

CHILD CARE, FEMALE EMPLOYMENT AND PUBLIC POLICY

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ABSTRACT

Recent increased accession of women to the labour market, together with other social transformations, may further raise the demand for child care in Spain. In this paper we examine child care choice from an economic perspective. Our objective is to analyze the determinants that influence the choice of child-care arrangements.

To reach this goal, a theoretical model is presented which assumes that families attempt to maximize total utility. Next, three possible econometric models are designed: The first analyzes the demand for external care; the second studies child care choice conditional on using external child care; the third one considers both decisions simultaneously: whether to use external care and which type of child care to use. The model is then applied to the Spanish Time-Use Survey data (INE, 2003).

1. INTRODUCTION

In this paper we examine child care choice from an economic perspective. We assume that families will attempt to maximize total utility in their consumption of this service. Our objective is to analyze the determinants that influence the choice of child-care type.

Maximization of utility requires knowledge of individual preferences and restrictions. Nonetheless there is a common framework in which these choices are taken that we examine in the first two sections. The first considers how social transformations shape new individual needs and preferences. The second reflects on the institutional framework and its role in shaping restrictions. Section 4 presents the theoretical model. The data and variable construction are described in section 5. Basic descriptive analysis is performed in section 6. Empirical results are given in section 7. And finally, section 8 debates possible improvements and conclusions.

2. CHOICE PREFERENCES: SOCIAL TRANSFORMATIONS

Over the last decade, in European countries, there have been a number of important social transformations that determine the emergence of new social needs. Concretely the trend towards an aging population, women's increased participation in the labour market, the expansion of new –reduced– family structures,... lead to changes in the way families take care of their dependants.

Let us first take a look at the sociological framework in which care choices have to be taken.

Firstly important **demographic changes** have taken place. The *aging of population* is a widespread phenomenon in western economies. The proportion of population aged 65 years or more has increased from 14.7% in 1991 to 16.7% in 2001 for European Union members. Spain shows an even more dramatic increase of three percentage points, remarkable for just 10 years. The sole exceptions to this trend come from United Kingdom and Sweden. Table 1 shows elderly rates for selected countries in 2001.

Over the last decade fertility levels have fallen substantially in many countries of the European Union. The trend has been so dramatic that has determined the use of new terminology: 'lowest low fertility'.¹ The table 1 shows total period fertility rates for some countries. As can be seen, lowest low fertility levels are reported for most Southern European countries: Spain, Italy and Greece. All the countries however show figures below replacement levels.

TABLE 1. SOCIAL TRANSFORMATIONS	DEMOGRAPHIC CHANGES	
	Share of elders (%)	Fertility rates (%)
	2001	2000
Belgium	16.8	1.66
France	16.0	1.89
Germany	16.3	1.38
Greece	17.3	1.29
Italy	17.9	1.24
Spain	16.9	1.24
Sweden	17.3	1.54
United Kingdom	15.6	1.65
EU (15 countries)	16.7	:
Source: EUROSTAT and Billari (2004)		

According to Billari (2004) these low levels of fertility are primarily explained by the word 'postponement'. In the new millenium, leaving the parental home, forming a new union, getting married and becoming a parent are experienced on average later than before. Spain can be seen as a clear exponent of this theory as average age for first birth is 29.1 years in 2000.

But postponement is not the only new socio-cultural trend. There is the emergence of **new family structures**, of marginal importance just a couple of decades ago. In the new Europe, more and more people are deciding to remain single, to cohabit with a partner or to divorce and sometimes start up a new family. For example, the rates of marriage within the Spanish

¹ According to Billari (2004,p.6), we can speak of low fertility levels when fertility is below replacement. We can speak of very low fertility when fertility is below 1.5 children per woman. And we can speak of lowest low fertility when fertility is below 1.3 children per woman.

population as a whole have been clearly decreasing: in 1972 there were 7.63 marriages for every thousand people, but in 2001 there have only been 5.25 (INE, 2003).

The third transformation that draws a different picture for child care issues is the massive **accession of women to the labour market**. Obviously women have always participated in the economic production of European countries. Initially they were employed in rural and agrarian production, trade and crafts; women often worked from home or in structures where the boundaries between economic production and domestic reproduction were far from clear-cut. During the second half of the 20th century, the introduction of salaried employment outside the home has transformed the professional and domestic reality of women (Le Feuvre, 1997).

This increase in activity levels has not taken place simultaneously all across Europe. In Northern Europe, it started around the nineteen sixties; Southern Europe began its modernization approximately in the middle eighties. This different timing explains part of the distinct actual activity rates which range from Sweden's almost 60% rate to Italy's 37% (Table 2).

TABLE 2. SOCIAL TRANSFORMATIONS	WOMEN IN THE LABOUR MARKET				
	Female activity rate 2002 (%)	Unemployment rate 2003 (%)		Part-time employment 2002 (%)	
		Total	Women	Men	Women
Belgium	42.6	8.5	7.8	37.7	5.9
France	49.1	10.6	8.3	29.7	5.0
Germany	49.4	8.9	9.6	:	:
Greece	37.7	14.1	6.1	8.1	2.3
Italy	36.8	11.7	6.8	16.7	3.7
Spain	41.1	15.9	8.2	17.0	2.6
Sweden	58.7	5.1	5.8	32.9	11.2
United Kingdom	54.8	4.4	5.5	44.0	9.4
EU (15 countries)	47.6	8.9	7.2	33.5	6.6
Source: EUROSTAT					

As Le Feuvre (1997) points it, women are more often salaried than their male counterparts. They tend to be concentrated in the tertiary sector, mostly in the public sector, where salaried work predominates. Also, although unemployment rates vary widely from country to country (from 5.0 in United Kingdom to 11.3% in Spain), as Table 2 states, women's unemployment rate is higher than men's everywhere in the European Union, with the exception of Sweden and United Kingdom.

