



## **Higher education demand in Spain: The influence of labour market signals and family background\***

CECILIA ALBERT

*University of Alcalá, Spain*

**Abstract.** Like many developed countries, Spain has experienced a growth in the demand for higher education over the last twenty years, despite diverse economic cycles. Since this demand does not slow down in the medium term, the objective of this study is to analyse, from statistical labour force sources since 1987, two potential influences: family characteristics and labour market signals.

The theoretical framework used here is the human capital theory, which is tested through discrete choice models where the selection process of young people through the education system is considered. The chief results may be summarised as follows: firstly, family characteristics are important elements in the demand for higher education, especially the mother's education attainment, which is even more determinant than that of the father. Secondly, the labour market signals in Spain have an influence on the demand for higher education: as a signal of both the opportunity cost of finding a job if not going to university and the employment expectations for each relevant education level.

### **1. Introduction**

The majority of developed countries have experienced a process of growth in higher education demand, and in recent years a myriad of studies have emerged in economic literature to analyse the factors that explain this phenomenon. According to the results of those studies, there are two broadly accepted factors affecting demand for education: (1) income and employment expectations relevant to each level of education, and (2) the family background characteristics of each potential student.

Since the early seventies, in Spain there have been two parallel trends: a steady growth in the demand for higher education<sup>1</sup> and a steady high level of unemployment. This paper presents the study of higher education in Spain over the past twelve years, placing special emphasis on the two previously mentioned groups of factors, family background and employment expectations; however, income expectations will be excluded from the analysis due to data restrictions. It should be noticed that the educational decisions of

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young people determine future labour supply qualifications in the medium and long term. If the behaviour of these young people and their families is very sensitive to market signals (such as employment opportunities or wage expectations) then market equilibrium will be easily reached. If, on the contrary, sociological variables are found to be the ones determining education demand decisions, then the mismatch between qualified labour demand and higher education demand will persist, and the adjustment in the long run will fall on the demand side and on the salaries.

Therefore, if the hypothesis that higher education demand corresponds to sociological and cultural variables is confirmed, then it follows a process which is independent from market signals, and the notion that an adjustment between the educational system and the economic system is futile may be accepted.

Few studies have analysed the combined impact of family background, income and employment expectations on education demand, due mainly to data restrictions: the available data do not offer the full range of information required for such a study. The one exception, and one which can be considered as a benchmark study, is that by Willis and Rosen (1979), where a database of American War Veterans (on whom they had longitudinal information) was used. In their study, they built a discrete choice model for education demand, obtained an unbiased wage-education estimate and analysed individual income expectations. Unfortunately, this sample is not representative of the entire population, so any further inferences become impossible. Because of this deficiency, the study by Willis and Rosen (1979) has not been replicated for other countries.

Broadly speaking, education demand has focused on two methodological lines:

- (1) The estimation of an education return rate through a mincerian wage equation.
- (2) The estimation of discrete choice models which allow us to study the influence of personal, family and labour market characteristics on the probability of demanding higher education.

The study at hand will follow this last methodology in order to understand the role of different factors on the demand for higher education in Spain. The book by Manski and Wise (1983) shows a wide repertory of the application of this methodology to different decisions individuals and institutions take regarding education in an American context. For the Spanish case, the first study using this methodology was that of Modrego (1986) where the probability of undertaking university studies is differentiated between short and long cycle programmes by using a sample in the province of Vizcay. Albert (1997, 1998a and 1999) has also presented diverse studies analysing higher

education demand using the Spanish Labour Force Survey (EPA, *Encuesta de Población Activa*) for different periods of time. She considers different definitions of higher education demand and also studied differences by gender. In another study, Mora (1997) estimated higher education demand models with the Family Budget Survey (EPF, *Encuesta de Presupuestos Familiares*). More recently, the work by Peraita and Sánchez (1998) also analysed the relation between the family background and the demand for education in Spain.

