HOUSEHOLD STRUCTURE, GENDER, AND THE ECONOMIC DETERMINANTS OF SCHOOL ATTENDANCE IN ARGENTINA*

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1 Introduction

The relationship between education and the welfare of a society is a subject whose relevance exceeds the scope of a single discipline, and it is consequently studied by practically every social and human science. From an economic standpoint, the traditional Beckerian approach (Becker, 1965, 1981) to the decision to study sees education as an investment that allows an individual or family to increase its stock of human capital. Within this framework, the individual (or his/her family) faces the direct costs of acquiring education (fees, books, travel expenses, etc.) and accepting a temporary reduction in his/her potential earnings while he/she studies. Nevertheless, the decision to study is essentially a more complex phenomenon, influenced by other social, cultural and psychological features beyond the strictly economic ones.

Even though a thorough understanding of the determinants of education is an essential input for the efficient design of policy measures aimed at poverty alleviation, the analysis of such an important topic has long remained unexplored in the Argentine case, mainly due to the high economic instability that characterized the Argentine economy in past decades, which forced most of the applied research to concentrate on macroeconomic issues aimed at controlling inflation and stabilizing the economy. The low levels of inflation experienced since 1991 and the structural changes adopted thereafter were followed by a marked and sustained increase in the unemployment rate, which went from 6% in 1991 to 17.4% in 1997. This phenomenon is likely to have introduced important changes in the social or economic structure of households, mainly due to the increasing participation of women in the labor force.

In this paper we examine the role played by household structure and gender on the decision to send children to school in Argentina. The study will be based on the Permanent Household Survey (Encuesta Permanente de Hogares, EPH) collected bi-annually by the National Statistical and Census Institute (INDEC). The EPH contains abundant information at the individual and household level. We explore the education patterns of boys and girls based on the gender of the individuals who make (or influence) the school attendance decision, and the economic and social household structure in which this decision is evaluated.

The paper is structured as follows. Section 2 defines the economic and sociological background of the paper, and advances relevant empirical questions to be explored in subsequent sections. Section 3 describes the data set used in this study and the methodology utilized to handle family structures and gender issues in the EPH. Section 4 presents estimates of binary choice school attendance models, and the results of several comparative statics and simulation exercises. Section 5 concludes and presents some policy recommendations.

2 Gender and Family Structure in the Economic and Sociological View of the Decision to Study

The standard economic approach to the decision to study relies heavily on Becker's (1965) classical work. Education arises as the result of a utility maximization problem, whose solution is a function of the household production function and the family investment function. The optimal level of education equates marginal benefits with marginal costs. So with perfect capital markets, parents act as if they face a perfectly elastic supply of funds to finance education, implying that family economic resources should not be relevant in the determination of the educational attainment.

Consequently, within this framework, any observed difference in education between two children should be associated to factors other than family financial resources. In general terms, these "other factors" reflect economic, psychological and social restrictions faced by the family who makes the schooling decision, and the different social and cultural characteristics that define the way in which different educational alternatives are evaluated against each other through the family utility function.

The sociological point of view[1] does not necessarily contradict the economic point of view, but the emphasis is put on parental ability to provide children with the motivation and skills necessary for school achievement (Garasky, 1995). The socialization theory of education focuses on different views about the way families contribute to the educational process of their children. One view stresses the role of the family in providing a hierarchical structure of authority, which is a key aspect in succeeding in institutions strongly characterized by such structures, like the educational system or the labor market (Nock, 1988; Weiss, 1979). A second view focuses on the family as a provider of role models for children (Hess and Camera, 1979). Other versions emphasize the role of the family in controlling stress and conflict, factors which may inhibit children's development (Loh, 1996).

From an empirical point of view, it is difficult (and maybe unnecessary) to exploit these theories to come up with a complete and orthogonal list of relevant factors that determine the decision to study. It is natural to expect that many of these factors interact, complicating the process of statistically identifying the effects on education of each of them separately. For example, most studies find a strong positive association between educational attainment and parents' education. This may reflect both the fact that better educated families are less likely to be credit constrained, and that these families have stronger "tastes for education", so, other things equal, families with higher education provide more and better education to their children. Similarly, the effect of marital dissolution may affect education through a reduction in income, and through some other channels not directly observable by the analyst (reduction in time spent with children, increase in family stress level, etc.).

In this study we emphasize two groups of factors that may affect the educational process: household structure and gender. In the Beckerian economic point of view, household structure affects education through altering the cost-benefit scheme where optimal schooling is decided. For example, marital dissolution should have a negative impact in investment in both financial terms and in the time and quality of time spent with children of schooling age. Within the socialization framework, different family structures provide different educational environments for their children. For example, the number of children may affect the schooling decision by inducing the family to assign different roles to each child.

There are several ways gender issues are involved in the school attendance decision. In general terms, they reflect the prevailing (or perceived) social norms which determine differences between males and females. Gender issues arise in the schooling decision through two channels. The first refers to the *gender composition of the family that* is involved in the schooling decision. The second is related directly to the *gender of the person* whose education is being considered.

By gender composition of the family, we refer to how the gender of the different members of the family alter the way different factors affect the decision to study. This is closely related to the different roles played by the members of the family in the educational process. For example, Leibowitz (1974) suggests that while both parents' education is relevant, father's education tends to represent genetic factors while mothers' education reflect both genetic and home specific factors since mothers usually spend more time caring for their children than do fathers. Also, some studies (Pitt and Khandker, 1997) have recently found that mothers make a more efficient use

of resources relevant in family decisions implying that, other things equal, single parent families headed by women may educate their children differently than those headed by men.

In summary, this discussion suggests that it is worthwhile to explore whether several factors typically thought to influence education, such as income and parental education, have a differential impact on children's education depending on the gender of those who are involved in the schooling decision

The second route to explore gender issues appears when parents are thought to have different preferences for their sons and daughters, or, whether due to prevailing social and economic conditions, parents perceive that boys and girls will perform differently in institutions like the educational system or the labor market (Deaton, 1997, pp. 224-225). From this point of view, independent of the gender composition of the household, children would be educated differently simply as a result of assigning scarce resources efficiently, according to the prevailing social rules. For example, faced with a decrease in permanent income, parents might decide that a boy should quit school to enter the labor market, while a girl should stay at school, as a result of the perception that wages are higher and job opportunities are better for boys than for girls.

