Compared to previous studies, the figure lies within the range of former estimates which vary from -0.46 for United Kingdom (Viitanen, 2005) to -1.06 for Canada (Cleveland et al., 1996) or -1.86 for the United States (Ribar, 1992).

Finally, the elasticity of paid childcare use with respect to the mother's wage is 0.44, indicating that high-wage mothers are more likely to purchase formal childcare. In particular, a 10% increase in the mother's wage rate is associated with approximately a 4% increase in the probability of using purchased care. This elasticity is within the range of previous estimates (i.e., 0.18 in Cleveland et al., 1997, or 0.62 in Viitanen, 2005).

TABLE 9

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[9] Blau and Robbins (1988) obtain -0.38, Cleveland et al. (1996), -0.39, Ribar (1992), -0.74 and Lokshin and Fong (2006), -0.46.

6.3.   Robustness check

In order to test the sensitivity of our results with respect to the criteria employed in selecting the sample, we estimated equations (3) and (4) including 269 observations pertaining to the relative care choice, along with the parental care, no paid care option. This specification involves assuming families do not distinguish between taking care of preschool children at home by household members or relying in other relatives living in a different household. Table 10 shows elasticities computed for this new sample. As can be observed wage elasticities are quite similar to our former results. On the contrary, price elasticities are somewhat inferior. Nonetheless the figures are still substantial. In fact, the estimated elasticity of labour force participation with respect to the hourly price of childcare indicates that a 10% reduction of childcare costs would increase the labour participation rate of mothers of pre-school-age children by approximately 8%. This estimate can be considered a floor –and the former 9.2%, a ceiling– for the actual effect of a price reduction on labour participation rates.

TABLE 10

6.4.   Policy implications

Finally, to asses the public policy implications of our empirical estimates, we simulate the employment effects of different levels of childcare costs subsidization. Specifically, we have calculated the mean predicted probabilities of labour force participation for direct childcare subsidies of 25%, 50% and 100%. The subsidy simulation provides estimates of the degree of employment response that could be anticipated in the event of significant childcare subsidies. The results of these simulations are given in Table 11, together with results from similar exercises.

TABLE 11

The mean predicted probability for our original sample is 39.7%. This measure is very close to the actual participation rate in the sample, which is 41.0%. If childcare costs were subsidized by 50%, the model predicts a LFP rate of 53.5%. If childcare costs were fully subsidized the LFP probability rises to 71.3%. These simulations indicate that Spanish mothers' LFP behaviour can be expected to respond substantially to subsidized childcare. Furthermore, when families using primarily relative care are included in the sample, the changes in LFP rates predicted by the model are of similar magnitude. In particular, universal childcare subsidization implies that 79.4% of Spanish mothers would be employed, in this case. These results are similar to those found for Canadian (Powel, 1997) or Italian mothers living in non-rationed areas (Del Bocca and Vuri, 2006). United States' studies show slightly reduced effects.

7. Conclusions

This paper has analyzed the effect of childcare costs on the labour supply decision of Spanish mothers. This is done through the estimation of bi-variate probits on the probability of using formal paid childcare and the probability of engaging in paid employment on the labour market, both decisions being functions of expected childcare costs, expected wages and other household characteristics. Since childcare prices are not observed for families who did not purchase market care, and wages are not observed for mothers who did not participate in the labour market, sample-selection corrected estimates of expected costs and wages are used. The model is estimated primarily on data from the Spanish Time Use survey.

The key finding in this paper is that childcare prices significantly impede Spanish mothers' labour force participation behaviour. A commonly argued rationale for government subsidization of childcare costs is to facilitate labour force participation by mothers. The responsiveness of the labour supply of mothers to childcare costs

demonstrated in this study indicates that such subsidies do have their intended effect of encouraging labour supply.

Finally, we should recognize that the use of aggregate data is not optimal. Better data on childcare costs and availability is desirable and would result in more accurate predictions.[10] Also, further research is required in order to improve our understanding of the supply side of the Spanish childcare market, including the analysis of quality measures such as group size or child-staff ratios.

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[10] We have used regional data. County level data or data relative to Spanish provinces would be very illuminating.

