

# **JOINT DECISIONS ON HOUSEHOLD MEMBERSHIP AND HUMAN CAPITAL ACCUMULATION OF YOUTHS: The role of expected earnings and labour market rationing**

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## **Abstract**

This paper focuses on the youth's decisions on household formation and human capital investment - in further education or work experience - and the factors influencing these choices. While previous studies limited their analyses to decisions concerning the living arrangements and the labour market, the choice set is extended here to take into account other alternatives. The decisions of either remaining in the parental household or going to live with a partner are modelled jointly with those of either entering the labour market (i.e. investing in work experience) or investing in higher (university) education. Using the Bank of Italy 1995 Sample Survey on Italian Households, a multinomial probit model estimates the probabilities of the different pairs of outcomes. The results highlight the crucial role of economic variables in shaping young adults' decisions. Among these, expected lifetime earnings from attending university have the most important impact on the choice of studying and coresiding. Implications for policy stem from the estimated impact of housing and labour market performance variables on young adults' decisions. In particular, a sizeable discouraged worker effect, inducing young people to study when the local unemployment rate is high, is detected. The effect of the cost of housing in delaying young workers' decisions to leave the parental home and form a new household is also remarkable. Two policy experiments are presented. The former measures the impact of housing policies targeted at reducing housing cost on the probability of marriage. The latter measures the extent to which labour policies targeted at reducing youth unemployment would decrease the number of discouraged workers that choose to study.

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## 1 Introduction

An increasing number of youths live with their parents long after reaching adulthood and this phenomenon is particularly true of Southern European countries. What are the economic consequences of coresidence for youths? First, it may affect young adults' reservation wages, therefore affecting their participation rates. In some cases it allows individuals to be more selective in the labour market and to raise their reservation wages; in other cases the opposite is also true, a likely outcome given poor labour market opportunities. Second, coresidence and investment in human capital become interdependent under certain economic conditions. For example, with imperfect capital markets parents may lend (if they are self-interested) or give for free (if they are altruistic) housing services to their adult children, thus allowing them to enter the labour market and to invest in on-the-job-training at low offered wages. A similar example can be given for investment in higher education, when young adults are faced with the decision to invest in university education and this is chosen jointly with that of cohabiting with parents. Third, cohabiting youths tend to delay family formation, and this has the obvious demographic consequences of the progressive aging of the population (and of the labour force).

The importance of the economic consequences of coresidence is supported by evidence of a different attitude towards work of young people who coreside with their parents as opposed to those who have formed their own family nucleus. All these considerations support the idea of analysing the behaviour of youths in a household context.

Surprisingly, the existing literature studying the complex and evolving relationship of young people with the labour market tends to separate work decisions from family matters, and alternatively either work status or household membership are taken as exogenous. Recent examples of this literature are Iacovou (1998) and Martinez and Ruiz Castillo (1999), who analyse household membership conditioning on labour market status. Iacovou (1998) studies this issue in a comparative framework using the European panel (Eurostat). She examines the relationship between living arrangements and labour market activity, testing the hypothesis that individuals who are more successful in the labour market make an earlier transition to independent living than their less successful peers. Martinez and Ruiz Castillo (1999) establish that in Spain the decision to leave the parental home is closely related to the probability of finding a job and to the cost of housing.

To our knowledge, only a few studies assume that market work and family status are determined jointly. McElroy (1985) estimates a multivariate probit model of the joint determination of market work and family status of American young men and shows that taking either household membership or work behaviour as predetermined would lead to results that differ sharply from those obtained with a joint analysis. Her results indicate that at a sufficiently low offered wage a young man lives with his parents without working and that coresidence is a sort of insurance against poor market opportunities. Another set of studies, leaving aside work decisions, focuses on coresidence as an implicit voluntary transfer of parents to their children. Rosenzweig and Wolpin (1993) introduce the decision on human capital

investment while treating coresidence as a voluntary intergenerational transfer. They find that young American men in school were likely to receive support, particularly in the form of shared residence. Ermisch (1997) also explores the issue of the support for human capital investment by British young adults from their parents' perspective. He finds that richer parents are more likely to support their sons' human capital investment through monetary transfers than with shared coresidence, but that shared coresidence is more likely to be offered to the working young.

The first pair of joint analyses cited focuses on the choice to work and coreside with parents, leaving aside investment in human capital and marriage. The second pair focuses on the youth's decision to invest in human capital and to coreside, leaving aside the labour market and marriage. All are conducted from the parents' perspective. In a study on the Italian case (see Giannelli and Monfardini, 2000), we investigate the problem from the youth's perspective, assuming that the decisions concerning coresidence/family formation and work/study are interrelated. We focus on the role of family background and find that it has a major impact on Italian youths' decisions. We estimate a multinomial logit model and find, among other things, that if the father has a university degree the probability of his adult child being a student and coresiding with his/her parents nearly doubles for males and increases by twenty percentage points for females. If the young person has a lyceum diploma, a specific type of human capital that has the highest probability of leading to university studies, the impact on the same choice is not much larger, especially for young males.

In the present study, we extend our previous analysis to take account of the role played by expected lifetime earnings from the choice of investing in a job or in university education in the youth's coresidence and work/study decisions. We also look more in depth at the issue of the impact of the cost of housing and unemployment on these decisions. A study by Rice (1999) focuses on the role of labour market conditions on the choice to enter the labour market or remain in full time education by British young people. She finds that participation rates in further education are positively related to the unemployment rates in the local labour markets. This finding supports the hypothesis that poor labour market conditions reduce the opportunity cost of remaining in full-time education. She finds also a positive effect of average lifetime earnings of professional occupations on the decision to study. We treat this issues in a broader context, since we analyse the choice of studying or working jointly with the cohabitation decision.