Previous work on how family structure and its gender composition affect the decision to study lies in the limits of economics and sociology[2]. Loh (1996) studies how observed changes in family structure affect schooling attainment and poverty status, and finds that family changes lower completed schooling, but the effect is difficult to identify since it mimics other regressors, like income. Garasky (1996) explores how changes in family structure experienced by children affect the probability of finishing high school, emphasizing whether the family effect varies with the age at which the change took place. He finds that family structure effects on educational attainment vary according to whether it is either the biological mother or father that lived with the child, and also according to the age of the child; and that these changes are more detrimental when they take place early in the educational life of the child. Tansel's work (1997) measures the importance of parents´ education on school attainment and studies differences by gender in two African countries finding that father's education seems to be more important than mother's, in contrast to high income countries,.

Studies specific for the Latin American case are scarce. Rodriguez and Abler (1998) study school attendance in Peru, finding that there are not obvious gender differences and that, quite surprisingly, income has only a minor effect. For the Argentine case, Gasparini et al. (1998) study school attendance in the province of Mendoza, but focus on the impact of income policies.

3 Data and Methodology

This section describes the data set used in this study and how the previous discussion translates into observable indicators of household structure and gender composition.

In general terms, the empirical strategy adopted in this paper is the result of the considerations advanced in the previous discussion and the limitations imposed by the availability of data for the Argentine case. The analysis is based on the Argentine Permanent Household Survey (Encuesta Permanente de Hogares, EPH), collected and processed by the local National Statistical and Census Institute (INDEC). The survey is conducted bi-annually in May and October and covers 25 urban centers which represents 70% of the urban population of the country and 98% of the population living in centers with more than 100,000 habitants. The EPH is implemented through two questionnaires: a family and a personal one. The first one includes information on

household characteristics such as dwelling attributes, family composition and other demographic characteristics. The personal questionnaire contains information related to occupational, educational and income characteristics at the individual level. The survey has a rolling panel structure: once a household is chosen it remains in the sample for four waves, that is, for two years. Each period, 25% of the families are replaced so that between two waves 75% of the families remain in the sample[3]. This study is based on the October wave of 1997 covering Greater Buenos Aires (GBA), La Plata and Mendoza[4].

There is a fundamental difference between this and other studies on the subject that is a direct consequence of the type of information available in the EPH. Several studies concentrate on school *attainment* and its determinants, which requires the availability of either a panel long enough to cover all the educational history of the individual, or "historic" questions. For example, if the goal is to measure the effect of family dissolution on educational attainment, it is essential to know not only whether events like father's death or divorce took place during the educational process but also *when* they occurred. In a very long panel, it is possible to recover the latter from questions regarding whether parents divorced or the father died at the moment the survey was conducted. Alternatively, the same information can be obtained from historical questions asking, for example, how long parents have been divorced.

The panel coverage of EPH is only two years long and does not contain historical questions on demographic or personal characteristics, but refers specifically to the moment when the survey is conducted. For example at a specific moment we know whether the family is headed by a woman, but we do not know for how long this situation has prevailed. Given this restriction, we must concentrate the analysis on school *attendance*, that is, on the determinants of the decision to send children to school.

For all individuals in the sample the survey indicates the maximum level of education attained or, if the individual is still attending school, which educational level he or she is at the moment of the survey. The population of interest is composed of all children who are observed to have decided to attend to school or not, and whose families are involved in that decision. Under these considerations, the estimation will be based on all boys and girls who, at the moment of the sample, were between 13 and 19 years old, single, classified as sons or daughters in the EPH, and have completed elementary school[5]. This leaves a sample of 1548 children: 729 girls and 819 boys.

The variable to be analyzed in this study is a binary indicator of whether a child at the moment of the survey attends school. We will estimate binary choice models of the decision to attend school. As is customary with these type of models, the decision to study is the result of a utility maximization problem where the utility of attending school is compared to the alternative of not participating in the educational system. Consequently, the binary indicator takes a value equal to one if the utility of attending school is greater than the utility of not doing so.

A conditional model expresses the probability of attending school as a function of several explanatory variables that may affect the decision to study. As discussed in the previous section, gender issues will be reflected in the decision to study in two ways. The first one is through how factors like parent's education and family income affect education according of the gender composition of the family, independently of the gender of the child being educated. The second refers to the opposite: how factors affect boys' and girls' education differently, independent of the gender composition of the family.

Table 1 shows attendance rates by gender. Each cell in the table has three numbers. The first refers to the number of individuals of the sample in each cell; the second, to the proportion of individuals according to the classifications corresponding

to the rows of the table; and the third to the proportion of individuals in the classifications implied by the columns. For example, 339 children in the sample do not attend school. Of this group, 37.46% are girls and 62.54% are boys. Of the 729 girls in the sample, 82.58% go to school.

TABLE 1: SCHOOL ATTENDANCE AND GENDER

Number of observations and percentages (by column and row)

Attendance	Gender		
	Female	Male	All
Do Not Attend	127	212	339
	37.46	62.54	100
	17.42	25.89	21.9
Attend	602	607	1209
	49.79	50.21	100
	82.58	74.11	78.1
All	729	819	1548
	47.09	52.91	100
	100	100	100

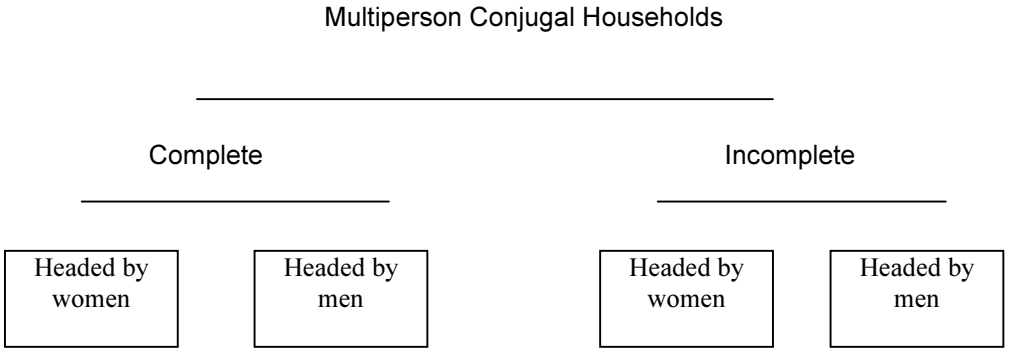
These numbers show some interesting facts. The gender composition of those who do not go to school is largely dominated by boys (62.54%) whereas the gender composition of those who attend school is practically equal. Attendance rates are higher for girls (82.58%) than for boys (74.11%)

Regarding the first channel, at this point it is relevant to discuss what will be understood by *family* and *household structure* for the purposes of this paper. The choice depends not only on the goals of the investigation but also on the characteristics of the available information. In any case, when defining the unit of analysis that will be taken as a family, it is important "to delimit...homogeneous subsets according to some essential dimensions in the analysis of household units" (Torrado, 1998). The definition of *household* is usually goal directed and it is, in general terms, associated to a group of people living and eating together (Deaton, 1997) who share resources for the purpose of pursuing their mutual well-being (Bryant, 1990). By *family* we understand two or more individuals of a household related between them by blood, adoption or marriage[6].