This paper is divided into six parts: Following the introduction, Section 2 presents a model for higher education demand. Section 3 describes the data set used. Then, in Section 4 the results from the estimation of the model of higher education demand (where the sample selection has been corrected) are analysed. Section 5 is an analysis of the recent trends in unemployment and demand of higher education. Finally, the main conclusions are shown in Section 6. In the Appendix one may consult the results of the estimation of unemployment probability which has been used to plot Figure 1.

## 2. A higher education demand model

The traditional approach of human capital theory considers the family background, the direct and opportunity costs (foregone incomes) and future incomes as the main determinants of education demand. Unemployment is expected to influence on the income and employment expectations of students as well as the opportunity costs of attending university, especially in countries that register high unemployment rates. The human capital theory points out three aspects of the demand for education to which unemployment can somehow affect:

- (a) *The opportunity cost of attending higher education.* Since unemployment rates for upper secondary young graduates is very high, they have lower chances of getting a job and, therefore, the opportunity cost of attending university will be lower as well.
- (b) *Employment expectations for university graduates.* The higher the unemployment rate of university graduates the lower the level of demand for university education.
- (c) *Unemployment increases uncertainty,* which implies an increase in the demand for higher education.

These latter aspects were considered in Kodde (1988) and Modrego (1986). In the paper of Kodde (1988), a model of education demand is developed and estimated taking into account forgone incomes, future incomes, the general unemployment level of the economy, and the different employment opportunities available for the relevant educational levels. For the Spanish case, Modrego (1986) proposes and estimates a higher education

demand model for the province of Vizcay in Spain, based on the work by Willis and Rosen (1979), and she incorporates the influence of labour market conditions on education demand.

Following Modrego (1986) and Kodde (1988), we are now able to incorporate the influence of labour market conditions into our education demand model. We also return to the suggestion by Venti and Wise (1983) to allow for sample selection bias in a model which reflects the demand of the higher education students. However, several aspects such as the quality of the school attended and the costs associated to each particular university have been excluded from the analysis. Such information is not available for Spain where practically all of higher education is publicly funded; individuals provide only twenty percent of tuition and enrolment costs. Student fees do not vary much amongst institutions, though certain disciplines, such as architecture, engineering, or medicine, are much more expensive than others. It would also be interesting to consider the influence of scholarships but, again, no data are readily available.

The problem of studying the influence of the labour market variables in the demand for higher education is to arrange the necessary information to validate the three previously mentioned aspects. But this is not a problem that only affects education economics, but to economics and social sciences in general. In this research work, we intend to use a discrete choice model to find the average influence of the family characteristics and the labour market on the demand for higher education. Through this model we will be able to infer the possible link between the evolution of the demand for higher education studies among the youth that has the possibility of taking this decision.

The estimated model is determined through the following expression:

$$\Pr(U_{it} > 0) = \Pr(X_{Uit}\beta_{1it} > -\epsilon_{1it}) = 1 - F(X_{Uit}\beta_{1it})$$

Where  $X_{Uit}$  are vectors of exogenous personal characteristics and employment opportunities which respectively influence the decision to continue into upper secondary education and to attend university in each moment of time. The  $\beta$  terms are unknown parameter vectors; the  $\epsilon$  terms are unobservable errors, and  $F$  are the associated distribution probability functions of demanding upper secondary level education.<sup>2</sup>

The strategy for estimation of the equation above consists in the estimation of a two-stage logit model. We use the Heckman-Lee two-stage estimation methods in this model (Maddala 1983).

In the first stage we estimate the probability of completing upper secondary education. In the second stage we estimate the probability of demanding higher education, including as an explanatory variable the previously estimated probability of completing upper secondary education.<sup>3</sup>

### 3. The data

The data are taken from the second quarter of EPA, from 1987 to 1998. In Spain the EPA offers three important advantages in comparison to other statistical sources in the study of education demand and its evolution. Firstly, it includes information on the highest educational level attained by individuals as well as information about the education undertaken in the reference week. Secondly, it gives information on personal, family and labour market characteristics at a regional level. Thirdly, since 1987 no methodological changes affecting the explanatory variables have been developed. All the aforementioned information is available as individual records in a computer-readable format, which allows the analysis of educational demand in the last 12 years and the update of the study at any time.