Additionally, in those countries in which part time work is a generalized form of employment, most of those part-time jobs are occupied by women. It is argued that this kind of employment reconciles women's careers and family responsibilities, absent adequate public provision of child care facilities. Table 2 also shows part-time employment rates for men and women. They range from United Kingdom's 44% to Italy's 16%.

3. CHOICE RESTRICCIONS: INSTITUTIONAL FRAMEWORK.

Every industrial country has a package of tax benefits, cash benefits, exemptions from charges, subsidies and services in kind which assist parents with the costs of raising children. Some of these instruments are aimed at encouraging a higher birth rate, others at facilitating reconciliation of work and family life, others at redistributing income to low-income families with children,... (Clearinghouse on International Developments in Child..., 2003) Anyhow, they all affect the way families face their child care matters. What follows is a brief comparison of child benefit packages in selected European countries. The background social expenditure level is presented first.

Table 3 offers a global picture of the size of the Welfare State in some European countries. The second column presents total social expenditure as a percentage of GDP in 2001. The figures for Sweden are in the first place and at a great distance of other countries. Spain is in the lowest post.

As a complement to the above information, the percentage of the family social expenditure is offered. We observe important differences in the weight attached to family social expenditures, from the less than 3% found for Spain to the almost 11% that shows Sweden (as other Nordic countries). As can be seen, there seems to be a correlation between total expenditure and family expenditure.

TABLE 3. INSTITUTIONAL FRAMEWORK	TOTAL SOCIAL EXPENDITURE AND FAMILY SOCIAL EXPENDITURE	
	TOTAL (% GDP)	FAMILY (% of Total Expenditure)
Belgium	27,5	10.6
France	30,0	9.6
Germany	29,8	10.6
Greece	27,2	7.4
Italy	25,6	3.8
Spain	20,1	2.7
Sweden	31,3	10.8
United Kingdom	27,2	7.1
EU (15 countries)	27,5	8.2

Fuente: EUROSTAT. European Social Statistics. 2001.

The child benefit package is usually composed of tax benefits, cash benefits, maternal leave and access to child care arrangements.² It is thus a combination of financial aids and services in kind.

Countries use different mixes of tax and cash benefits and both represent alternative ways of delivering financial help to families with children. Tax benefits can take the form of tax allowances (subtracted from the tax base) or tax credits (subtracted after gross tax has been

² Bradshaw and Finch (2002) also consider housing and health policies and other kinds of social assistance.

assessed). On their turn, cash benefits can be income-related or non-income-related (paid for children irrespective of parental income). The Table 4 shows the different structures held by different countries.

Brandshaw and Finch (2002) underline that countries like Belgium, France or Germany count on generous familiar subsidies and use the tax system solely as an additional redistributive method. On the contrary, in the Mediterranean countries, like Greece or Spain, the subsidies are much less important and the redistribution tends to take place through fiscal incentives.

The second branch of child benefit package is leave entitlement. Leave from paid work encourages a balance between paid employment and unpaid care. One can think of three possible regimes: maternity leave (for mothers taking care of newborns), paternity leave (to encourage fathers taking care of newborns) and parental leave (gender-neutral rights to take care of children, not necessarily newborns). Table 4 shows the maximum number of weeks of paid leave that mothers can take for caring for newborns. It also shows the level of compensations. As Bradshaw and Finch (2002) state it is difficult to generalize which country has the most generous scheme. The length of the leave, percentage of earnings replacement, maintenance of social contributions, or job guarantee are among the characteristics that matter. On this basis, France, Germany, Greece and Spain offer the most supportive arrangements.

Finally there is the access to affordable childcare. Table 4 also shows the most prevalent formal arrangement for children under three. For them, the proportion in child care or education varies from three per cent in Greece to 41 per cent in Belgium. Most Southern European countries do not provide adequate formal care and relatives or housekeepers are used where needed. France or Sweden, on the other hand, supply formal care services of quality.

TABLE 4. CHILD BENEFITS						
	Financial aids		Maternity leave		Formal child care arrangement for under threes	
	Tax benefits	Cash benefits	Duration (weeks)	Compensation	Most prevalent	Proportion
Belgium	Tax credit	Non-income related	15	30days:82% after 75%	Day care family	41%
France	Tax credit	Non-income related	16	100%	Child minder	17%
Germany	Tax allowance & Tax credit	Income related	14	100%	Day nursery	:
Greece	Tax credit	Non-income-related	17	100%	Public/private childcare	3%
Italy	Tax credit	Income related	20	80%	Day nursery	:
Spain	Tax credit	Income related	16	100%	Private day nurseries	21%
Sweden	None	Non-income related	64	72%	Municipal day care centres	:
United Kingdom	Tax credit	Non-income related	18	6weeks:90% after 95€	Child minder	11%

Source: Bradshaw and Finch (2002)

4. CHILD CARE CHOICE PROBLEMS: THEORETICAL MODEL

According to Blau and Hagy (1998) two main issues have occupied the attention of policy makers and scholars interested in child care. One is how the cost of child care affects the labour market decisions of young children's mothers. The other is how child care affects children, as their well-being may be influenced by the quality of those non-parental arrangements. From the Spanish point of view, two further topics must be added: first, the effect of child care policy on fertility decisions of would-be parents (in a lowest low rate framework); and second, the effect of child care policy on the demand for labour (in a high unemployment rate framework).