For the purposes of this work, it is relevant to consider what are known as *multiperson conjugal households* (Torrado, 1998). A multiperson household is defined as a group of two or more people sharing the same dwelling, and nutritional or some other basic needs. By *conjugal* it means that there exists a conjugal link, that is, a family in one of the following forms: couple (married or not) with no children, couple with one or more unmarried children, mother or father alone with one or more unmarried children. In each of these households one person plays the role of the *head* of the household. In the EPH, the head is "the one recognized as such by the other members of the households" (INDEC, 1997).

Within this category it is possible to find characteristics that delimit homogeneous subsets, like the presence or absence of the spouse and/or the gender of the head. We will distinguish between *complete* (mother and father, or head and spouse) and *incomplete* (mother or father, or head only) households, and *households headed by a woman* and *headed by a man.* Figure 1 summarizes these categorizations.

FIGURE 1: HOUSEHOLD STRUCTURES RELEVANT FOR THE SCHOOLING DECISION



Source: Torrado (1998)

Within complete households, we will distinguish between (legally) married and non-married couples; and within incomplete families we distinguish between divorced, widowed or those who do not fall in the previous categories. Each of these five groups can be headed by women or men.

In order to capture the effects of these different structures on the schooling decision we constructed the binary indicators *married* and *couple* for the complete families (1 for legally married and not married parents, respectively), and *widowed*, *divorced* and *single* for the incomplete ones (1 depending on the civil status of the family head). Another indicator that characterizes the family structure is *femhead* (1 if the family is headed by a woman and 0 if headed by a man).

The evolution of households headed by women (HHW) was rather particular in Argentina for the last decades. In Table 2 we present the evolution of the proportion of HHW's as a proportion of the total of households, for Greater Buenos Aires. Within the HHW we distinguish between single person (e.g., female senior citizens living alone) and multiperson households as defined above. In this category, we include non-conjugal (e.g., two girls sharing an apartment), complete, and woman only households.

In the last decades, the number of HHW's has increased steadily in Greater Buenos Aires, going from 17% of the total of households to 24,8%. As stressed in Torrado (1998b) it is interesting to observe that an important proportion of the HHW's corresponds to women living alone, which face different needs and characteristics. In any case, these figures reveal that a significant part of the population lives in households where relevant decisions are considerably influenced by women.

TABLE 2: EVOLUTION OF HOUSEHOLDS HEADED BY WOMEN PARTICIPATION

(% of total households)

	Headed By women	Single person	Multiperson		
			Non-conjugal	*Complete*	*Woman only*
1980	17,1	6,9	3,5	0,8	6,4
1982	19,6	7,3	3,8	1,0	7,5
1986	19,9	7,4	3,6	0,9	8,0
1988	20,7	8,6	3,7	0,8	7,8
1990	21,1	8,5	3,9	0,6	7,9
1992	22,2	9,1	3,6	1,3	8,2

1994	23,6	10,4	3,6	1,1	8,5
1996	24,8	8,8	4,0	1,6	9,3

Source: Torrado (1998b) based on EPH for Greater Buenos Aires

The next table shows school attendance patterns for the different household structures relevant for this work. The attendance rates for boys does not seem to be altered by changes in family structure whereas for girls, attendance rates are lower for those living in incomplete families. Within this group, attendance is lower for those living with their fathers compared to those living in a HHW.

TABLE 3: SCHOOL ATTENDANCE AND HOUSEHOLD STRUCTURE

	Girls		Boys	
Family structure	Total	Attend in %	Total	Attend in %
All	729	82,58	819	74,11
mother and father	608	84,54	679	74,37
only father	19	63,16	39	74,36
only mother	102	74,51	101	72,28

Corresponds to family structure in the estimation sample: children from multiperson conjugal households, 13 to 19 years old, single and with primary school completed.

Many studies (Rodriguez and Abler (1996), Loh (1996), Garasky (1995)) find that the number of siblings is relevant in the decision to study. Once we control for per capita income, the number of siblings should reflect the effect of family size which is not captured by changes in financial resources available for the family. That is, we allow for the possibility that an increase in the family size that leaves per-capita income unaltered, has an effect on education which is not related to the financial resources available for the family. We also considered the possibility that child's birth order play a role in intrahousehold resource allocation. We included a dummy variable to control for this effect.

Income is measured as the log of per capita income (*lpci*), which is the total household income divided by the number of members. As discussed in the previous section, current income should reflect the resources available to finance education. We will allow *lpci* to interact with *femhead* (*incfem*) and we will measure whether the income effect has a differential effect if the family is headed by a woman. We also constructed a variable labeled as *incomeh*, which is the proportion of total family income earned by the head of the family. This indicator measures the degree of concentration of family income by different sources. *incomeh* close to one might identifies wealthy families where a high income by one member of the family has a strong income effect so as to induce other members of the family to quit the labor market. It may also be an indicator of risk associated to the source of income: low *incomeh* should indicate that total income come from many possible unrelated sources, indicating more stable income. We will allow this indicator to interact with *femhead* (*incfem*) and we will measure whether the concentration effect has a differential effect if the family is headed by a woman.

Table 4 shows attendance rates by income deciles. Attendance rates for girls are higher than for boys in all income deciles, though these differences are minor in the upper two deciles.