From the methodological side, we adopt here a multinomial probit model rather than a logit one, and release therefore the very restrictive zero-covariance pattern imposed by the latter. This generalisation introduces two kinds of difficulties in the econometric analysis. Firstly, it makes the estimation of the model more complicated as multiple integrals enter the likelihood function. There are different examples in the recent literature of empirical discrete choice models where this computational

problem is solved by resorting to numerical integration methods or simulation techniques.<sup>1</sup> A second issue related to multinomial probit estimation arises from the identification of the parameters, which requires the presence of choice-specific explanatory variables (Keane, 1992). This problem has been mostly ignored in empirical applications, and it is not a trivial one in labour economics where choice-specific variables are often not available and must be appropriately chosen and estimated. We obtain choice-specific regressors by including the expected lifetime earnings from the two alternative investment choices available to the youth among the determinants of the stochastic utilities. This implies from the one side the extension of the choice model with equations explaining the earnings expectation mechanism, and from the other side the exclusion from the sample of the non-investors category (i.e. housewives, for whom it is not possible to define a measure of expected earnings).

We study the case of Italy using the Bank of Italy sample survey on household budgets. Italy is a country where the phenomenon of young people delaying exit from the parental home, even beyond the age of thirty, is massive and increasing. According to a multipurpose survey conducted by the Italian National Statistical Institute, 52% of Italians aged 18-34 lived with their parents in 1990 and the percentage increased to 59% in 1998. Young adults in their thirties tend to leave their parental home later: in 1990, 18% of males aged 30-34 coresided with their parents, while in 1998 this percentage increased to 29%. The corresponding percentage for females is 10% and 15% respectively. It can be argued that the phenomenon of rising coresidence behaviour, particularly among young people over 25, is due entirely to the growing levels of youth unemployment. The Bank of Italy data show that this is not the case: in 1995, excluding the unemployed, the share of males over 29 who were working and coresiding with their parents was 22%, and the share of females 16%.<sup>2</sup>

We have conducted our analysis in a regional perspective. The Italian labour market is strongly dualistic in a North-South sense.<sup>3</sup> The two extreme cases are represented by the North East and the South of Italy. In the North East, the unemployment rate is at frictional levels, labour demand is rationed and there is a strong incentive for young people to enter the labour market at an early age. In the South, young people experience dramatic levels of unemployment (over 50%!) and stay in the education system until very late. All these phenomena are certainly better understood if studied in conjunction with household membership.

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<sup>1</sup> See Geweke et al. (1994) for a review and a comparison of various computational approaches.

<sup>2</sup> These percentages are calculated over the sample presented in section 3.

<sup>3</sup> For a recent account of this phenomenon see Brunello et al. (1999).

The paper is organised as follows: Section 2 sketches the theoretical model; Section 3 describes the data and sample; Section 4 presents the econometric model and the methodology for predicting expected lifetime earnings; Section 5 presents the result and Section 6 concludes.

## 2. The theoretical model

The following theoretical model sketches the behaviour of youths regarding study, work and living arrangements. As a consequence of the emphasis we put on lifetime expected earnings, we concentrate on human capital accumulation in the form of education or labour market experience, leaving the residual choice (do not study, do not work) out of the analysis. It is, however, general and can function for the non participation decision – in the labour market or in education, typical of housewives - as well (see Giannelli and Monfardini, 2000).

The youth is assumed to maximise an expected lifetime utility,  $U_t$ , of goods and leisure,  $C_t$  and  $L_t$ , subject to a number of constraints, which vary according to the joint alternatives coreside or not coreside, work or study.

The youth is assumed to maximise:

$$\max E \sum_{t=1}^{\infty} (1 + \delta)^{t-1} [U(C_t, L_t)]$$

where preferences are intertemporally separable and  $\delta$  is the rate of time preference. This utility maximization problem is subject to:

1) a budget constraint:

$$\sum_{t=1}^{\infty} (1 + r)^{t-1} [W_t + \alpha_t TR_t - C_t - HC_t]$$

where  $r$  is the interest rate,  $W_t$  is labour income.  $\alpha_t = 1$  if the young person coresides and  $\alpha_t = 0$  if he/she lives apart,  $TR_t$  is the value of transfers from parents to adult coresident children (which include both the implicit value of housing services and explicit money transfers),  $HC_t$  are the housing costs faced by young adults (either explicit for the non-coresident youth or implicit for the coresident youth); non-coresident adult children are assumed not to receive private transfers;

2) a labour earnings constraint:

$$W_t = wK_tH_t$$

where  $w$  is the wage per unit of capital stock,  $K_t$  is the human capital stock and  $H_t$  are hours of work;

3) a time constraint:

$$T = \beta_t H_t + L_t + (1 - \beta_t) S_t$$

where  $T$  is time endowment, and study and work are mutually exclusive, i.e.  $\beta_t = 1$  if the young works,  $\beta_t = 0$  if the young studies, and  $S_t$  are hours of study.

Human capital is accumulated either with hours of work or with hours of study. This leads us to 4), the last constraint:

$$k_t = \left\{ \begin{array}{ll} K_{t-1} + F[\beta_{t-1}S_{t-1} + (1-\beta_{t-1})H_t] & \text{for } t=1, t^* \\ K_{t-1} + G[H_t] & \text{for } t=t^*+1, t^{end} \end{array} \right\}$$

given  $K_0$ , where  $F$  and  $G$  are functions. At time  $t=1$  (rescaled at the date at which the youth is observed to make this choice), we assume that the process of human capital accumulation is expected to continue until  $t^*$  with either study or work.  $t^*$  is the point in time when the youth has reached the age at which human capital can be accumulated only in the labour market until the end of active life,  $t^{end}$ . This age is assumed to be the same for all individuals.