One of the first problems we find when studying demand for education is its definition. Normally, this is strongly influenced by the available information. In this study, we consider that an individual has demanded higher education if s/he has obtained a higher education degree or is undertaking such education in the reference week.

The chosen population for the study are young people aged between 19 and 24. Such a sample allows for two fundamental aspects: first, the guarantee that the individuals are old enough to have covered the relevant educational levels, and second, that they are young enough to be living in the parental home, where family characteristics may be observed.

As for the period of analysis, this will be from 1987 to 1998.

### 4. Results

To estimate the global effect of family background and labour market signals, a binomial logit model for qualitative response has been tested as outlined in the Section 2. The dependent variable takes value zero for young people who have not obtained a higher education degree or who are not undertaking higher studies in the reference week and value one for those who have finished or are undertaking higher studies in the reference week.

The independent variables represent the characteristics that could influence the choice we want to analyse. We have selected among the available variables the following ones (which are split in two groups):

(a) The family socio-economic background:

- *Mother's and father's educational level*, through four dichotomous variables for each one: illiterate or without education (reference category), lower secondary, upper and vocational upper secondary education and higher education.

- *Father's socio-economic conditions* taking nine dichotomous variable: unskilled (reference category), farmer, employer, professional, manager, skilled worker, other employed, unemployed and inactive.
  - *Living with parents*: living with both parents (reference category), mother not present, father not present; youth does not live with parents. Regarding other studies about higher education demand for Spain (Modrego 1986 or Mora 1997) in which only individuals living at home with both parents are chosen, we use the entire sample of young people controlling for different situations as regards living with parents.
- (b) Labour market variables:
- Annual regional *unemployment rate for young (19 to 24 year-olds) upper secondary education graduates*. Through this variable we intend to measure the opportunity cost in terms of employment chances among the young potential students for university education.
  - Annual regional *unemployment rates for higher education graduates*. Through this variable we intend to proxy the employment expectations for higher education.

In a country with high level of interregional labour mobility, regional unemployment rates should not be used to proxy employment opportunities and opportunity costs of demanding education. However, in Spain, several studies show the low level of labour force mobility (especially Bentolila and Jimeno 1998), therefore regional unemployment rates may be regarded as good approximate representations of both opportunity costs and employment expectations in the decision on demand for higher education.

Three additional variables have been included in the analysis: gender, the *lambda*, which accounts for the selection bias of completing upper secondary education and of being a potential demanders for higher education (predicted probability value) and one dichotomous variable for each year.

In a binomial logit model it is possible to estimate the marginal effect for each variable on the probability of demand for higher education. In our case, the marginal effect shows the variation in the demand for higher education for each of the considered features. This marginal effect is obtained through the following expression:

$$\frac{\partial P_i}{\partial X_i} = \frac{e^{\beta_i}}{(1 + e^{\beta_i})^2} \beta_i$$

Where  $\beta_i$  are the regression coefficients of each variable. The results for this model are displayed in Table 1.

It is important to point out that the probability of demanding higher education decreases 7% for men. Among all the considered variables, this (together