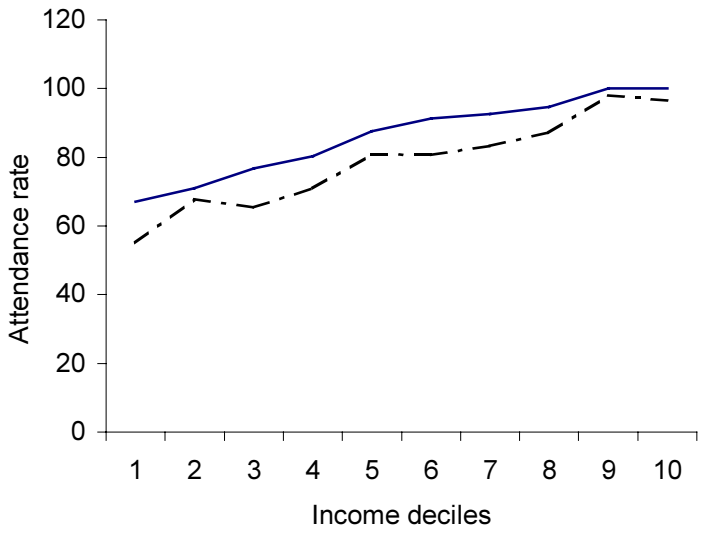
TABLE 4: SCHOOL ATTENDANCE BY INCOME DECILE

	Girls		Boys	
decile*	total	attend in %	total	attend in %
1	137	67,15	136	55,15
2	83	71,08	118	67,80
3	86	76,74	101	65,35
4	66	80,30	83	71,08
5	88	87,50	94	80,85
6	69	91,30	78	80,77
7	67	92,54	60	83,33
8	57	94,74	70	87,14
9	42	100,00	50	98,00
10	34	100,00	29	96,55

* households ranked by household per capita income

Figure 2 shows this information graphically. The solid line corresponds to attendance rates for girls and the dashed one for boys. Income has a positive effect on education, but this effect is slightly stronger for boys than for girls as revealed by the slope of the boys' curve.

FIGURE 2: INCOME, EDUCATION AND GENDER



Pare e will allow father's and mother's education to contribute differently to the stock of family human capital as it influences child's education. It is important to recognize that the identification of this differential effect may be complicated by the expected correlation between parent's education (matching). For our sample, the correlation between parents education is 0.4084.

Unemployment of father or mother may affect school attendance by the reduction in income implied or by introducing uncertainty or stress in the family. We measure whether it is relevant that particular members like mother or father are unemployed, or if it just matters whether the head of the family is unemployed.

Age is typically included in attendance models. It can either reflect increasing opportunity costs as time passes by, or it may reveal inertial effects. With the

information in the EPH it is difficult to predict its effect since we do not observe in which year of school the individual is (we only know whether he attends or not). Take the case of a 16 year old child still in school. If he is close to finishing, then age reflects that he spent considerable time in school, which may force him to complete the degree. On the other hand, if he is in the first year of high school, his opportunity cost will increase dramatically inducing him to quit school.

4 Empirical results

This section presents estimation and inference results of logit models of school attendance. The set of explanatory variables is listed in Table 5 and the Appendix describes how these variables were constructed from the EPH

TABLE 5: VARIABLE NAMES AND DESCRIPTION

Variable	Description
age	age in years
age2	age squared
lpci	log of per-capita income
eduf	education of the father in years
edum	education of the mother in years
funempl	1 if the father is unemployed, 0 otherwise
munempl	1 if the mother is unemployed, 0 otherwise
siblings	number of siblings
femhead	1 if household is headed by a woman
married	1 if child lives in a married complete family
couple	1 if child lives in an unmarried complete family
single	1 if child lives in an incomplete family with single head
widowed	1 if child lives in an incomplete family with widowed head
divorced	1 if child lives in an incomplete family with divorced head
incomeh	proportion of household income earned by the head of the family
incfem	lpci * femhead
unskh	1 if head has not completed high school
laplata	1 if the city of residence is La Plata
mendoza	1 if the city of residence is Mendoza
eldest	1 if eldest child.

Table 6 presents basic descriptive statistics for the whole population and for the sample divided in those who attend school and those who do not. Table 7 presents the same descriptive statistics for boys and girls separately.

TABLE 6: DESCRIPTIVE STATISTICS BY SCHOOL ATTENDANCE

MEANS (PROPORTIONS) FOR ALL VARIABLES

	ALL		ATTEND SCHOOL		DO NOT ATTEND	
Variables	mean	std. dev.	mean	std. dev.	Mean	std. dev.
Age	16.27	1.83	16.01	1.84	17.19	1.46
Lpci	5.20	0.89	5.33	0.86	4.73	0.84

Pci	264.11	351.41	295.95	387.31	150.56	111.77
Eduf	8.04	4.81	8.68	4.94	5.76	3.45
Edum	8.88	4.26	9.54	4.28	6.51	3.19
Funempl	0.12	0.48	0.09	0.41	0.24	0.65
Munempl	0.10	0.43	0.10	0.44	0.08	0.38
Siblings	2.15	1.51	2.02	1.43	2.62	1.68
Femhead	0.15	0.36	0.14	0.35	0.20	0.40
Married	0.73	0.44	0.76	0.43	0.62	0.49
Couple	0.10	0.30	0.08	0.27	0.17	0.37
Single	0.01	0.11	0.01	0.10	0.01	0.12
Widowed	0.05	0.22	0.04	0.20	0.08	0.28
Divorced	0.09	0.29	0.09	0.29	0.09	0.29
Incomeh	0.67	0.32	0.71	0.30	0.55	0.35
Incfem	0.10	0.27	0.10	0.28	0.08	0.24
Unskh	0.69	0.46	0.62	0.49	0.95	0.22
Laplata	0.15	0.36	0.16	0.36	0.14	0.35
Mendoza	0.24	0.43	0.25	0.43	0.22	0.42
Eldest	0.43	0.49	0.43	0.50	0.42	0.49
Obs	1548		1209		339	