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LIST OF TABLES

TABLE 1. SPANISH WOMEN'S LABOUR MARKET						
Source : OECD Employment Outlook 2007, OECD Society indicators 2005.						
	Labor force participation rates		**Part-time employment as a proportion of total employment**		**Employment rates for mothers with youngest child aged under 6**	
	1990	**2006**	**1990**	**2006**	**1990**	**2002**
Australia	61.9	75.9	40.1	40.7	42.4	45.0
Belgium	46.1	65.9	25.9	34.7	64.4	68.8
Canada	69.2	77.9	26.8	31.9	56.9	62.7
Denmark	77.6	80.1	38.4	25.6	:	74.3
Finland	73.4	74.7	10.2	14.9	64.3	49.4
France	58.0	69.1	23.6	22.9	61.3	64.7
Germany	55.5	75.0	30.0	39.2	41.4	57.1
Greece	42.6	67.0	12.1	12.9	42.9	49.1
Ireland	42.6	71.3	17.6	34.9	30.6	51.8
Italy	44.0	62.7	9.6	29.4	45.3	53.0
Japan	60.4	73.1	32.8	40.9	37.2	35.2
Luxembourg	42.4	66.6	16.2	27.2	40.9	66.7
Netherlands	52.4	75.7	59.3	59.7	37.0	71.2
Portugal	59.6	73.9	9.4	13.2	67.4	79.2
Spain	**42.2**	**61.1**	**12.1**	**21.4**	**36.1**	**51.0**
Sweden	82.5	80.2	40.4	19.0	85.0	77.5
United Kingdom	67.3	76.7	42.6	38.8	42.5	57.0
United States	67.8	75.5	25.2	17.8	54.0	59.5
OECD	59.5	60.8	:	26.4	48.5	59.2

TABLE 2. PROPORTION OF YOUNG CHILDREN IN FORMAL[*] CARE, 2004.		
	Enrolment rates for 3-year-old children	Enrolment rates for less than 3 years old children
Australia	55.0	29.0
Belgium	99.3	38.5
Canada	:	19.0
Denmark	81.8	61.7
Finland	37.7	22.4
France	100.0	26.0
Germany	69.5	9.0
Greece	:	7.0
Ireland	48.0	15.0
Italy	98.7	6.3
Japan	67.3	15.2
Luxembourg	37.9	14.0
Netherlands	32.3	29.5
Portugal	63.9	23.5
Spain	95.9	20.7
Sweden	82.5	39.5
United Kingdom	50.2	25.8
United States	41.8	29.5
Source: OECD Family database (2008)		

[*]Formal care refers to day-care centres and pre-schools.

TABLE 3 SAMPLE SELECTION	
	Observations after selection
Time-Use Survey	20,063
Reason for removal	
No children under four	1,970
Missing values on critical variables	1,522
Child at public school	1,347
Child cared by relative	1,078
Source: Spanish Time-Use Survey, INE 2002/2003	

TABLE 4 FORMAL CHILD-CARE USE AND LABOR FORCE PARTICIPATION			
	NON-WORKING	WORKING	TOTAL
NON-USING	474	158	632
USING	162	284	446
TOTAL	636	442	1,078
Source: Spanish Time-Use Survey, INE 2002/2003			

TABLE 5. DEFINITION AND BASIC STATISTICS OF DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES. MEANS			
	UNITS	DEFINITION	MEAN
WAGE	Eu/ hour	Hourly market wage of workers	6.844 (5.85)
PRICE	Eu/hour	Hourly price of childcare of users	1.071 (0.23)
AGE	years	Age of the child in years	1.288 (1.01)
AGE_0	0/1	Dichotomous variable which takes value 1 if the child is less than one years old.	0.277 (0.44)
AGE_1	0/1	Dichotomous variable which takes value 1 if the child is less than two years old.	0.294 (0.45)
AGE_2	0/1	Dichotomous variable which takes value 1 if the child is two or three years old.	0.42 (0.49)
AGEMOTH	Years	Age of the mother	33.145 (5.30)
EDLEVEL1	0/1	Dichotomous variable which takes value 1 if the mother's education level is primary school or less	0.454 (0.49)
EDLEVEL2	0/1	Dichotomous variable which takes value 1 if the mother's education level is secondary school	0.322 (0.46)
EDLEVEL3	0/1	Dichotomous variable which takes value 1 if the mother's education level is University degree	0.223 (0.41)
FOREIGNER	0/1	Dichotomous variable which takes value 1 if the mother is a foreign person	0.083 (0.27)
ONE-PARENT	0/1	Dichotomous variable which takes value 1 if the mother is single	0.019 (0.13)
CHILDREN	number	Number of children under 10 living in the household	1.862 (0.92)
ADCHILDREN	0/1	Dichotomous variable which takes value 1 if there are additional children under 10 living in the household	0.615 (0.48)
ADULTS	number	Number of adults living in the household	2.089 (0.35)
UNINCOME	Thou.eu/ month	Aggregated monthly earnings of household members less mother's labour income	1.338 (0.90)
AVAILABILITY	Places/child	Regional availability of day-care places per child	0.041 (0.02)
CARE_WAGE	Thou.eu/ year	Regional average wage of workers in the personal services sector	11.347 (1.37)
UNEMPLOYM	Percentage	Regional unemployment rate	17.185 (7.16)
Source: Spanish Time-Use Survey (INE 2002/2003), Spanish Household Budget Survey (INE 2003), Anuario de Estadísticas Laborales y Asuntos Sociales. 2003 (Ministerio de Trabajo y Asuntos Sociales, 2004), Encuesta de Estructura Salarial. 2002 (INE, 2004) and Encuesta de Población Activa, Resultados Anuales. 2003 (INE, 2004)			