Table 1. Logit regression on the probability of demanding higher education\*

	Coefficient	T-student	Marginal effect
Male	-0,29	-24,38	-0,07
Fatherless	0,21	6,93	0,05
Motherless	0,14	3,28	0,03
Does not live with the parents	-0,30	-6,52	-0,07
Father with lower secondary education	0,04	1,61	0,01
Father with upper/vocational upper sec. ed.	0,35	10,92	0,09
Father with higher education	0,80	21,28	0,17
Mother with lower secondary education	0,18	8,08	0,04
Mother with upper/vocational upper sec. ed.	0,45	12,86	0,11
Mother with higher education	0,94	23,61	0,19
Father: farmer	0,39	14,13	0,09
Father: employer	0,25	11,05	0,06
Father: professional	0,40	13,99	0,10
Father: manager	0,48	13,85	0,11
Father: skilled worker	0,09	4,34	0,02
Father: other employed	0,20	4,45	0,05
Father: unemployed	0,01	0,19	0,00
Father: inactive	0,11	5,15	0,03
Unemployment rates for education level and age			
For higher education graduates	0,03	19,19	0,01
For young upper secondary graduates	0,00	3,00	0,00
1988	0,04	1,68	0,01
1989	0,21	8,17	0,05
1990	0,32	12,50	0,08
1991	0,38	14,15	0,09
1992	0,43	16,63	0,10
1993	0,34	14,11	0,08
1994	0,22	9,17	0,05
1995	0,29	12,00	0,07
1996	0,30	12,69	0,07
1997	0,34	14,35	0,08
1998	0,35	14,41	0,09
<i>Lambda</i>	0,45	6,14	0,11
Constant	-1,05	-22,12	
N		102138	
-2 log L.**		264235,58	

\*Reference category: woman whose parents are illiterate or without studies, her father is an unskilled worker, and the reference year is 1987.

\*\*Significance at 99%.

with the *not living at the parental home*) is the one that fosters most attending university. The increasing proportion of women in higher education is a generalised trend in industrialised countries, and this tendency is very strong in Spain (Mora 1997). The screening theory turns out to be a good tool to explain this trend: Women need a higher level of qualification than men do in order to compete in the labour market. Discrimination towards women in the labour market is the most relevant reason in this argument (Albert 1999).

The coefficient related to the parents' education attainment is positive and significant. This particular effect is stronger for the mother's education attainment than for the father's. There it can be seen that the youth whose father has completed higher education registers a higher probability of attending university (17% higher than that whose father is illiterate or has completed no studies). If the youth's mother is a university graduate, his/her probability of attending university is 19% higher than there whose mother is illiterate or has completed no studies. We would like to emphasise that these are the features that most increase the probability of demanding higher education. These results are in tune with other studies such a Duncan (1994) or Kodde and Ritzen (1994).

The father's socio-economic situation, which reflects the family's economic conditions, reveals that the children of unskilled workers have a lower probability of demanding higher education than children of fathers with other socio-economic condition. Youths whose fathers are managers register the highest probability of demanding university. There are no differences among children of unskilled workers and those of inactive fathers.

The family situation of children as regards life together with their parents are variables that have been included as control variables necessary due to the use of the whole sample. These variables reflect that a family where one of the parents is absent registers a higher probability for children to attend university than families where both parents are present. Besides, youths who do not live with their parents register a lower probability (7% lower) of attending university. This shows that secondary school-graduates who go straight to the labour market rather than going on to higher education can be expected to be self-sufficient at an earlier age.

We observe that the higher the probability of completing upper secondary education (the higher the *lambda*), the higher the probability of demanding higher education. This result is in tune with that found by Venti and Wise (1983), which is to say, a selection process of the individuals throughout the education system exists which makes it necessary to take into account in the estimations.

The regional unemployment rates for upper secondary young graduates reflect the opportunity cost of demanding higher education. The coefficient

associated to this variable registers the expected sign. An increase in the probability of being unemployed for these young people with upper secondary education attainment increases the probability of demanding higher education. One could say that the role of the university in Spain is somehow counteracting the effects of unemployment among the young people.