TABLE 7: DESCRIPTIVE STATISTICS BY GENDER

MEANS (PROPORTIONS) FOR ALL VARIABLES

	MALE				FEMALE			
	ATTEND		DO NOT ATTEND		ATTEND		DO NOT ATTEND	
variables	Mean	std. dev.	mean	Std. dev.	mean	std. dev.	mean	std. dev.
age	15.87	1.79	17.25	1.45	16.15	1.89	17.09	1.47
lpci	5.34	0.86	4.78	0.87	5.32	0.87	4.63	0.80
pci	290.91	266.51	161.07	121.25	301.03	479.43	133.01	91.62
eduf	8.88	5.02	6.09	3.34	8.49	4.85	5.20	3.56
edum	9.50	4.33	6.74	3.24	9.58	4.24	6.13	3.09
funempl	0.08	0.40	0.28	0.70	0.09	0.42	0.17	0.56
munempl	0.10	0.43	0.06	0.33	0.10	0.44	0.11	0.46

siblings	1.99	1.45	2.69	1.72	2.05	1.42	2.50	1.61
femhead	0.14	0.35	0.17	0.38	0.14	0.35	0.24	0.43
married	0.74	0.44	0.65	0.48	0.78	0.41	0.58	0.50
couple	0.09	0.29	0.17	0.38	0.07	0.26	0.16	0.37
single	0.01	0.09	0.01	0.10	0.01	0.11	0.02	0.15
widowed	0.05	0.21	0.06	0.24	0.04	0.19	0.12	0.32
divorced	0.09	0.29	0.10	0.31	0.09	0.28	0.08	0.27
incomeh	0.72	0.31	0.51	0.35	0.70	0.30	0.63	0.33
incfem	0.10	0.29	0.05	0.18	0.10	0.28	0.14	0.31
unskh	0.60	0.49	0.94	0.24	0.64	0.48	0.96	0.20
laplata	0.14	0.35	0.12	0.33	0.17	0.38	0.17	0.38
mendoza	0.24	0.42	0.19	0.40	0.26	0.44	0.27	0.44
eldest	0.43	0.50	0.39	0.49	0.43	0.50	0.47	0.50
obs	607		212		602		127	

Tables 8a and 8b present logit estimates of several specifications for the school attendance model. In all cases we estimated models for boys and girls separately. As mentioned before, it is expected that indicators capture more than one effect since there are interactions between them. For this reason, we estimated several versions using different sets of explanatory variables, in order to see how results change with the introduction or exclusion of additional explanatory variables. Tables 8a and 8b present five specifications. Other less informative cases will be mentioned but not presented in the paper[7].

The different specifications start with a "basic specification" (Model 1). The second adds family structure variables (*couple, single, widowed* and *divorced*). The third one explores income effects by gender adding *incomeh* and *incfem*. The fourth specification includes head's work qualification (*unskh*). The last specification controls for city of residence (adds dummies for La Plata and Mendoza) and a binary variable indicating whether the child is the eldest child in the family. All specifications estimated provide reasonable econometric and economic results, and the null hypothesis that no variables are significant is strongly rejected in all cases. In general terms, the set of explanatory variables included seem to explain education for boys more than for girls, as reflected in the pseudo R^2 coefficients.

TABLE 8a: LOGIT ESTIMATES (MODELS 1-3)

DEPENDENT VARIABLE: ATTEND (=1 if attends school)

(z-values in parenthesis)

	Model 1		Model 2		Model 3	
Variable	Female	Male	Female	Male	Female	Male
Age	-4.4414	-2.6581	-4.6657	-2.7634	-4.7457	-3.0347
	(-2.971)	(-2.102)	(-3.019)	(-2.167)	(-3.06)	(-2.329)
Age2	0.1218	0.0618	0.1272	0.0648	0.1296	0.0737
	(2.726)	(1.629)	(2.758)	(1.691)	(2.800)	(1.881)
Lpci	0.5764	0.3152	0.5958	0.3203	0.6389	0.3560
	(3.795)	(2.399)	(3.824)	(2.414)	(3.971)	(2.533)
Eduf	0.1234	0.1465	0.1402	0.1465	0.1488	0.1461
	(2.856)	(4.280)	(3.157)	(4.202)	(3.302)	(4.088)
Edum	0.1769	0.1219	0.1815	0.1412	0.1709	0.1266

	(4.978)	(4.483)	(4.845)	(4.685)	(4.474)	(4.051)
Funempl	-0.1045	-0.6126	-0.0979	-0.5596	-0.0825	-0.3817
	(-0.507)	(-3.487)	(-0.464)	(-3.124)	(-0.361)	(-1.927)
Munempl	0.1314	0.3769	0.2056	0.3879	0.2335	0.4530
	(0.518)	(1.428)	(0.777)	(1.441)	(0.875)	(1.549)
Siblings	-0.0279	-0.2544	0.0190	-0.2379	0.0152	-0.2056
	(-0.367)	(-4.013)	(0.242)	(-3.69)	(0.193)	(-3.124)
Femhead	0.1499	0.6473	-0.3825	-0.0027	-0.9607	-0.7374
	(0.376)	(1.820)	(-0.807)	(-0.006)	(-1.485)	(-1.251)
Couple			-0.7865	-0.5347	-0.7475	-0.5125
			(-2.249)	(-1.81)	(-2.119)	(-1.743)
Single			0.9323	1.7700	0.7392	0.7598
			(1.106)	(1.712)	(0.865)	(0.692)
Widowed			0.1219	0.6115	-0.0170	0.4324
			(0.245)	(1.227)	(-0.033)	(0.809)
Divorced			1.3519	0.7495	1.1265	0.3939
			(2.567)	(1.703)	(2.082)	(0.838)
Incomeh					-0.0649	0.6639
					(-0.149)	(1.782)
Incfem					1.2304	2.1498
					(1.451)	(2.670)
Const	36.4285	24.9236	38.3474	25.6721	38.8808	27.0964
	(2.927)	(2.375)	(2.979)	(2.427)	(3.009)	(2.507)
Pseudo R2	0.2436	0.283	0.2655	0.2935	0.2692	0.3166
Log-likelihood	-255.03374	-335.78923	-247.64132	-330.86561	-246.40541	-320.0841
Observations	729	819	729	819	729	819

TABLE 8b: LOGIT ESTIMATES (MODELS 4-5)

DEPENDENT VARIABLE: ATTEND (=1 if attends school)

(z-values in parenthesis)