We adopt a utility comparison framework to carry out the analysis. In this theoretical context, the youth is assumed to choose the human capital accumulation method and living arrangement combination that maximises his/her utility. Thus, the set of indirect utilities is the following:

$$v_{w,co}, v_{w,nco} : \text{work and coreside/not coreside}$$

$$v_{s,co}, v_{s,nco} : \text{study and coreside/not coreside.}$$

The youth chooses the combination of human capital investment and household membership that maximises her/his utility. For example, to observe a youth working and coresiding implies that:

$$\max(v_{w,co}, v_{w,nco}, v_{s,co}, v_{s,nco}) = v_{w,co}^*$$

The above assumptions imply that each indirect utility depends on the following set of variables:

$$v = (W_w^E, W_s^E, I, P, M)$$

where  $W_w^E$  and  $W_s^E$  are life-time labour earnings expected from human capital investment in either labour market experience or education respectively;  $I$  is a set of individual characteristics such as, for example,  $K_0$  and age at  $t=1$ ;  $P$  is a vector of parental variables, including income and transfer made to coresident children,  $TR$ .  $M$  is a vector of market variables, like  $HC$  and the unemployment rate, which in this context approximate the housing and labour market performance at the time of the youth's choice.

Human capital and labour supply theories predict, in this theoretical context, the following outcomes:

- 1) the maximum level of individual indirect utility is more likely to derive from the study state the higher the expected earnings are from the study choice;
- 2) there is a “reservation” expected level of lifetime labour earnings deriving from the study decision that leaves a youth indifferent to the choice between studying and working at  $t=1$ ; if preferences are heterogeneous, the level of the “reservation wage” will vary across individuals or groups of individuals.

Moreover, under the hypothesis of parents' altruistic behaviour, this model also predicts that:

3) the youth will buy fewer housing services explicitly, the higher their price, i.e. he/she will be more likely to live with his/her parents. For very high levels of the cost of housing, high expected lifetime earnings from the study decision may imply coresidence (all students will coreside).

Finally, if the hypothesis of the "discouraged worker" holds true:

4) the youth is more likely to choose to study, the higher the level of rationing in the labour market. This may turn out to be a loss of human resources, because students who are in fact discouraged workers are likely to be more productive if they choose to work.

### **3 Data and sample**

The data are drawn from the Bank of Italy sample survey on the family budgets of Italian households in 1995. The survey, covering 8,135 households and 23,924 individuals, provides information on a number of relevant variables, relating to both the household and the individual. Moreover, in 1995 the Survey has a section on intergenerational aspects such as the education and labour market experience of the parents of both the household head and its partner. The sample selection criteria are the following.

First, only observations on young people aged 18-32 have been selected. The lower bound represents the starting age at which these decide either to enter the labour market or to invest in further schooling. The relatively high upper bound of the age bracket reflects the observation that a large proportion of young people live in the parental home until their thirties.

The second selection criterion states that the young people's parents must both be alive, as events such as the premature death of one parent might heavily interfere with a steady human capital accumulation process.

Thirdly, we focus on the behaviour of those who decide either to go on studying or participate. After 18, the decision to invest in further education coincides with the decision to invest in university education, and therefore we select out young people without a high school diploma (who can not enrol university programs) and students who already have a university degree. Also, we drop out housewives, who choose to stay out of the labour force.

The fourth selection criterion excludes the unemployed. This selection must be carefully motivated, since unemployed youths amount to 17% of the sample as defined until now. In principle, since we are interested in human capital investment, the unemployed should be part of the sample as labour market investors. A first possibility would be to form a separate category of human capital investors, i.e. those choosing to invest in a job search (in addition to workers and students). However, the vast majority of unemployed young adults is concentrated in the south of Italy, a region where youth unemployment has reached dramatic proportions, incompatible with any explanation of equilibrium



unemployment.<sup>4</sup> A second alternative would be to include unemployed people in the category of labour market investors together with workers, introducing then a large amount of heterogeneity into the group.<sup>5</sup> Another reason for this exclusion lies with the scope of our analysis. One of our objectives is to measure the “discouraged worker effect” which induces young adults to study given bad labour market opportunities. We measure this through the effect of the regional youth unemployment rate on the probability of studying (and coresiding or not). This effect cannot be correctly estimated if the group of labour market investors includes the unemployed, since they certainly have many characteristics in common with discouraged workers.<sup>6</sup>

Table 1 shows the sample frequencies of the different pairs of outcomes by sex. The decision to coreside is taken in more than 80% of the cases sampled. The status “not member of parents’ household” amounts to living with a partner, since the status of “living alone” is not chosen by Italian young people. In substance, the decision to exit the parents’ household in Italy coincides with the decision to live with a partner.

The frequency distribution indicates the outcomes that are relevant for the analysis. Both males and females decide to work and live with their parents, study and live with their parents or work and form a new household, while nobody is observed to study out of his/her parents’ household. Consequently, we assume that for all individuals the indirect utility associated to the state “study and not coreside”,  $v_{s,nc}$ , is lower than the utilities deriving from the other states.<sup>7</sup> The most frequent state for both sexes is to be student and to coreside with parents. As can be seen above, males choose to work and coreside with parents more than females. Thus, even excluding the unemployed young people, the coresidence behaviour of workers turns out to be a very pronounced phenomenon.

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<sup>4</sup> The “involuntary” nature of unemployment is also supported by some pieces of evidence contained in the survey. For example, it is asked whether the unemployed people have looked for a job during the reference year; 90% of the total had. It is then asked if they were offered any kind of job during the reference year; 90% were not. It is then asked how many job opportunities were refused; 94% answered that they had not refused any job opportunity.