The regional unemployment rate for higher education graduates reflects employment expectations for the individual if s/he decides to demand this level of education. Therefore, the higher this rate, the lower the education demand should be since employment expectations for this group worsen. This variable does not register the expected sign. According to the results obtained in this model, there seems to be evidence of a mismatch between higher education demand and qualified labour demand. Two possible explanations can be applicable to this phenomenon:

- (a) This result is in tune with the human capital prediction in relation to the rise in uncertainty on education demand. From this point of view, and with the obtained results, we could say that the social atmosphere created by the high unemployment rates in Spain has caused a sudden and strong rise in the demand for higher education. This trend is not due to an irrational behaviour among the individuals, but to a very rational conduct, education being used as a protecting tool against the uncertainty in a country with such a high unemployment problem. The use of demand for education as a reaction towards uncertainty has been included in several theoretic models and it is perfectly framed in the human capital theory (Levhari and Weiss 1974; Williams 1979; Eaton and Rosen 1980; Kodde 1986). On the other hand, this idea has also been forwarded from a sociological perspective for which a wider discussion can be found in Carabaña (1987) for the Spanish case. The lack of relation between higher education demand and university graduates unemployment rate was also found by Modrego (1986) using the data from the Census of the Population in 1981 for the province of Vizcay.
- (b) These results can be also explained in the framework of the screening hypothesis. This hypothesis predicts an unavoidable over-education of the population, which is not caused by the uncertainty that high unemployment may cause. The most productive individuals will have a higher necessity to signal themselves to the market over those who are not qualified, and this trend increases as the educational level of the population increases. In order to test this hypothesis, a comparison of the wages of workers in each firm and their educational level should be undertaken.

Whatever the cause may be, it can be concluded that if the tendency of the last years persists, the distance between the labour market and education demand will increase. When evaluating this process, one should not forget

that higher education is not uniquely an investment good, and it is considered not only as a means to supply a qualified labour force to the labour market. The consumption components and the externalities produced by higher education cannot be forgotten when evaluating the so-called “over-education” problem.

### **5. Trends in unemployment and demand for higher education**

The model of demand for higher education displayed in the prior Section allows us to study the “autonomous” trend of the demand for higher education during the survey period. From this analysis we may infer whether the demand for education responds somehow to the economic cycles in the labour market.

The evolution of unemployment in Spain during the period of observation shows the following trend: general unemployment rate fell during the period 1985–1991. The latter year means the summit of this cycle and from this moment the deep early nineties crisis will strongly affect employment. In 1994 the highest unemployment rates were registered and thereafter unemployment rates have smoothly fallen. Figure 1 shows the evolution of the probability of being unemployed for the relevant education levels and the probability of demanding higher education. The probability (risk) of being unemployed has been obtained through a logit model for obtaining an average profile of the unemployed, where a dichotomous variable for each year has been included (see the Appendix for more detailed information). The probability of demanding higher education has been obtained through the higher education demand model presented in Table 1.<sup>4</sup>

Figure 1 must be carefully interpreted, since the size of the probabilities of being unemployed and demanding higher education (estimated for the average values of the continuous variables considered in the model) are not comparable. However, their evolution trends are comparable, showing how the time variable affects each probability studied. One first reading of this figure suggests that the evolution of the demand for higher education registers an inverse relation to the evolution of the unemployment rate. This might be explained by the fact that the lowest and highest probability of being unemployed are registered in 1991 and 1994 respectively. At the same time, the highest and lowest probability of demanding higher education are registered in 1991–1992 and 1994–1995 respectively (the difference in the probability between the first two years is significant at 95% and between the two latter at 91%). This result seems to contradict the link observed between the demand for higher education model and the unemployment rate.