These issues raise important questions about the nature of consumer demand for child care. In this paper we analyze how income, the price of child care and family characteristics influence the type of child care arrangement chosen by families. The ability of government policy to affect the type of child care chosen depends on the answers to these questions. Policies directed at increasing the market - and thus employment - demand for child care may fail to achieve its goals if families are reluctant to the market child care option regardless of its relative price.

Our theoretical model describes the choice of child care arrangements for their youngest child by Spanish families who have children under four. Following Hofferth and Wissoker (1992) and Hofferth and Chapin (1998) labor participation decisions of parents are assumed to be independent of the child care decision. This assumption may be unrealistic for some families, in which the second earner - usually the mother - is decided dependent on the

availability of child care options.³ Nevertheless, in Spain it is not infrequent that families use some type of care even when one of the partners is not in the labour market.⁴ And in addition, given the high levels of female unemployment, working women may feel that leaving the labour force will impede that they return to it after the children grow and thus for many 'loosing' their job is not an option.

We consider five modes of care: parental care, care by a relative, care by a baby-sitter (generally home-based), care at a day-care centre and care at a school. We regard it as a multinomial variable and thus study the primary child care arrangement used for the youngest child in the household. This primary arrangement refers to the type of regular non-parental care used for the greatest amount of time. When no such regular non-parental service is recorded, parental care is considered the primary arrangement. Day care centres and schools are differentiated here because prices paid may differ.⁵ Also hours contracted for day-care centres appear to have much more variability than those relating to schools. Sitter care, even if belonging to the market sector as those former forms of care, is generally unregulated and frequently informal. Finally, paid and unpaid relatives are included as a single category, although the most common form is unpaid.

It is assumed that families wish to maximize utility. Each family evaluates the utility of each available child care mode and then chooses the mode with the highest utility. The utility of each mode is assumed to depend on mode attributes like its expected price and quality, family characteristics such as income, education level or family structure and a purely random component of utility (Hofferth and Wissoker, 1992).

Three different models can be postulated. The first one analyses the decision of whether to use external child care (in any form). The second one studies the choice of child care arrangement conditional on using external child care. The last one is the generalized model in which both decisions are considered: whether to use external care and which type of external care.

All of the above models can be formally represented by the same generic econometric model. We assume an explicit relationship between the utility of an alternative and the characteristics of the alternative and the household. The utility of choice n for individual i , V_{in} , is assumed to be a linear function of the characteristics of the individual x_i , the attributes of the mode z_{in} , and the random component e_{in} :

$$V_{in} = z_{in}' a_n + x_i' b_n + e_{in} \quad 1.$$

³ For instance, Powel (2002) or Blau and Hagy (1998) estimate joint labour participation and childcare mode decisions of mothers.

⁴ We will discuss this issue in section 6.

⁵ We found schools were either more expensive than day-care centres or almost free.

Considering N different alternatives, the individual will choose the option with the highest utility. Option j will be chosen if

$$V_{ij} > V_{in} \quad \forall n \neq j \quad 2.$$

Following Hofferth and Wissoker (1992), we suppose that the random components of utility are independent across individuals and modes of care and that each is drawn from the Extreme Value (I) distribution. Therefore, the multinomial logit specification for probabilities is obtained. In this case, the probability that mode j is chosen may be written:

$$P_{ij} = \Pr ob(V_{ij} > V_{in} \quad \forall n \neq j) = \frac{\exp(z_{ij}' a_j + x_i' b_j)}{\sum_{n=1}^N \exp(z_{in}' a_n + x_i' b_n)} \quad 3.$$

The parameters of the model can be estimated using maximum likelihood techniques.⁶

5. DATA AND VARIABLE CONSTRUCTION

The study uses 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, obtained by two-step stratified sampling. For our study, 2,095 households were selected – out of the 20,603 sample total – in which the youngest child was less than four years old.

Even if it is not specifically intended to study child-care matters, the survey provides interesting information on child care arrangements by households. Particularly, families are asked whether each of their children under ten are taken care of by different alternatives and for how long (in weekly hours) this caring takes place.

This information allows the construction of our dependent variable, mode of primary child care arrangement, as stated before. Table 5 provides a simple tabulation of the variable.

TABLE5 MODE OF PRIMARY CHILD-CARE ARRANGEMENT FOR CHILDREN UNDER 4			
	Frequency	Percentage	Cumulative
PARENTAL CARE	787	37.57	37.57
RELATIVE CARE	334	15.94	53.51
BABY-SITTER	118	5.63	59.14
DAY-CARE CENTRE	527	25.16	84.30
SCHOOL	329	15.70	100.00
TOTAL	2,095	100	
Source: Spanish Time-Use Survey, INE 2002/2003			

⁶ We have used STATA version 8.0.

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. Table 6 defines and states the dimension of the relevant variables.⁷

	UNITS	DEFINITION	MEAN
HOURS	h./week	Hours of care contracted per week	19.686 (19.84)
PUBLIC	0/1	Dichotomous variable which takes value 1 if the institution of care is public	0.521 (0.69)
AGE	years	Age of the child in years	1.541 (1.11)
MEMBERS	number	Number of family members	4.121 (1.26)
ONEPA	0/1	Dichotomous variable which takes value 1 if it is a one-parent family	0.022 (0.14)
FULLM	0/1	Dichotomous variable which takes value 1 if the mother works full-time	0.388 (0.48)
PARTM	0/1	Dichotomous variable which takes value 1 if the mother works part-time	0.061 (0.23)
BOTH	0/1	Dichotomous variable which takes value 1 if both parents work	0.448 (0.49)
INCOME	eu/month	Aggregated monthly earnings of household members	1852.60 (1189.4)

Source: Spanish Time-Use Survey, INE 2002/2003

Additionally we can count on information relative to the autonomous region and municipality size of the city of residence of the family. Simple tabulations of these variables are offered in tables 7 and 8.