<sup>5</sup> Notice that heterogeneity can not be controlled for, since all unemployed people reside with their parents and a dummy for the unemployment status would predict perfectly the outcome “invest in the labour market and reside with parents”, resulting in an identification problem.

<sup>6</sup> There is also the risk that the regional youth unemployment rate would, in part, become endogenous to the analysis, since it is calculated over the 15-29 age bracket, which nearly coincides with that one of our sample.

<sup>7</sup> The survey is structured in such a way that students living apart but formally residing at their parents’ household are not distinguishable from those actually cohabiting with their parents. However, evidence from other sources shows that the number of students who study and live apart is rather limited – only students who live very far from the nearest university are likely to make this choice - given the absence of any public grant scheme for university students.

Table 1  
**Observed sample frequencies (and percentages) aged 18-32. BI survey,**

	<i>FEMALES</i>		Total
	members of parents' household	not members of parents' household	
Working	284	179	463
	29%	19%	48%
Studying	490	10	500
	51%	1%	52%
Total	774	189	963
	80%	20%	100%
	<i>MALES</i>		
Working	377	135	512
	38%	14%	51%
Studying	485	0	485
	49%	0%	49%
Total	862	135	997
	86%	14%	100%

#### 4 The econometric model

The utility maximization theoretical framework results in the following empirical discrete choice model for the latent indicator of the utility individual  $i$  derives from choosing state  $j$ :

$$u_{ij} = \underline{x}_{ij}' \beta_j + \varepsilon_{ij}$$

$i=1, \dots, N, j=1, \dots, J$ , where  $N$  is the total number of individuals in the sample, and  $J$  is the number of states the individual can choose.  $x_{ij}$  is a vector of observed explanatory variables describing individual and alternative specific characteristics which are supposed to be important for the determination of the choice. The parameter vectors  $\beta_j, j=1, \dots, J$ , are unknown and they are the object of inference. The utility indicator  $u_{ij}$  is latent, but we observe the realization:  $I_i = j$  iff  $u_{ij} > u_{ik} \quad \forall k \neq j$ , i.e. we observe individual  $i$  in state  $j$  if he/she gains from this state the greatest utility.

We use a probit formulation. The probit model is characterized by the assumption of the normal distribution of the stochastic component  $\varepsilon_{ij}$ . In particular,  $\underline{\varepsilon}_i = (\varepsilon_{i1}, \dots, \varepsilon_{ij}, \dots, \varepsilon_{ij})'$ ,  $i=1 \dots N$ , is assumed to be distributed as a  $J$ -dimensional multivariate normal independently and identically across the individuals. In most applied studies, discrete choice is analysed by adopting the logit formulation, which follows from the assumption that  $\underline{\varepsilon}_i$  has type 1 extreme value distribution. The probit formulation can be distinguished from logit one on the account of its capacity to postulate a covariance pattern among the error components of the utility indicators attached to different alternatives. These covariances are forced to be equal to zero by the distributional assumption in the logit model, and this pattern is known

in the literature as the Independence of the Irrelevant Alternative (IIA) hypothesis. IIA means that the utility attached to a given choice is not correlated to the utility attached to any other choice. This is very strong statement, as the unobservable components of different alternative utility functions could contain common terms which, for example, could make two states more similar to each other than another state for an individual with given observed attributes. The probit model does not impose the IIA assumption *a priori*, but the greater generality is achieved at the cost of a more complicated setting for the estimation of its parameters, as will be shown below.

The multinomial probit model in the form above suffers from two identification problems. The first derives from the fact that the observed choices  $I_i$  are not informative on the level of the utilities: therefore the model must be rewritten in differenced utilities. It follows that the relevant multivariate distribution for the error terms has dimensions equal to  $J-1$ . Secondly, the scale of the problem is not identified, so that the variance of one of the error terms must be set equal to unity. Taking state  $J$  as reference one, the resulting model is given by:

$$u_{ij}^* = \underline{x}_{ij}' \beta_j^* + \varepsilon_{ij}^*$$

$$\underline{\varepsilon}_i^* = (\varepsilon_{i1}^*, \dots, \varepsilon_{ij}^*, \dots, \varepsilon_{iJ-1}^*)' \sim IIDN_{J-1}(\underline{0}, \Sigma^*)$$

$j=1, \dots, J-1$ , where:  $\sigma_{11}^* = 1$ , and the parameters  $\beta_j^*$  are differenced from the original  $\beta_j$ . The log-likelihood function to be maximized is given by:

$$L(\mathbf{b}^*, \Sigma^*) = \frac{1}{N} \sum_{i=1}^N \sum_{j=1}^J m_{ij} \ln P_{ij}(\mathbf{b}^*, \Sigma^*)$$

where  $P_{ij} = \Pr(u_{ij}^* > u_{ik}^*, k \neq j = 1, \dots, J-1)$  and  $m_{ij} = 1$  iff individual  $i$  is observed in state  $j$ . The probabilities  $P_{ij}$  contain a  $(J-1)$ -dimensional integral which can be computed by resorting to numerical methods such as quadrature when  $J$  is not greater than 4.