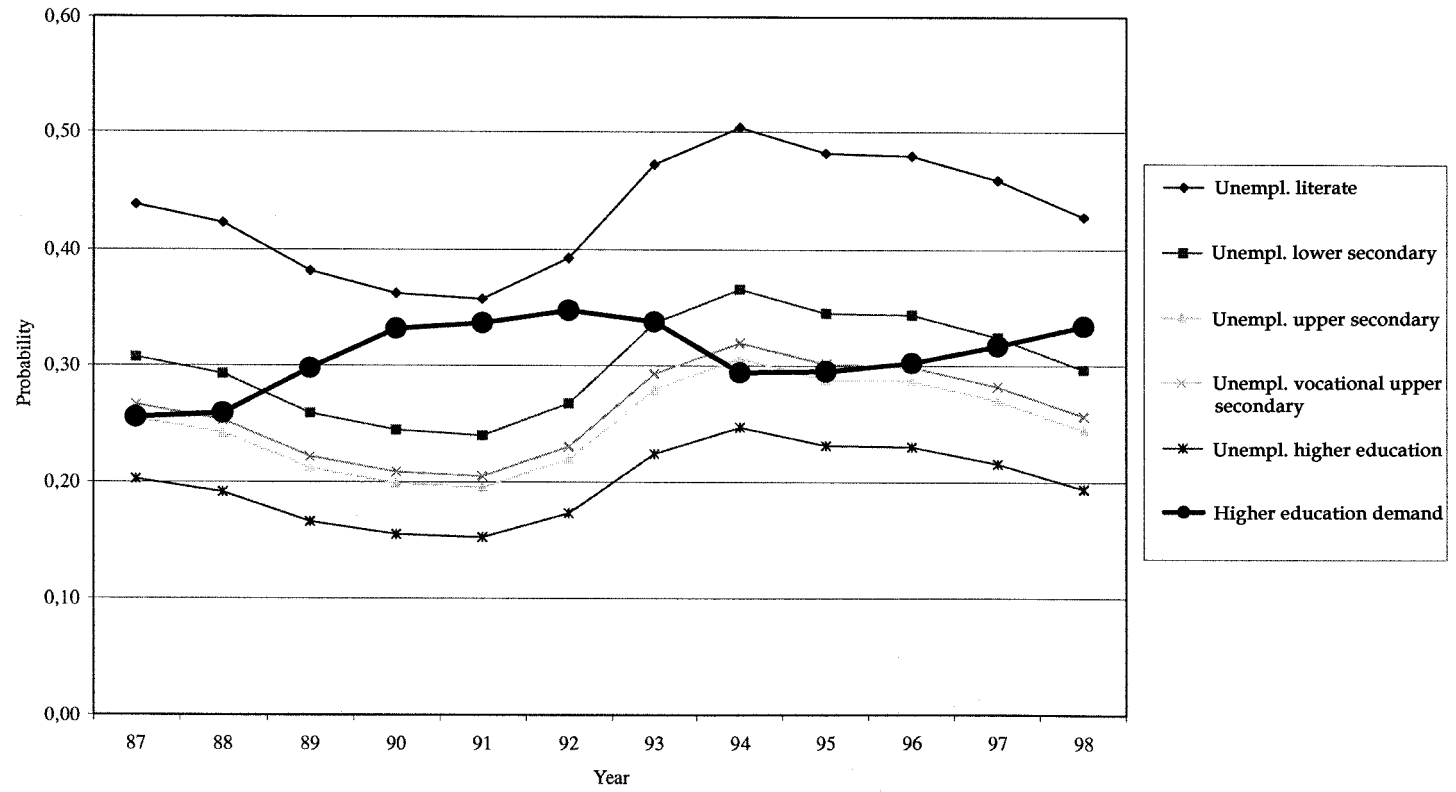


Figure 1. Evolution of the probability of being unemployed for different levels of education and the demand for higher education.

Nevertheless, it is reasonable to think that the demand for higher education does not react immediately to the evolution of the cycles in the labour market and that there is a certain time gap between the probability of demanding higher education and the probability of being unemployed. If we “moved backwards” four or five years the series of the probability of demanding higher education, we would see that this protracted series has a parallel evolution to the series of the current probability of being unemployed. That is, the increase in the probability of demanding higher education from 1987 to 1991 or 1992 seems to be a reaction to the higher unemployment rates of the early eighties (data not shown). Moreover, the fall of the probability of demanding higher education from 1991 or 1992 could be the result of the improvement in the unemployment rates along the middle eighties. This trend might have been repeated for the early nineties crisis. In 1998 the probability of demanding higher education was not significantly higher than that in 1997. This fact does not clearly reflect a reaction to the decrease in unemployment after 1994. This result is in tune with the one by the classic work of Freeman (1975) and the previous study of Albert (1998b) for the Spanish case where a shorter period of analysis than the current one is used.