TABLE 6 LFP PROBIT COEFFICIENT AND LOG-WAGE COEFFICIENT ESTIMATES				
Number of obs = 1078			Log-likelihood= -754.475	
Censored obs = 636			Chi2(7): 145.360	
Uncensored obs= 442			Prob > chi2: 0.000	
	LFP		Log-Wage	
Variable	Coef.	S.E.	Coef.	S.E.
CONSTANT	-0.177	0.384	0.601***	0.224
AGEMOTH	0.002	0.008	0.013**	0.006
EDLEVEL2	0.593***	0.100	0.390***	0.078
EDLEVEL3	1.123***	0.115	0.885***	0.088
FOREIGNER	-0.852***	0.185	-0.599***	0.152
UNEMPLOYM	-0.037***	0.006	-0.016***	0.005
UNINCOME	-0.215***	0.046		
AGE_0	-0.105	0.080		
CHILDREN	-0.099**	0.045		
ADULTS	0.123	0.100		
LAMBDA			0.520***	0.059
Significance level: *10%; **5%; ***1%.				

TABLE 7 CCU PROBIT COEFFICIENT AND LOG-PRICE COEFFICIENT ESTIMATES				
Number of obs = 1078			Log-likelihood= -519.626	
Censored obs = 632			Chi2(23): 115.520	
Uncensored obs= 446			Prob > chi2: 0.000	
	CCU		Log-Price	
Variable	Coef.	S.E.	Coef.	S.E.
CONSTANT	-1.177**	0.515	-0.401*	0.226
AGE	0.577***	0.044	-0.047***	0.004
AGEMOTH	-0.007	0.008	-0.001	0.002
EDLEVEL2	0.343***	0.098	-0.053*	0.030
EDLEVEL3	0.662***	0.112	-0.126***	0.036
ONE_PARENT	0.450	0.308	-0.210***	0.077
FOREIGNER	-0.363**	0.157	0.017	0.050
UNINCOME	0.047	0.047	-0.005	0.013
CARE_WAGE	0.038	0.031	0.059***	0.015
AD_CHILDREN	-0.120	0.074		
ADULTS	-0.152	0.111		
AVAILABILITY	1.361	1.959		
LESS_TENTH	-0.493***	0.117		
LAMBDA			-0.258***	0.020
Significance level: *10%; **5%; ***1%. Specification includes regional dummies				

TABLE 8 LFP/CCU BI-VARIATE PROBIT COEFFICIENT ESTIMATES				
Number of obs= 1078	Corr. Coef. Rho: 0.595*** (0.041) Chi2(1): 133.283 Prob > chi2: 0.000		Log-likelihood= -1149.674 Chi2(18): 368.320 Prob > chi2: 0.000	
	LFP		CCU	
Variable	Coef.	S.E.	Coef.	S.E.
CONSTANT	0.314	0.655	1.350**	0.618
WAGEHAT	0.336***	0.040	0.147***	0.035
PRICEHAT	-0.688**	0.306	-0.723*	0.384
AGE_0	-0.212*	0.111	-1.339***	0.155
AGE_1			-0.386***	0.122
AGEMOTH	-0.008	0.008		
FOREIGNER	-0.141	0.163	-0.153	0.165
ONE_PARENT	-0.206	0.338	0.072	0.357
UNINCOME	-0.029***	0.052	0.048	0.049
AD_CHILDREN	-0.319***	0.087	-0.235***	0.087
ADULTS	0.289**	0.031	-0.286**	0.141
AVAILABILITY			3.073	1.909
UNEMPLOYM	-0.022***	0.006		
Significance level: *10%; **5%; ***1%. Specification includes regional dummies				

TABLE 9 PRICE AND WAGE ELASTICITIES FROM LFP/CCU MODEL. 1078 Obs.				
	LFP		CCU	
	Elasticity	S.E.	Elasticity	S.E.
WAGEHAT	0.999***	0.123	0.446***	0.119
PRICEHAT	-0.918**	0.412	-0.983*	0.522
Significance level: *10%; **5%; ***1%.				

TABLE 10 SENSITIVITY TEST. PRICE AND WAGE ELASTICITIES. 1351 Obs.				
	LFP		CCU	
	Elasticity	S.E.	Elasticity	S.E.
WAGEHAT	0.925***	0.106	0.268***	0.081
PRICEHAT	-0.808***	0.309	-0.867**	0.349
Significance level: *10%; **5%; ***1%.				

TABLE 11. LABOUR FORCE PARTICIPATION SIMULATIONS.					
Study	Country	Baseline	25% sub.	50% sub.	100% sub.
This study	Spain	39.7%	+9.5%	+17.8%	+31.5%
This study with relative care	Spain	45.7%	+9.2%	+18.2%	+33.8%
Del Bocca and Vuri (2006)	Italy (North) (South)	61.5% 40.8%	:	+15.5% +2.7%	+26.5% +5.4%
Kimmel (1998)	USA	58.0%		+5.0%	+9%
Powell (1997)	Canada	46.4%	:	+9.5%	+16.8%
Connelly (1992)	USA	58.8%	:	+5.2%	+9.9%