Following the investigation of the sample at our disposal for the analysis of the young adults' choices in section 3 and our focus on the investment decisions, we model a three-point choice for both females and males, where the states are summarized in the following scheme:

<i>choice j</i>	<i>Description of the state</i>
1	Work & live with parents
2	Work & live with partner
3	Study & live with parents

#### 4.1 Life-cycle earnings prediction

As explained in section 2, life-time earnings expected from the two choices of either studying or working are introduced among the explanatory variables ( $W_w^E$  and  $W_s^E$  in section 2). There is also an important econometric reason for this. Namely, the probit model outlined above is formally identified,

but a study performed by Keane (1992), shows that identification problems arise in the estimation of its parameters unless the regressors of the stochastic utilities  $u_{ij}^*$  include an alternative-specific attribute. This means that the data must contain some variables - observed for all individuals - which should enter only the utility associated with one state and not the others. Such alternative-specific variables are usually available in studies concerning brand or transportation mode choices, where, for example, the price or a quality indicator faced by the individual in each alternative can be observed. In our context, the choice-specific regressors must be appropriately chosen and built, bearing in mind their relevance for the economic theory underlying the phenomenon under examination.

We achieve the identification of the probit model by assuming the life-cycle expected earnings from each type of investment to be the appropriate choice-specific variables for our problem. In other words, we assume that the decision of either attending university or entering the labour market after high school is based on a long-term comparison of the “returns” expected from each type of human capital investment. Therefore, we introduce as explanatory variables of the stochastic utilities the discounted stream of earnings the individual expects from the two alternative choices. In particular, we distinguish the life-cycle earnings stemming from the investment in higher education after high school, i. e. the “university diploma-life-cycle-expected earnings” (*ULCEE* in this section) and the life-cycle earnings that the individual expects from the choice of investing in the labour market, i.e. the “high school diploma-life-cycle-expected-earnings” (*HLCEE*). These are our choice-specific variables.

These variables are not observed, and we have to compute them for all individuals in the sample. Therefore, we need to postulate the mechanism according to which young people form their expectations. In our setting, the period following the high school diploma is considered for both outcomes as an investment in human capital. Consequently, it seems natural to assume that young adults evaluate their stream of expected returns by looking at the earnings patterns of people who have completed this investment period - i.e. people over 32 years.

This led us to an out-of sample estimation of two earnings equations, one for graduates and one for non-graduates. These have to be corrected for self-selection phenomena, as we observe only the wages of individuals who have chosen a given alternative, i.e. to enter the labour market or a university degree program. In order to correct for self-selection, the earnings equations are estimated jointly with a bivariate probit determining the probability of obtaining a university degree (or the high school diploma).<sup>8</sup> Estimation of the earnings equations jointly with the selection model is performed by maximum likelihood according to the model proposed by Heckman (1979).<sup>9</sup>

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<sup>8</sup> It is worth emphasising that this selection mechanism is not in contrast with the one constituting the focus of our analysis (i.e. the mechanism determining investment jointly with coresidence) as it applies to a sample of adults, for which the coresidence decision is no longer relevant.

<sup>9</sup> The results are not presented for the sake of brevity, but are available on request. The wage equation for graduation includes as explanatory variables age, sex, parents' education, father's position in the labour market, individual's position and sector of employment, type of university degree, and area of residence. The selection equation contains age cohorts instead of age and number of siblings as further explanatory variables.

We use the resulting estimated model to build the expectations of the returns on the two possible investment choices of the young adults in our sample, i.e. for each individual we predict the two wages (as a graduates and as a non-graduates) in correspondence of his/her own characteristics. We then compute the life-cycle expected wages,  $ULCEE$  and  $HLCEE$ , summing the predicted stream of earnings from age 33<sup>10</sup> to the end of the working life (i.e. age 65), where each term is discounted by an appropriate factor involving the interest rate on ten-year bonds (equal to 9.37% in 1995) and the number of years separating each individual from the age of 33.<sup>11</sup>

The expected returns on the two possible investments in human capital thus enter the specification

$$u_{ij} = \underline{w}_i \gamma_j + \vartheta_{jH} HLCEE_i + \vartheta_{jU} ULCEE_i + \varepsilon_{ij}$$

of the original utilities associated with the different states, i.e.:

$j=1,2,3$ , where  $\underline{w}_i$  contains individual specific, parental and market variables. We then investigate whether predicted wages can be used as alternative specific regressors in the feasible differenced model. The best we can do is to use the logit specification, whose differenced form can be used to test the significance of the predicted wages variables. Taking  $j=1$  as the reference state, which allows us to emphasise the most different states, i.e. working and living with a partner *versus* studying and coresiding with parents, we estimate the differenced logit model:

$$u_{ij}^* = \underline{w}_i \gamma_j^* + \vartheta_{jH}^* HLCEE_i + \vartheta_{jU}^* ULCEE_i + \eta_{ij}^*$$

$j=1,2,3$  where  $u_{i1}^* = 0$  and stars denote a difference with respect to the corresponding quantities in state

1. We can then test for the following exclusion restrictions:  $\vartheta_{2U}^* = 0, \vartheta_{3H}^* = 0$ , in both models for males and females. The above restrictions are accepted on the basis of the appropriate likelihood ratio tests. They can be given the interpretation that the differenced utility associated with a given state depends only on the stream of wages, i.e. the returns expected from the investment in human capital which characterises the state itself. The restricted model constitutes the necessary starting point for estimation of the probit formulation, as it contains the required choice-specific variables.

<sup>10</sup> In a first step we tried to take into account the opportunity cost associated with the choice of studying by subtracting from the life cycle expression the lost wages from the current age of the individual to the end of the investment period. This raises a problem of endogeneity, since until the age of 33 young people are still taking investment decisions. Having verified that consideration of opportunity cost does not affect at all the final estimated effect of the predicted variable in our choice model, we preferred starting our evaluation at 33 years of age.