Figure 1 must not only be interpreted cautiously until some years will have passed and two cycles will have been completed, but it also must be noticed that the reaction of the probability of demanding higher education to the evolution of the labour market does not have a high magnitude. While the probability of being unemployed has a four points range, the probability of demanding higher education registers a narrower range: only one point.

## 6. Conclusions

According to the human capital theory, the demand for education depends on two factors: the family background and the employment and income expectations according to the education level. Knowing the relative weight of these two factors may be highly relevant for education and labour market policy. The most relevant conclusion in this study is that the family background explains higher education demand. However, three aspects need to be emphasised:

- (a) Having parents whose education attainment is high increases the probability of attending university. Additionally, the mother’s education is more decisive than the father’s in the demand for higher education.
- (b) A “high” socio-economic status and condition in the father also increases the probability of demanding higher education. Specifically, all

categories of socio-economic status of fathers increase the probability of demanding higher education compared to unskilled fathers.

- (c) Gender has an important effect on higher education in the sense that being a man has a negative effect on the decision of attending higher education.

This trend is leading more women to obtain a higher qualification than men, in order to compete in the labour market.

On the other hand, the high unemployment rates of the last years have not only affected the delay of marriages and the fall of birth rates in our country, but they have also hindered the evolution of the demand for education in context of uncertainty. Should these high unemployment rates persist in our economy, we would expect them to encourage higher education demand which, in any case, will smoothly respond to the employment cycles, though with four or five years delay.

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### Appendix

Logit model on the probability of being unemployed\*

	Coefficient	T-student
Female	-0.49	-98.14
Age	-0.04	-184.50
Autonomous community		Yes
Relation to the head of the household		
Spouse or partner of the head of the household	0.46	61.64
Child or stepson/daughter	0.56	62.28
Son or daughter in law	0.31	19.65
Grandchildren or grandchildren-in-law	0.61	28.61
Parent, father or mother-in-law	0.41	6.97

	Coefficient	T-student
Other relative of the Head of the household	0.39	23.50
Domestic staff	-3.85	-14.63
Non related to the head of the household	0.05	1.76
Marital status		
Married	-0.29	-33.49
Widow/widower	-0.14	-6.97
Separated or divorced	0.32	23.35
Year		
1988	-0.07	-6.70
1989	-0.24	-23.79
1990	-0.32	-31.25
1991	-0.34	-33.61
1992	-0.19	-19.24
1993	0.13	13.83
1994	0.26	27.57
1995	0.17	18.08
1996	0.16	17.24
1997	0.08	8.47
1998	-0.05	-4.99
Education attainment		
Lower secondary	-0.57	-75.57
Upper secondary	-0.83	-84.79
Vocational upper secondary	-0.77	-80.96
Higher education	-1.13	-119.02
Constant	1.14	67.15
N		905135
-2 ln L.**		622187.69

\*Reference category: single woman, from Andalucía, illiterate without studies, observed in 1987.

\*\*Significance at 99%.

## Notes

1. In Spain the universities provide more than 90 percent of higher education. In the text both university and higher education are referred to without distinction.
2. See Albert (1998a) for a more extensive deterministic and stochastic version of this model based on the revealed preferences and aleatory utility models.
3. See Amemylla (1981), Maddala (1983) and McFadden (1974, 1981). It could be argued that this model should be estimated as a simultaneous equations system, with an equation

for every moment in time. Nevertheless, it can be verified that the results do not vary in relation to those for a single equation since the explanatory variables are the same at all the moments in time (Greene 1990).

4. In order to estimate the probability from the logit models, we have used the relevant transformation for each model (Maddala 1983).

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