AUT. REGION	Freq.	Percent	Cum.
ANDALUCIA	492	23.48	23.48
ARAGON	53	2.53	26.01
ASTURIAS	30	1.43	27.45
BALEARES	50	2.39	29.83
CANARIAS	81	3.87	33.70
CANTABRIA	32	1.53	35.23
CASTILLA-LEON	78	3.72	38.95
CASTILLA-LAMANCHA	76	3.63	42.58
CATALUÑA	330	15.75	58.33
VALENCIA	160	7.64	65.97
EXTREMADURA	49	2.34	68.31
GALICIA	141	6.73	75.04
MADRID	198	9.45	84.49
MURCIA	54	2.58	87.06
NAVARRA	87	4.15	91.22
PAIS VASCO	58	2.77	93.99
LA RIOJA	49	2.34	96.32
CEUTA-MELILLA	77	3.68	100.00

Source: Spanish Time-Use Survey, INE 2002/2003

⁷ Note that some of the variables pertained to different folders of the Survey and had to be merged.

MUNICIPALITI SIZE	Freq.	Percent	Cum.
Capitols (var. CAPITOL)	806	38.47	38.47
More than 100.000 inhab. (var. THOUSAND)	175	8.35	46.83
Betw. 50.000 & 100.000 inhab. (var. FIFTY)	313	14.94	61.77
Betw. 20.000 & 50.000 inhab. (var. TWENTY)	165	7.88	69.64
Betw. 10.000 & 20.000 inhab. (var. TENTHOU)	426	20.33	89.98
Less than 10.000 inhab. (var. LESTENTH)	210	10.02	100.00
TOTAL	2,095	100.00	

Source: Spanish Time-Use Survey, INE 2002/2003

Unfortunately the Spanish Time-Use Survey does not provide information on the expenditure involved in those activities, and thus prices of the services can not be computed. Thus information from other sources has had to be collected. Concretely we have used the Spanish Household Budget Survey (INE, 2005) for the same years (2002-2003). We have information on regions and municipal sizes to calculate average expenditures incurred by families in three headings of seven digits' COICOP/HBS.⁸ Concretely we have used information on Domestic Service Expenditures (0562104-COICOP/HBS) to calculate baby sitting outlays; information on Kindergarten Expenditures (1231208-COICOP-HBS) to calculate day-care centres' expenses; and information on Pre-primary Education Expenditures (1011110-COICOP/HBS) to calculate schooling costs. Average expenditures by region and size of municipality have been calculated and have then been confronted with average hours of care also by region and municipality size to obtain average fares for the three kinds of paid services of care: baby-sitter, day-care centre and school. As the Household Budget Survey only records actual expenditures, those prices could only be of use for families paying for the services. Thus for those cases in which families manifested a zero cost of caring services, a zero price was recorded. Table 9 offers some descriptive statistics of the three prices used.

	UNITS	DEFINITION	MEAN
PBABYSIT	Eu/hour	Price of babysitting services	6.208 (10.28)
PDAYCA	Eu/hour	Price of kindergarten services	1.306 (1.58)
PSCHOOL	Eu/hour	Price of schooling services	0.630 (0.72)

Source: Spanish Household Budget Survey and Spanish Time-Use Survey, INE 2002/2003

6. DESCRIPTIVE ANALYSIS

Before turning to estimation of the econometric models we have considered useful to present in Table 10 summary statistics of available variables for the five options considered– parental

⁸ Classification of Individual Consumption by Purpose Adapted to the Needs of Household Budget Surveys. (INE, 2005).

care, relative care, baby sitter, day-care centre and pre-school -, an also for the entire data set.

	PARENT CARE	RELATIVE CARE	BABY-SITTER	DAY-CARE CENTRE	SCHOOL	TOTAL
HOURS	:	25.880 (21.71)	34.855 (16.51)	31.648 (13.46)	32.249 (11.26)	30.637 (16.05)
PUBLIC	:	:	:	0.361 (0.60)	0.805 (0.77)	0.521 (0.69)
AGE	0.998 (0.99)	1.146 (0.98)	1.305 (1.00)	1.889 (0.85)	2.765 (0.64)	1.541 (1.11)
MEMBERS	4.382 (1.47)	3.829 (1.06)	4.067 (1.11)	3.86 (1.00)	4.227 (1.18)	4.121 (1.26)
ONEPA	0.032 (0.17)	0.016 (0.17)	0.016 (0.12)	0.034 (0.18)	0.018 (0.13)	0.022 (0.14)
FULLM	0.169 (0.37)	0.496 (0.50)	0.844 (0.36)	0.523 (0.49)	0.358 (0.48)	0.388 (0.48)
PARTM	0.018 (0.13)	0.109 (0.31)	0.043 (0.20)	0.086 (0.28)	0.072 (0.25)	0.061 (0.23)
BOTH	0.219 (0.41)	0.612 (0.48)	0.880 (0.32)	0.583 (0.49)	0.410 (0.49)	0.448 (0.49)
INCOME	1548.35 (1017.2)	1831.45 (1087.2)	3169.65 (1436.9)	2047.82 (1215.6)	1806.19 (1149.0)	1852.60 (1189.4)
N Obs.	787	334	118	527	329	2,095

At a first sight, most variables behave differently for the options considered. For instance, the age of a child increases continuously as the options evolve (from parental care to school). Families relying on parent care tend to be larger families with lower incomes. Households that utilize relatives usually have younger children and use less hours. Families that rely primarily on baby sitters (or housekeepers) have on average higher incomes, employ longer hours and also tend to have fully-employed mothers. Households that use primarily day-care centres have older under-fours, less family members and, on average, less earnings. Also, most one-parent families and families where mothers are employed part-time use this kind of primary arrangement. Finally households that rely on schools have the characteristic of using generally public institutions. They present a little below average income and older children.