<sup>11</sup> Denoting by  $r$  the interest rate, by  $UE(age)_i$  and  $HE(age)_i$  the predicted earnings as a graduate and non-graduate respectively as a function of age, the life cycle wages are given by:

$$ULCEE_i = \frac{UE(33)_i}{(1+r)^{33-age_i}} + \dots + \frac{UE(65)_i}{(1+r)^{65-age_i}}, \quad HLCEE_i = \frac{HE(33)_i}{(1+r)^{33-age_i}} + \dots + \frac{HE(65)_i}{(1+r)^{65-age_i}}$$

## 4.2 Individual characteristics, family background and local market variables

Individual variables ( $I$ ) include age and type of high school diploma obtained by the youth (which approximates  $K_0$ ). The Italian socio-economic system is strongly dualistic in a North-South sense: some regional dummies<sup>12</sup> are therefore introduced to capture other unobserved characteristics of young people. We expect our predicted probabilities to support the evidence that working and coresiding with parents is a widespread phenomenon in the North-Eastern area of Italy, while in the South more young people choose to study and coreside than in other regions.

Parental variables ( $P$ ) include the level of education and professional qualification of youths' fathers. A dummy variable for fathers over 65 captures the effect on adult children's decisions of having a retired father. Controls for mothers' human capital introduce instability into the results on the effects of family background (e.g. the introduction of mother's education reverses the sign of some of the coefficients of father's education).<sup>13</sup> Unfortunately, the survey does not provide information on parents' incomes. Family background, however, is a good control for individual ability (which we use both in the model and for the prediction of expected earnings) since, according to some recent econometric evidence, it plays a more important role than income in determining children's development (see Blau, 1999). A demographic variable for the number of siblings in the parental family takes account of the dimension of the family of origin, and should also proxy the income share allocated to each child (the larger the family the smaller the income share).

The labour and housing market performance ( $M$ ) represent the two main constraints on youths' choices.<sup>14</sup> Rationing on the labour market may induce some young people, through a discouraged worker effect, to invest in university education. The unemployment rate for young people aged 15 to 29 by sex and region controls for this effect. A high cost of housing is likely to constrain some young people to delay exiting from their parental home. We use an indicator of the housing costs faced by a youth in terms of rent, bills, and maintenance. We prefer this indicator to a housing price index,<sup>15</sup> because in our context this is also a proxy of the implicit transfer ( $TR$ ) from parents to their coresident adult children (cf. section 2). Our indicator is the ratio of the housing cost index over the total consumption price index. Housing costs are represented by rent, costs for water, maintenance, and the

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<sup>12</sup> A note by Moulton (1990) warns against the practice of using aggregate data such as regional-specific variables in models for micro observations (in our case individuals). The rationale for that is the probable omission of further regional characteristics which would make the model error components correlated for individuals belonging to the same region. In our model, we characterise each region by the local unemployment rate and housing cost and a regional-specific constant term (regional dummy). We should therefore be able to control for most of the unobserved regional heterogeneity relevant for the phenomenon we examine.

<sup>13</sup> The mother's participation dummy could not be used, since for non-coresident people it refers to the time when the mother was the same age as her adult child. Observation for just one point in time is not enough to proxy a mother's labour market state, especially for these age cohorts.

<sup>14</sup> See Appendix I for a detailed description of these two variables.

<sup>15</sup> A housing price index would be more suitable if we were analysing home-ownership decisions. Moreover, a housing price index is more likely to be correlated with income. In this context, we should also take account of borrowing constraints, since these might play an important role (see Guiso and Jappelli, 1999). The survey contains some information on rationing in the financial market, but this is unsuitable for our model.

repair of domestic equipment (ISTAT, 1995). The indicator thus represents the relative change of housing costs over total consumption costs with respect to a base year, 1985. Since the decision to leave the parental home, once taken, is assumed to be irreversible, the relative index in the year of marriage (or the year of the beginning of cohabitation with a partner) is the relevant variable for the group of non-coresiding young people.<sup>16</sup> Coresiding young people are, instead, assumed to be able to revise their decision at each point in time, and for them the index in 1995 is the variable chosen to proxy this effect on their cohabitation decisions.

## 5 Results

### 5.1 Probit coefficients.

We have performed a maximum likelihood estimation of the females and males models by resorting to the numerical maximization routine provided by GAUSS 3.2 and exploit its numerical computation of bivariate integrals of the normal density function that are needed for the estimation of the trivariate probit model. Maximization of the loglikelihood function is achieved through the “BHHH” algorithm, which uses the information matrix equality and approximate the (negative) Hessian by the cross-product matrix. The cross-product matrix is computed providing analytical expression of the first derivatives of the likelihood function, resulting in a considerable decrease in computational time. Once maximization is achieved, a further run with the Newton-Rapson method allows for the computation of the heteroscedasticity-consistent covariance matrix of the estimated parameters.<sup>17</sup>

For both models we proceed stepwise. First, we estimate an independent probit model, i.e. we set  $\Sigma^* = I$ , using as starting values the estimated parameters of the logit specification,<sup>18</sup> which are automatically implemented by STATA 6. Second, we release the covariance parameter  $\sigma_{12}^*$  and use as starting values for the numerical maximization the independent probit estimated parameters. As the variance elements are kept fixed equal to one, we are in fact estimating the correlation between the two differenced utilities. We can thus test the hypothesis of significance of the estimated correlation parameter by looking at its standard error and by the corresponding likelihood ratio test (LRT) based on a comparison of the restricted estimation (obtained in the first step) and the unrestricted one. The evidence suggests that the estimated correlations for both models cannot be rejected as equal to zero (although for women  $r$  is significantly different from zero at a 10% level). It is difficult to give an

<sup>16</sup> The information on the year of marriage or beginning of cohabitation is not available in the survey and had to be predicted. See Appendix I for the details.