	Model 4		Model 5	
Variable	Female	Male	Female	Male
Age	-4.7651	-2.8312	-4.7780	-2.8745
	(-3.078)	(-2.183)	(-3.076)	(-2.203)
age2	0.1303	0.0677	0.1309	0.0685
	(2.820)	(1.735)	(2.823)	(1.747)
Lpci	0.6161	0.3572	0.5885	0.3902
	(3.783)	(2.557)	(3.549)	(2.726)
Eduf	0.1174	0.0785	0.1160	0.0784
	(2.348)	(1.743)	(2.302)	(1.730)
Edum	0.1445	0.1061	0.1467	0.1018
	(3.478)	(3.261)	(3.509)	(3.077)
Funempl	-0.0700	-0.3779	-0.0865	-0.3705
	(-0.308)	(-1.898)	(-0.379)	(-1.852)
Munempl	0.2325	0.4775	0.2202	0.4734
	(0.868)	(1.640)	(0.818)	(1.613)
Siblings	0.0181	-0.1889	0.0051	-0.1640
	(0.231)	(-2.88)	(0.062)	(-2.377)
Femhead	-0.9611	-0.9129	-0.9748	-0.9475
	(-1.487)	(-1.538)	(-1.507)	(-1.582)
Couple	-0.7498	-0.4966	-0.7354	-0.5026
	(-2.134)	(-1.696)	(-2.046)	(-1.698)
Single	0.5519	0.4746	0.5034	0.3518
	(0.628)	(0.425)	(0.568)	(0.313)
Widowed	-0.2207	0.1173	-0.2305	0.1730
	(-0.415)	(0.213)	(-0.432)	(0.310)
Divorced	0.9992	0.1346	0.9855	0.1618
	(1.802)	(0.277)	(1.772)	(0.330)
Incomeh	-0.0278	0.6465	0.0179	0.5981
	(-0.064)	(1.728)	(0.040)	(1.542)
Incfem	1.0057	2.0047	1.0031	2.0573
	(1.166)	(2.469)	(1.160)	(2.517)
Unskh	-0.9387	-1.0758	-0.9577	-1.0844
	(-1.656)	(-2.512)	(-1.687)	(-2.51)
Laplata			0.0715	0.2684
			(0.228)	(0.866)
Mendoza			-0.1460	0.1690
			(-0.52)	(0.657)
Eldest			-0.1423	0.2347
			(-0.561)	(1.026)
Const	40.3645	26.9824	40.6425	27.1416
	(3.122)	(2.515)	(3.129)	(2.514)
Pseudo R2	0.2737	0.3237	0.2748	0.3261
Log-likelihood	-244.87732	-316.72217	-244.50022	-315.62573
Observations	729	819	729	819

4.1 Significant factors affecting the decision to study

With 10 models and 19 explanatory variables involved, it is impossible to comment on every estimated coefficient. To organize the interpretation, first we will comment on the different groups of variables and then we will summarize differences and similarities by gender. Except for some specific cases, interpretations will be mostly based in the last two specifications, which includes most of the covariates.

To begin, *age* and *age*2 are always significant across all specifications and genders. In the relevant range, age has a negative and quadratic effect on education, and its effect is stronger and more significant for girls. This suggests that the second effect mentioned in the previous section prevails: age has a strong detrimental effect on education meaning that the inertial effect is more than compensated by the increase in the opportunity cost

Log income (*lpci*) has always a significant and positive effect on education for both boys and girls. From the Beckerian perspective, we should be inclined to conclude that limited access to the credit market make current income relevant for school attendance, but one should be cautious with this interpretation, since income usually captures more than lack of financial constraints. As is the case with age, coefficients are higher and more significant for females, but the null hypothesis of equal coefficients for boys and girls cannot be rejected, indicating that the marginal contribution of income is equal for both sexes.

Mother's and father's education increase the probability of school attendance. In contrast with Tansel (1997) and in agreement with findings for high income countries (Schultz, 1993), mother's education seems to contribute to the probability of school attendance more than father's. Its coefficient is always greater and more significant. Regarding differences by gender, it is interesting to remark that father's education is significant for boys only at 8%.

For the case of boys, whether the father is unemployed reduces the likelihood of going to school and whether the mother is unemployed increases this probability, though significantly only at around 10%. Results related to father's status are likely to be linked to more stress, reductions in permanent income not directly captured by current income, and other negative social or psychological consequences of being unemployed. Mother's unemployment is somewhat surprising, but it could reflect that in terms of education, and other things equal, the beneficial side of being unemployed (more time to spend with her children) more than compensates any negative aspect directly associated with her being unemployed.

The number of *siblings* in the family is an interesting case, since across all specifications it has a significant negative effect for males whereas for girls the effect is still negative but *never significant*. This result sheds light about the way boys and girls are substituted in family tasks as a reaction to changes in family size. The result indicates that as the number of siblings gets larger, families tend to take boys out of the school system more likely than girls.

The family structure variables (*couple, single, widowed* and *divorced)* present interesting results. The excluded (base) category is a married couple. Children living under non-married couples (*couple*=1) are negatively affected when compared to those living under married ones, being this effect significant for both boys and girls. The other variables are not significant, with the exception of *divorced*, which has a positive effect on girls though it has no significant effect on boys.

The proportion of income earned by the head of the family has a significant positive effect for boys but not for girls. This indicates that families whose source of income is concentrated in a few or one person face better conditions for school attendance.

Femhead has a negative effect, and is significant only in specifications that control for differential effects on income, and at 13% of significance. On the other hand,

the positive coefficient of *incfem* suggests that woman heads make a different use of resources than male heads. The positive coefficient suggests that additional income increases the probability of sending children to school more if financial resources are controlled by a woman. Compared to the previous result obtained by femhead, this means that for the case of boys (and less emphatically for girls), the positive effect on education of being in a household headed by a woman appears only through its interaction with income effects.

Attempts to control for parents work qualification are complicated since this variable is difficult to measure in the EPH, resulting in many missing observations Instead we have tried to proxy work qualification by looking at head's education. We included a dummy variable indicating whether the head of the family has not finished high-school. The variable *unskh* (1 if the head has not finished high school, 0 if he/she has) has a negative and significant effect on education for boys and girls, suggesting that low levels of family education have detrimental effects on children education not captured by the variables controlling for education.

The coefficient of eldest suggests that for the Argentine case, being the eldest child does not have any effect on education[8]. Similarly, the city where the family is located does not influence the probability of attending school.

In terms of the classification proposed in the previous section, we can summarize the findings of this section as follows:

1) *Family structure:* Its effect on education goes beyond altering income. Once controlling for the latter, children living under non-married couples are less likely to go to school. Also, girls living with single divorced mother or father face worse conditions to attend school. The number of siblings is an important negative factor affecting boys' education but not girls'.

2) Gender issues:

a) Gender composition of the family: The effect of being a woman head appears as significant when it is interacted with log income. This gives some support to the idea that households headed by women make a more emphatic (though not necessarily efficient) use of their resources in providing more education to their children. The model presents some evidence that mother's unemployment may have a positive effect on boys education. Finally, mother's education seems to be more important than father's in inducing education

b) Gender of the child being educated: Boys' education is better explained by the covariates as reflected in higher pseudo R^2 and more significant variables. Age, parent's education and income affect boys and girls alike. Also, being in a non-married couple affects education in a gender neutral way. The number of siblings, the degree of concentration of family income, and whether the family is headed by a woman affect boys' education but not girls'. Being in a divorced family affects girls' but not boys' education.