To stress the relative importance of the employment situation of the mother, table 11 is constructed. It shows the differences in child care mode choice by employment situation of the mother.

	NOT WORKING ⁹	PART-TIME	FULL-TIME
PARENTAL CARE	52.50	11.02	15.51
RELATIVE CARE	11.89	29.66	21.26
BABY-SITTER	1.23	4.24	13.10
DAY-CARE CENTRE	18.04	36.44	35.56
SCHOOL	16.34	18.64	14.57
TOTAL	100.00	100.00	100.00
N Obs.	1,059	118	748

Source: Spanish Time-Use Survey, INE 2002/2003

⁹ This category includes unemployed and temporarily absent from work mothers.

As already stated, it surprises the relative unimportance of part-time jobs in Spain. Besides this, two other circumstances warrant attention. The first one is that almost 50% of the surveyed mothers use some kind of regular external care for their children even if they do not work. This situation is quite specific of our country. In fact most of studies (like Hofferth and Chaplin (1998) or Del Boca et al. (2003)) focus only on child care decisions of working mothers, as this decision appears to be necessary condition to demand external child-care. This is obviously not the case for Spanish families and this particular condition supports our consideration of working status as a dependent variable.

The other circumstance comes from the relatively similar distribution of care types among part-timers and full-timers. Apart from the above average reliance of fully employed mothers on babysitters and the above average use of day-care centres of part time feminine workers, the distribution of shares can be considered parallel for both groups.

7. ESTIMATION RESULTS

7.1. The determinants of the demand for external care

As stated in section 4, we first model the probability of households relying on external sources of care. Thus we investigate the determinants of that 62.43 percentage of families that use outside help for the caring of their infants, regardless of the type of arrangement actually chosen. Table 12 presents regression results for the binomial logit model involved. The final specification was achieved by testing minor changes in the choice of explanatory variables. All of them were subject to a cause and effect relationship with the dependent variables, but some simply could not be included simultaneously due to its mutually high correlation.¹⁰ This last arrangement obtained the highest value of the McFadden's adjusted R-squared.

¹⁰ This was the case with the variables BOTH and FULLTMA and PARTTMA. Using the former or the two latter had to be decided.

TABLE 12. COEFICIENT ESTIMATES FOR EXTERNAL DEMAND FOR CARE BINOMIAL LOGIT				
Logit estimates	Number of obs = 1918			
	LR chi2(13) = 593.12			
Log likelihood = -953.5086	Prob > chi2 = 0.0000			
	McFadden's R2 = 0.237			
	McFadden's Adj. R2 = 0.226			
	Coef.	Std. Err.	z	P> z
AGE	.8582332	.0550609	15.59	0.000
MEMBERS	-.129671	.0570573	-2.27	0.023
ONE-PARENT	1.448.868	.4260881	3.40	0.001
BOTH	1.604.069	.1350732	11.88	0.000
INCOME	.0002536	.0000605	4.19	0.000
ARAGON	-.8594155	.3479353	-2.47	0.014
BALEARES	.541904	.3946864	1.37	0.170
CASLEON	-.4235471	.286505	-1.48	0.139
CATALUÑA	-.2922578	.162808	-1.80	0.073
MADRID	-.5598688	.2111704	-2.65	0.008
NAVARRA	-.7338965	.2795345	-2.63	0.009
CEUTA	-1.076.034	.3043729	-3.54	0.000
LESSTENTH	-.5312261	.1931684	-2.75	0.006
_cons	-.9695017	.2640215	-3.67	0.000

According to our estimations, the variables that influence the decision to use a external form of care are the age of the child, the number of members of the family, its income and the facts of being a family were both parents work or a one-parent household.

The signs of these variables indicate that, all else equal, larger families tend to use external forms of care less frequently. Also the probability of using outside help increases with the age of the child and the income of the family. Additionally one-parent families and families where both progenitors work tend to utilize external care more often.

The model includes additional geographical and locality size dummies as control variables. According to them, those living in Baleares are more prone to using outside help. On the contrary, families form Aragon, Castilla-Leon, Cataluña, Madrid, Navarra and Ceuta tend to rely on parental care more often. Finally, the probability of using outside help decreases for households located in municipalities of less than ten thousand inhabitants.

7.2. The determinants of families' choice among different external care arrangements

Consistent with the econometric strategy outlined in section 4, we now focus on the choice of child-care arrangement of those families using external child care. That is, once we know they use outside help, we study which kind of help. The four options thus considered are care by a relative, baby-sitter care, day-care centre and pre-school.

Table 13 reports coefficient estimates of the multinomial logit model. This time, three groups of estimators are offered, corresponding to the comparison of the three remaining categories with the base case (relative care). The model finally chosen is what Hofferth and Wissoker (1992) or Powell (2002) refer to as universal logit model. A conditional logit model, where the effect of the price variable is constrained to be equal across all modes of care, was also tested, but results turned unsatisfactory and the more general universal form was maintained. As before, the final specification was achieved by testing minor changes in the choice of explanatory variables. The value of McFadden's adjusted R-squared was used as a general measure of fit.