<sup>17</sup> It is important to consider this variance estimator - proposed by White (1980) - as in our cross-section model we are likely to omit relevant individual characteristics which we cannot observe. The estimator is computed as:  $J_T^{-1} I_T^{-1} J_T^{-1}$ , where  $I_T$  is the cross-product matrix and  $J_T$  is the negative Hessian.

<sup>18</sup> The logit parameters are made comparable with those of the independent probit using the multiplicative factor suggested by the Stern (1989) for the trivariate case, i.e.  $0.7877/\sqrt{2}$ .

economic interpretation for this result, as  $\rho = \text{corr}(\varepsilon_{i2} - \varepsilon_{i1}, \varepsilon_{i3} - \varepsilon_{i1})$  and the correlations among original utilities are not identified. Tables 2 and 3 summarise the estimation results.

Table 2  
**Estimated probit coefficients – Females model (917 observations)**<sup>19</sup>

	State 2 – Work & live with partner		State 3 – Study and live with parents	
	Coeff. <sup>20</sup>	s.e.	Coeff.	s.e.
Age	1.31080*	0.50521	-0.54126*	0.27167
Age <sup>2</sup>	-0.02161*	0.00693	0.00327	0.00562
Voc.dipl.	0.35221**	0.20929	-0.73217*	0.19347
Tech. dipl.	0.12556	0.18244	-0.28782**	0.15469
Lyceum	-0.31942	0.29719	1.15685*	0.18441
North W.	0.03062	0.50035	-0.41046	0.28739
North E.	-0.16682	0.50490	-0.57694**	0.31362
Centre	-0.25780	0.35660	-0.41360**	0.25183
Father ret.	-0.09247	0.22524	-0.37399	0.22937
Father 60-65	-0.68875*	0.31914	0.26962	0.21463
Father 50-60	-0.45039**	0.27956	-0.07906	0.16052
Father univ. or dip.	-0.52683	0.26128	0.13085	0.15290
Father mid. sch.	-0.07876	0.23138	-0.07857	0.15838
Father Pub. Adm.	-0.49579	0.33303	0.12345	0.13942
Father manager	-0.14059	0.29185	0.28058	0.20125
N. siblings	0.56514*	0.08853	-0.18593*	0.07322
Un. rate 15-29	-0.01240	0.01066	0.01842*	0.00809
Housing cost	-4.16280*	1.10151	0.50199	0.65961
Ln(Un.L.C.Exp.Earn.)	-	-	1.33903*	0.46859
Ln(Dip.L.C.Exp.Earn)	1.12397	3.63867	-	-
Const	-19.99224*	8.46758	4.67490	3.34415
<b>r</b>	-0.41407**	0.22434		
Log-likelihood	-0.52524			
Log-likelihood ( <b>r=0</b> )	-0.52613			
LR test ( <b>r=0</b> )	0.00178			

<sup>19</sup> The numerical maximization algorithm converged after 32 iterations, with a tolerance level for the gradient set to 0.00001. The computation time was about 1.5 seconds per iteration on a Pentium 150 Mherz.

<sup>20</sup> One star denotes significance at a level of 5%, two stars at a level of 10%.



Table 3

**Estimated probit coefficients – Males model (958 observations)<sup>21</sup>**

Males - 958 observations <sup>22</sup>				
	State 2 – Work & live with partner		State 3 – Study and live with parents	
	Coeff. <sup>23</sup>	s.e.	Coeff.	s.e.
Age	0.18671	0.57223	-0.62511*	0.22880
Age <sup>2</sup>	-0.00656	0.00797	0.00422	0.00462
Voc. dipl.	-0.04848	0.43174	-1.01151*	0.27435
Tech. dipl.	-0.22955	0.39217	-0.40001	0.25053
Lyceum	-0.27697	0.46942	0.95872*	0.27049
North W.	-0.13160	0.42436	-0.55639*	0.23857
North E.	-0.48902	0.45196	-0.64830*	0.27754
Centre	-0.20829	0.34002	-0.44647**	0.23242
Father ret.	-0.16138	0.19787	-0.22059	0.24355
Father 60-65	-0.14698	0.33328	-0.01706	0.22687
Father 50-60	-0.22635	0.32504	0.11889	0.17290
Palau	-0.67777	0.68385	0.16253	0.33454
Padip	0.38101	0.28738	0.22304	0.16557
Father mid. sch.	-0.25274	0.27689	-0.01651	0.15229
Father Pub. Adm.	-0.27420	0.35428	0.35898*	0.13340
Father manager	-0.52359**	0.29161	0.00498	0.17804
N. siblings	0.64860*	0.08463	-0.12186	0.07603
Un. rate 15-29	-0.01705	0.01258	0.00975	0.00845
Housing cost	-3.87884**	0.91941	-0.44757	0.64550
Ln(Un.L.C.Exp.Earn.)			2.11700*	0.55786
Ln(Dip.L.C.Exp.Earn.)	4.12957	3.89871		
Const	-14.9712	9.93004	4.29239	3.18648
<b>r</b>	0.24974	0.32181		
Log-likelihood	-0.51981			
Log-likelihood ( <b>r</b> =0)	-0.52004			
LR test ( <b>r</b> =0)	0.0004			

An inspection of the tables above shows the relevance of the explanatory variables included in our information set, with their different effect across the considered states and the two models. Individual characteristics such as age, area of residence and type of secondary education obtained are found to be important determinants of a youth's decision. Among the family background variables, those referring to fathers' human capital exhibit estimated coefficients which are not significantly different from zero for both females and males. If expected earnings are omitted (as in Giannelli and Monfardini 2000), family background becomes an important determinant of young adults' behaviour. This suggests that the effect of such variables comes through the earnings expectation mechanism. The importance of lifetime expected earnings of the choice of attending university emerges clearly for both sexes. The cost of housing and the unemployment rate are relevant explanatory variables, especially for females. We

<sup>21</sup> The numerical maximization algorithm converged after 18 iterations, with tolerance level for the gradient set to 0.00001. The computation time was about 1.5 seconds per iteration on a Pentium 150 Mherz.