4.2 The impact on education of changes in socioeconomic variables

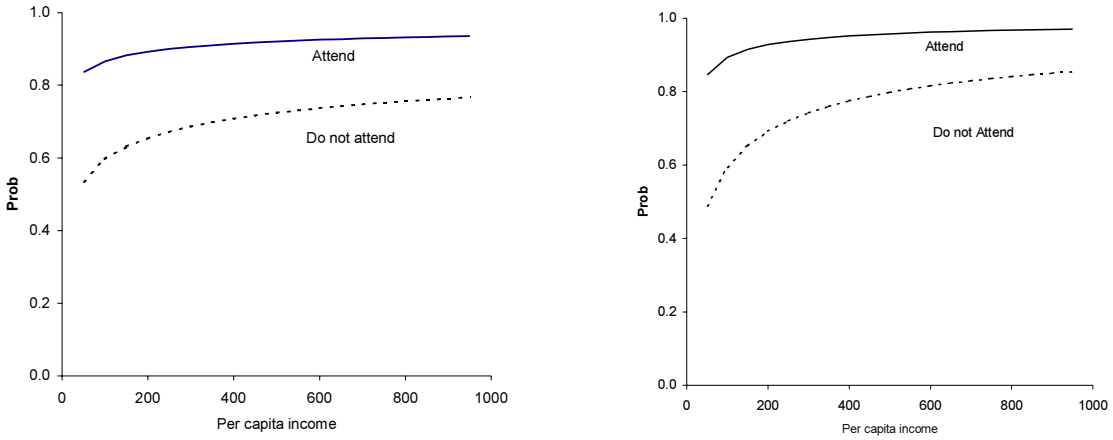
The previous analysis is based strictly on the significance and signs of the factors affecting education. It is also of interest to examine to what extent these variables affect the probability of attending school. Since logit involves a non-linear econometric model, the differential effect of each factor varies with the point at which it is measured.

This subsection presents several exercises aimed at quantifying the effect of socio-economic factors on education. All exercises will be based on Model 4 of Table 8b, which present all the relevant covariates.

First we explore the effect of income on education. Figure 3 shows the predicted probability of school attendance for different levels of per capita income. The solid line shows this probability for individuals with covariates set at the averages of individuals who are observed to attend school, and the dashed line corresponds to covariates set at the averages of individuals who do not attend school. The left panel corresponds to boys and the right one corresponds to girls.

FIGURE 3: EFFECT OF INCOME ON EDUCATION

BOYS GIRLS



Though statistically significant, income variations seem to have a minor effect on the schooling situation of people of the characteristics of those who attend school, either boys or girls. The predicted probability for all levels of income is above 0.8. On the contrary, and especially for girls, income has a very strong positive effect on the schooling decision of those who do not attend school. Other things equal, in the case of girls, the probability of attendance rapidly rises with income. This effect is less powerful for the case of boys. As an illustration, Table 9 measures the attendance probabilities for the different deciles of the distribution of household incomes.

In all cases, it is important to remark that though powerful, it requires a substantial effort in terms of income to compensate the detrimental factors faced by those who do not attend school compared to those that attend. Families should receive (for each boy who does not attend school) more than $90 per capita per month for the boy to have the same attendance probability as an average boy already going to school. On the other hand, this amount is less than $20 to make the same compensation for a girl. This important difference in part reflects the stronger influence on boys of family structure, education and employment.

TABLE 9: PREDICTED ATTENDANCE PROBABILITIES BY INCOME DECILES

Deciles	**Mean**	**Male**	**Female**

of pci	Pci	Attend	Do not attend	Attend	Do not attend
1	39.39	0.82	0.51	0.83	0.45
2	76.22	0.86	0.57	0.88	0.55
3	106.95	0.87	0.60	0.90	0.60
4	138.40	0.88	0.62	0.91	0.64
5	171.46	0.89	0.64	0.92	0.67
6	211.89	0.89	0.66	0.93	0.70
7	258.49	0.90	0.67	0.94	0.72
8	318.33	0.91	0.69	0.95	0.75
9	433.15	0.92	0.71	0.95	0.78
10	891.64	0.93	0.76	0.97	0.85

These income compensations could also be interpreted as summary of the effects of other variables influencing the attendance probability. In order to quantify these effects, we computed the changes in the school attendance probabilities induced by several changes in the socioeconomic variables studied in this work. For each change, we also computed how much income is necessary to give to (take from) the family so each effect does not alter the probability of attending school.

The comparison will be made starting with a family with $200 of per-capita income per month, both parents are present and legally married (the head is the man) and have three children. Both parents have completed primary school education and are both employed. We will compute the effects for 13 and 17 years old children. Table 10 shows some results

In the first row we study what happens to the attendance probability if starting with the "base" family, we change mother's education from completed primary to completed secondary. As expected, this change increases the probability of attendance. The effect is particularly strong for 17 years old boys (almost 10%). In terms of income, once mother's education is increased from primary to secondary, it would be necessary to subtract $154.71 per capita per month to compensate this effect. The effect with father's education is more complex since in most cases he is also the head of the family. When we switch his education from elementary to complete high school, the father also becomes "skilled". The joint effect is valued $193.35, again , for 17 years old boys, it represents a substantial increase in the attendance probability.

The effect of having an additional sibling decreases the probability of attendance and alters boys' education mostly. The probability of attendance would be unaltered if the family is compensated with $139.43

Regarding effects of family structure, we explored what happens when the woman starts heading the family. As a result of the model specification, this effect comes through a binary indicator (*femhead*) and its interaction with income (*incfem*). Also, some assumptions must be introduced regarding how her participation in income (*incomeh*) results when the change is introduced. We computed the effects for the case when the woman head makes 75% of income and when she makes 25% of total income. The results are very significant for boys, for whom the attendance probability raises dramatically. The income value of this effect is $196.72. Note that even though the effect on the probability is substantial, the income compensation is not as strong since the introduced change alters the marginal effect of income through the interaction term with *femhead.*

TABLE 10: MARGINAL EFFECTS AND INCOME COMPENSATIONS

Changes	BOYS			GIRLS		
	Income Compensation	Mg. Effect		Income Compensation	Mg. Effect	
		13 years old	17 years old		13 years old	17 years old
mother has only 12 years of schooling	-154.71	0.00862	0.10894	-138.12	0.00503	0.05180
father has only 12 years of schooling *	-193.35	0.01624	0.23825	-175.77	0.00434	0.08869
child has 3 siblings	139.43	-0.00430	-0.04398	-5.79	0.00017	0.00323
family headed by the woman 1	-196.72	0.02120	0.34751	-186.46	0.00970	0.22969
family headed by the woman 2	-196.72	0.02906	0.42390	-186.46	0.00957	0.22727
parents legally married	-150.21	0.01317	0.11920	-140.78	0.01074	0.15853

* Note that this effect interacts with the one of *unskh*.