TABLE 13. CHOICE OF EXTERNAL CHILD-CARE TYPE. MULTINOMIAL LOGIT				
Multinomial logistic regression		Number of obs = 1221		
Outcome CARETYPE==1 (Relative care) is the comparison group		LR chi2(54) = 839.87		
		Prob > chi2 = 0.0000		
Log likelihood = -1150.7975		McFadden's R2 = 0.267		
		McFadden's Adj. R2 = 0.229		
Coeficient estimates for baby sitter care (CARETYPE=2)	Coef.	Std. Err.	z	P> z
PDAYCARE	-212.423	6.496.444	-3.27	0.001
PSCHOOL	1.067.835	3.443.512	3.10	0.002
PBABYSIT	.4104472	.6243998	0.66	0.511
HOURS	0.0120073	0.0075072	1.60	0.110
AGE	.2123012	.1264639	1.68	0.093
MEMBERS	.5710327	.1348714	4.23	0.000
BOTH	120.389	.3560212	3.38	0.001
INCOME	.0006531	.0001008	6.48	0.000
ASTURIAS	.762572	.6541102	1.17	0.244
CANARIAS	-.0537802	.8777149	-0.06	0.951
CANTABRIA	1.804.206	.866238	2.08	0.037
CASLEON	2.068.211	.6532524	3.17	0.002
CATALUÑA	3.767.725	1.247.163	3.02	0.003
VALENCIA	-.6446475	.6520709	-0.99	0.323
NAVARRA	2.432.635	.6528636	3.73	0.000
CAPITOL	3.217.582	1.006.574	3.20	0.001
TWENTY	.3441	.6707018	0.51	0.608
TENTHOU	.0351661	.5071146	0.07	0.945
LESSTENTH	-2.243.767	1.017.542	-2.21	0.027
_cons	-6.227.753	.8910278	-6.99	0.000
Coeficient estimates for day-care centre (CARETYPE=3)	Coef.	Std. Err.	z	P> z
PDAYCARE	-7.702.014	3.476.935	-2.22	0.027
PSCHOOL	4.420.078	1.823.578	2.42	0.015
PBABYSIT	.0819103	.3790334	0.22	0.829
HOURS	0.0167295	0.0053507	3.13	0.002

AGE	.8236574	.0830217	9.92	0.000
MEMBERS	.0853778	.0962374	0.89	0.375
BOTH	-.4281304	.182687	-2.34	0.019
INCOME	.0001952	.0000819	2.38	0.017
ASTURIAS	-2.152.942	1.092.463	-1.97	0.049
CANARIAS	1.027.494	.5201196	1.98	0.048
CANTABRIA	.4713842	.8873932	0.53	0.595
CASLEON	.8067267	.5166933	1.56	0.118
CATALUÑA	2.294.052	.7455092	3.08	0.002
VALENCIA	.3640937	.285055	1.28	0.202
NAVARRA	.8444295	.5282506	1.60	0.110
CAPITOL	1.380.258	.5782691	2.39	0.017
TWENTY	.8479082	.4100229	2.07	0.039
TENTHOU	-.3107052	.3121302	-1.00	0.320
LESSTENTH	-.2635734	.4582047	-0.58	0.565
_cons	-1.689.698	.530337	-3.19	0.001
Coeficient estimates for pre-school (CARETYPE=4)	Coef.	Std. Err.	z	P> z
PDAYCARE	5.724.136	3.863.706	1.48	0.138
PSCHOOL	-3.440.136	1.920.066	-1.79	0.073
PBABYSIT	1.204.096	.5291535	2.28	0.023
HOURS	0.0232071	0.0077106	3.01	0.003
AGE	2.382.947	.1551471	15.36	0.000
MEMBERS	.4639376	.118082	3.93	0.000
BOTH	-.9790881	.233674	-4.19	0.000
INCOME	.0000913	.0001037	0.88	0.379
ASTURIAS	-.1085429	.9733021	-0.11	0.911
CANARIAS	1.75.592	.6461064	2.72	0.006
CANTABRIA	2.022.453	.9417018	2.15	0.032
CASLEON	1.034837	.5987692	1.73	0.084
CATALUÑA	.0164746	.8560367	0.02	0.985
VALENCIA	.5651166	.3862678	1.46	0.143
NAVARRA	1.896127	.6370053	2.98	0.003
CAPITOL	.281262	.7418664	0.38	0.705
TWENTY	1.454278	.5490861	2.65	0.008
TENTHOU	.777826	.4386151	1.77	0.076
LESSTENTH	1.026313	.6384036	1.61	0.108
_cons	-8.61452	.8216021	-10.49	0.000

Taking the previous binomial model as a benchmark we find that some variables that were then significant appear to keep on being decisive for the choice of care type. We are referring to the age of the child (as older children tend to go to day-care centres and pre-schools), the income of the family (which significantly affects the probability of using baby-sitters), the

number of family members (that tends to favour schools or babysitters over relative care) or the fact of being a two-earner couple (where day-care centres tend not to be used).

Nonetheless, some other important variables are included, above all those referring to price and hours of care.

As already stated, we include three different price variables, one for each of the pay modes: baby-sitter, day-care and school.¹¹ Economic theory dictates that price and quantity demanded usually vary negatively. Thus we should expect a negative effect for those prices on the probability of their own modes, that meaning for instance that an increase in the price of a day-care centre diminishes the probability of centre care being the chosen option compared to the base case relative care. As can be observed, that circumstance can be corroborated for the day-care and the pre-school options, but not for the babysitting option. The sign of the PBABYSIT variable is positive for the baby-sitter alternative. Nevertheless, this counter-intuitive result comes from the fact that the price variable is not significant and thus no conclusions can be drawn from the analysis. This variable appears to have a positive influence on the choice of care at a school, thus indicating that families taking their children to school face on average expensive babysitters. This cross-substitution negative effects are found for most relationships, which means that an increase in the price of an alternative form of care usually tends to rise the probability of being the chosen option.

With respect to the variable HOURS, its sign tells us that, compared to relative care, families needing longer times of care tend to use day-care centres or pre-schools.

Regional and municipality size dummies are also included as control variables. Their effect can only be ascertained for the options for which they are significant. For instance, families living in provincial capitols tend to rely on babysitters and day-care centres, rather than relatives. Also, households from Canarias tend to use schools and day-care centres and those from Cataluña tend to employ baby-sitters and pre-schools.

As Train (2002, p.49), among others, states the logit model implies a certain pattern of substitution across alternatives. For any two alternatives j and k , the ratio of the logit probabilities is

$$\frac{P_{ij}}{P_{ik}} = e^{V_{ij}-V_{ik}} \quad 4.$$

This ratio does not depend on any alternatives other than j and k . That is, the relative odds of choosing j over k are the same no matter what other alternatives are available or what their attributes are. Therefore it is said that the logit model exhibits Independence of Irrelevant Alternatives (IIA).

¹¹ Relative care is mostly unpaid.

Whether IIA holds in a particular setting is an empirical question. Following Hausman and McFadden (1984) we will perform a Hausman-type test. The intuitive idea is that the model can be estimated on a subset of the alternatives. If IIA holds in reality, then the parameter estimates obtained on the subset of alternatives will not be significantly different from those obtained on the full set of alternatives. A statistic can be calculated which is asymptotically distributed as a chi-squared with degrees of freedom equal to the number of regressors.¹² Significant values of the statistic indicate that the IIA assumption has been violated.

Table 14 presents Hausman tests results for the multinomial model of external care. None of the cases appears to have problems of Independence of Irrelevant Alternatives; not even when the base case option, relative care, (the only unpaid option) is omitted.

Omitted	chi2	df	P>chi2	evidence
Baby-sitter (2)	-6.273	38	1.000	for Ho
Day-care centre(3)	-67.372	38	1.000	for Ho
Pre-school (4)	6.609	38	1.000	for Ho
Relative care (1)	-5.389	38	1.000	for Ho

Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.

7.3. The determinants of child care choice

The last econometric model to be estimated relates to the generalized child-care problem. A model where, as stated, both decisions are considered: whether to use external care and which type of external care. We would expect a replica of the results obtained in the former models and so both will be used as points of reference. Again minor changes in the choice of explanatory variables were tested and the value of McFadden's adjusted R squared was used as general measure of fit. Table 15 shows the results.

Multinomial logistic regression		Number of obs = 1918		
Outcome CARETYPE==0 (Parental care) is the comparison group		LR chi2(48) = 1322.25		
		Prob > chi2 = 0.0000		
Log likelihood = -2173.7809		McFadden's R2 = 0.233		
		McFadden's Adj. R2 = 0.215		
Coefficient estimates for Relative care (CARETYPE=1)	Coef.	Std. Err.	z	P> z
PDAYCARE	-267.409	100.025	-2.67	0.008
PSCHOOL	-.2065064	.6162472	-0.34	0.738
AGE	.1427422	.0748783	1.91	0.057

¹² Long and Freese (2003, p.207) offer the calculations involved.

MEMBERS	-.2641992	.0824623	-3.20	0.001
ONE-PARENT	1.470.526	.4869203	3.02	0.003
BOTH	1.826.253	.1710666	10.68	0.000
INCOME	.0000818	.0000832	0.98	0.325
ASTURIAS	.170214	.5112808	0.33	0.739
CANTABRIA	-.9746476	.8428811	-1.16	0.248
NAVARRA	-1.534.942	.4754778	-3.23	0.001
CAPITOL	.0537895	.1942302	0.28	0.782
LESSTENTH	-.2618875	.2540214	-1.03	0.303
_cons	.0509195	.4058753	0.13	0.900
Coeficient estimates for Baby-sitter care (CARETYPE=2)	Coef.	Std. Err.	z	P> z
PDAYCARE	-523.443	1.805.464	-2.90	0.004
PSCHOOL	2.108.652	.9445276	2.23	0.026
AGE	.3719505	.1154626	3.22	0.001
MEMBERS	.2409787	.1119064	2.15	0.031
ONE-PARENT	2.241.614	1.120.393	2.00	0.045
BOTH	3.010.231	.3361103	8.96	0.000
INCOME	.0007042	.000088	8.00	0.000
ASTURIAS	.7785599	.6680304	1.17	0.244
CANTABRIA	.9515812	.6797971	1.40	0.162
NAVARRA	.4601142	.4611906	1.00	0.318
CAPITOL	.7410215	.3276191	2.26	0.024
LESSTENTH	-2.300.647	.7769293	-2.96	0.003
_cons	-6.106.923	.7046426	-8.67	0.000
Coeficient estimates for Day-care centre (CARETYPE=3)	Coef.	Std. Err.	z	P> z
PDAYCARE	-.9533339	.9076212	-1.05	0.294
PSCHOOL	-.2253728	.5314359	-0.42	0.672
AGE	.9116741	.0696035	13.10	0.000
MEMBERS	-.2434966	.0730257	-3.33	0.001
ONE-PARENT	1.352.554	.4696852	2.88	0.004
BOTH	1.449.107	.1569582	9.23	0.000
INCOME	.0002935	.0000702	4.18	0.000
ASTURIAS	-2.381.949	1.078.216	-2.21	0.027
CANTABRIA	-.4775546	.6392203	-0.75	0.455
NAVARRA	-.7142265	.3518467	-2.03	0.042
CAPITOL	.0889596	.1758841	0.51	0.613
LESSTENTH	-.5468894	.2482063	-2.20	0.028
_cons	-1.392.825	.3704148	-3.76	0.000
Coeficient estimates for Pre-school (CARETYPE=4)	Coef.	Std. Err.	z	P> z
PDAYCARE	2.549.296	1.099.737	2.32	0.020
PSCHOOL	-1.764.408	.6495049	-2.72	0.007