1. Note that this effect interacts with the one of *incfem*. Besides, now is the woman the one who earns 75% of family income.
2. It is assumed that the woman still earns only 25% of family income, but now she is the head.

5 Conclusion

Every political or social sector in Argentina agrees that the government should do more to induce children and their families to acquire more education. The focus on educational policies is a key element for the current government and for every political party in the opposition. So the relevant question is not whether more should be invested in education but *how* to invest more in education. This paper contributes to the literature by providing empirical results on the economic and social determinants of the decision to send children to school for the Argentine case.

As expected, for a child of a given age, income and parent's education play a key role in the decision to send boys and girls to school. The paper explores the role played by family structure and gender issues. The issue is not trivial since there are a priori reasons to suspect that many of these effects are captured by variations in income. The results of this paper suggest that differences in family structure influence the way children are educated beyond their effect on family income. In particular, the effect of living in a family with non-married parents has a detrimental effect for both boys and girls.

The paper presents interesting results regarding the much debated subject of women heading families. The fact of being under a woman head does not increase or decrease the likelihood of education *per se* but when faced with additional resources, women heads assign a larger part of this increment to education than men would do. This has relevant policy implications regarding the structure of income subsidies for education.

Gender considerations appear in several ways in the process of determining education. In addition to the previous result regarding women heads, mother's education is more significant than father's, which is consistent with result for higher income countries. The proposed set of covariates seem to give account of boys' education better than girls'. This suggests that changes in the economic and social environment affect boys' education more than girls', what may help explain the observed disparities in attendance rates between them, being the latter higher than the former.

The paper goes beyond the qualitative analysis of what factors are relevant and what are not. Our results provide a quantitative exploration of the effects of several changes in family structure and its gender composition. As expected, income has a powerful effect in inducing education, but if there are no changes in the negative socioeconomic aspects that affect education, it requires a substantial investment to compensate the effects of these factors. It also suggest that it is important to consider

social factors (like the number of siblings, parental education and family structures) in designing efficient subsidy policies aimed at keeping children at school, since the effect of these factors vary considerably by income and age groups.

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Appendix
Construction of variables from the EPH

Dependent variable
attend. Is a binary variable with value 1 is the individual is currently at school, finished secondary education or started college.

Explanatory Variables
- *sex*: =1 for men
- *age y age2:* age and age squared.
- *pci y pci2*: per-capita family income (variable ipcf in the EPH). All income measures come directly from the EPH, excluding incoherent observations.
- *lpci:* log of per-capita income
- *eduf:* father's education. In the EPH " father" is either the male head or the husband. In the EPH education is a qualitative variable (*nivel*) which (following previous work on the EPH (Pessino, 1995, for example), was translated into a quantitative variable according to the following convention:
  3.5 years if nivel=12 (incomplete elementary)
  7 years if nivel=11 (comlete elementary)
  9.5 years if nivel=22 (incomplete high school)
  10 years if nivel=42 (incomplete technical high school)
  12 years if nivel=21 (complete high school)
  13 years if nivel=41 (complete technical high school)
  14.5 years if nivel=32 (incomplete superior or college)
  17 years if nivel=31 (complete superior or college)
- *edum*: mother's education. "Mother" is either the female head or wife. Her education is constructed in the same way as *eduf*
- *funempl:* =1 if the "father" is unemployed. The base category is "employed or inactive"
- *munempl:* =1 if the "mother" The base category is "employed or inactive"
- *siblings:* number of brothers or sisters the individual has.
- *femhead:* =1 if female head
- *married:* =1 both parents are present and the couple is legally married
- *couple:* =1 if both parents are present but not legally married
- *widowed:* =1 if the head is single and widowed
- *divorced*: =1 if the head is single and divorced
- *single*: =1 if the head is single and is not widowed or divorced.
- *incomeh:* proportion of total family income earned by the head
- *incfem*: *lpci*femhead*
- *unskh:* =1 if the head has education less than complete high-school
- *laplata:* =1 if the observation corresponds to La Plata
- *mendoza:* =1 if the observation corresponds to Mendoza
- *eldest:* =1 if the individual is the eldest child in the family.

Notes

[1] There are several reviews of the "socialization theory" of education. Ours is based on Loh (1996) and Garasky (1995) and we refer to these authors for more details and references.

[2] A detailed review of empirical findings on the subject exceeds the goal of the paper. We will limit the review to recent work specific to household structure and gender. Tansel (1997) has abundant references and useful results for international comparisson.

[3] For detailed information on the EPH, its historical development and perspectives see INDEC (1997)

[4] The choice of these aglomerates is a compromise between homogeneity and sampling variation. Any single aglomerate (like GBA) at any period guarantees regional homogeneity across individuals but leaves few observations of interest. Attempts to expand the sample incorporating panel information do not produce an obvious gain in information due to the very small time span of the panel and to the high correlation between observations induced by the panel structure. On the other hand, La Plata (for geographical proximity) and Mendoza (being another important urban area), add more variability to the sample, while allowing us to control for intergroup heterogenity.

[5] Elementary school is mandatory in Argentina and attendance rates are almost perfect, leaving little (if no) room for conditional analysis. Estimations for this subsample give trivial results (available from the authors) and were not included in the paper. The range 13-19 years covers most of the interesting cases. The earliest age to start high school in Argentina is 13 years by June 30th of the corresponding year, so in October of a given year, every high school student must be at least 13 years old. High school lasts 5 to 6 years, depending on the specialization (5 for commercial and the baccalaureate, 6 for technical and some University high schools).

[6] Recent discussions on different definitions of household and family which are relevant for economic analysis can be found in Bryant (1990) and Deaton (1997). From a sociological perspective and with special reference to the EPH, Torrado (1998) is particularly informative

[7] Additional specifications can be obtained from the authors.

[8] We also tried to control for birth order, with similar results.