AGE	2.44657	.1382091	17.70	0.000
MEMBERS	.0046293	.0862352	0.05	0.957
ONE-PARENT	.5331231	.6249268	0.85	0.394
BOTH	.8480006	.203832	4.16	0.000
INCOME	.0002052	.0000885	2.32	0.020
ASTURIAS	-.6244961	.7932643	-0.79	0.431
CANTABRIA	1.005.013	.62948	1.60	0.110
NAVARRA	-.0500503	.4386648	-0.11	0.909
CAPITOL	-.2432442	.22294	-1.09	0.275
LESSTENTH	-.414892	.3172474	-1.31	0.191
_cons	-6.495.937	.574589	-11.31	0.000

As can be observed, four groups of estimates are offered belonging to the comparison of the four remaining categories with the base case, which this time is parental care. Once more, a conditional logit model was also tested, but it could be rejected against a model that allowed price effects to vary with child-care choice.

The variable PBABY has not been included in the final specification as was encountered not to be significant and its inclusion lowered the value of the McFadden's adjusted R squared. The other two price variables show expected signs for their effect on their own alternatives. Nevertheless, the variable PDAYCARE is not quite significant.

Other influential variables are again the age of the child, the number of family members, the income of the family, its marital status, its employment situation,...

The positive signs of the variable AGE tell us that the older the child, the more probable the option of utilizing a day-care centre or pre-school becomes. Presumably, children cared at centres are allowed to interact between each other and this fact is considered to be more important as children grow old. This result is also found in Connelly and Kimmel (2003) for United States or Powell (2002) for Canada. However, also for U.S.A., Hofferth and Wisoker (1992) find that the age of the child does not affect choice of care, once differences in other factors including price and quality are taken into account, and Johansen et al. (1996) report that, contrary to what they hypothesized, mothers with younger children are significantly more likely to choose care in a day care centre than care at home.

The signs of the variable MEMBER indicate that parental and baby-sitter care are encouraged over relative and centre care as the number of children increases. Similar results are reported in Hofferth and Wisoker (1992) or Connelly and Kimmel (2003), both for United States.

Obviously one-parent households tend to rely on other forms of care different from parental care, primarily centre care and baby-sitter. Also families in which both parents work use external care. Apparently, baby-sitters are the preferred option. This can be considered a

specific result for Spanish families as this option is not as important in other developed countries.

The signs of the variable INCOME indicate a relative tendency of families with larger incomes to utilize other care options different from parental care. Nonetheless the tendency of employing baby-sitters as the preferred option for richer families clearly contradicts studies by Hofferth and Wissoker (1992) or Johansen et al. (1996) in which day-care centres are the preferred option.

Turning to the geographical and size control variables, we can conclude that families from Asturias tend to prefer parental care to day-care centres; households from Navarra, on average, favour parental care compared to relative care and day-care centres; families living in capitols, on the contrary, tend to rely on day-care centres; and those belonging to small localities prefer parental care to baby-sitters or day-care centres.

As already asserted, in order for the multinomial logit model to be adequate, data have to fulfil the assumption of Independence of Irrelevant Alternatives, thus indicating that the odds ratio among any two alternatives do not depend on the characteristics of the rest of the options. Table 16 shows Hausman tests of the IIA assumption that correspond to the multinomial model of table 15. As can be observed in none of the cases is the difference among coefficients as large as to reject the null hypothesis. Even in the case in which the base category, parental care, is omitted, the results do not significantly differ from what has been reported in table 15.

TABLE 16. HAUSMAN TESTS OF INDEPENDENCE OF IRRELEVANT ALTERNATIVES FOR MULTINOMIAL MODEL OF CHOICE OF CARE-TYPE				
Omitted	chi2	df	P>chi2	evidence
Relative care(1)	12.629	36	1.000	for Ho
Baby-sitter (2)	-22.657	36	1.000	for Ho
Day-care centre(3)	-65.791	36	1.000	for Ho
Pre-school (4)	17.494	36	0.996	for Ho
Parental care (0)	27.810	36	0.834	for Ho
Ho: Odds(Outcome-J vs Outcome-K) are independent of other alternatives.				

7.4. Policy discussion

The preceding results allow us to guess probable effects from different policy assumptions.¹³ We will focus on the last model, as it seems to be more general.

¹³ However, in order to quantify these effects calculation of marginal effects is needed.

We can think of two types of policies connected to child care issues. The first one relates to subsidizing the prices of the different services. And the second one consists on transferring income to the families involved.

Our results tell us in the first place that subsidizing baby-sitter care will not affect the choices of families, as the price of this service is not a significant determinant of child care choices.

In the second place, a decrease in the price of day-care centres will not significantly augment the tendency of families to use this kind of arrangement.

In the third place, subsidizing school services will significantly raise the demand for this kind of service.

Finally, transfer payments to families with children under four will translate into increases in the probability of using external care. Nonetheless we will expect a greater rise in the demand for baby-sitter services.

8. CONCLUDING REMARKS

As we have seen, important social changes have determined the upsurge of new social needs, among which we find child care services. On the other hand, countries differ extremely in the institutional framework that restricts child care choices. In Spain the need for child care services has not found adequate response from the policy arena. Private solutions are commonplace and in many cases those solutions come from outside the market – relative care – or from informal markets – babysitters.

If from the political point of view formal arrangements (day-care centres and schools) are preferred to informal ones (care by relatives or babysitters), our results show that subsidizing schools is a better option, compared to subsidizing day-care centres or allowing transfer payments. The first option will not significantly increase the demand for this kind of services and the second could be lost in housekeeping expenditures.

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