<sup>22</sup> The numerical maximization algorithm converged after 18 iterations, with tolerance level for the gradient set to 0.00001. The computation time was about 1.5 seconds per iteration on a Pentium 150 Mherz.

<sup>23</sup> One star denote significance at level of 5% , two stars at a level of 10%.

comment more in depth on the estimated coefficients and the implied marginal effects and elasticities in the next section.

As a goodness-of-fit measure we report the comparison between actual and predicted choices,<sup>24</sup> obtained by allocating a youth in the state with the highest predicted probability (cf. Table 4). The percentage of correctly classified individuals (i.e. the fraction of people observed in a given state which is predicted to choose that state) is very satisfactory in both models.

Table 4

**Predicted versus observed choices (percentage of correct classification)**

<i>Predicted Observed</i>	FEMALES				MALES			
	WORK & CORES	WORK & MARRIED	STUDY & CORES	TOT	WORK & CORES	WORK & MARRIED	STUDY & CORES	TOT
WORK & CORES	197 (69%)	24	63	284	291 (77%)	16	70	377
WORK & MARRIED	39	119 (72%)	7	165	47	68 (57%)	4	119
STUDY & CORES	58	8	402 (86%)	468	78	3	381 (82%)	462
TOT	294	151	472 (78%)	917 (78%)	416	87	455 (77%)	958 (77%)

## 5.2 Reference probabilities and the effects of individual and family background variables

Turning now to the interpretation of the estimated coefficients, we first present the predicted probabilities of the three states and the effects on these probabilities of variations in the significant categorical variables,<sup>25</sup> reported in Table A.2. These effects are split across four “reference individuals” - one for each region - whose characteristics are represented by the average value of continuous explanatory variables and the modal value of categorical explanatory variables (table A.1 in the appendix reports the reference characteristics).<sup>26</sup>

The differences in the probabilities between the South and the rest of Italy<sup>27</sup> are indeed remarkable. Take, for example, the two extreme cases of females living in the North East and in the South. In the North East the “reference female” (who is 24, has a technical school degree and faces an unemployment rate of 17%) has the probability of 78% of working and coresiding, of 12% of working and being married, and of 10% of studying and living with her parents. In the South, where the reference characteristics differ from those of the other three regions (for example, a lyceum diploma and an unemployment rate of 53%), a female of 24 has a probability of 5% of working and coresiding, of 1%

<sup>24</sup> We tried to evaluate the so-called pseudo  $R^2$  indicator, but did not manage this due to the failure of the maximisation procedure for the estimation of the probit model when only the constant term was included as a determinant of the utilities.

<sup>25</sup> The effects of all the variables on the probabilities are evaluated by taking into account both their direct impact and their indirect impact coming through the predicted lifetime earnings.

<sup>26</sup> This way of presenting our results depends on our interest in the effects of local economic variables such as the housing cost and the unemployment, which are found to exhibit important variations across the regions. Moreover, the regional dummies' coefficients turned out to be highly significant.

<sup>27</sup> The distribution of the sample by region of residence is coherent with the predictions of the model.

of being married and living with her partner, of 95% of studying and living with her parents. Analogous differences are found for males.<sup>28</sup>

The reference individual probabilities serve as benchmarks against the variations in categorical variables. In all regions the relative magnitude of the changes of significant variables is about the same: a lyceum degree determines a large increase in the probability of studying (50% points for females in the North, for example), whereas a vocational training school<sup>29</sup> degree increases both the probabilities of working and coresiding and working and being married.

The only important family background variable is constituted by the number of siblings: the probability of studying is negatively correlated to the number of brother and sisters, whereas the probability of marrying increases with the size of the family of origin. If the number of children in the family of origin is inversely related to the share of parental income allocated to each child, this piece of evidence represents an indirect measure of the role of family income in shaping young people's decisions. Neither father's education nor father's managerial or public administrative positions in the labour market, nor his retirement from work have any significant impact according to the estimated coefficients presented in the section above.<sup>30</sup> Father's education, however, is a significant explanatory variable of expected lifetime earnings. If we omit this expected variable in the choice model, the effect of father's university degree on the probability of studying becomes much larger for both sexes (see Giannelli and Monfardini, 2000).

### **5.3. The impact of expected lifetime earnings, local cost of housing and local unemployment**

We use our estimates to measure the contribution of economic variables to the predicted outcomes, focusing on the role of expected lifetime earnings from a university degree of the local cost of housing and of the level of local unemployment in explaining the striking behavioural differences observed among young adults living in different areas of the country.

#### **5.3.1 Expected lifetime earnings.**

Table A.3 reports the estimated marginal effects and elasticities of the continuous economic variables on the probability of studying and coresiding. Our results give evidence of the crucial role played by expected lifetime earnings in the determination of young adults' decisions, as this variable has the largest impact on the choice to go to university.

Fig.1-4 present some interesting regional and gender differences in predicted probabilities by level of expected life-cycle earnings from a university degree. Since these probabilities are calculated at

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<sup>28</sup> Note that the striking regional differences found for females are also due to the fact that in the South the reference female has a lyceum diploma, whereas in the rest of Italy she has a technical school diploma. In Tables A2, the reference probability for the South must be compared with the line corresponding to a lyceum degree in the other regions. The reference male, instead, has a technical school diploma for all regions.

<sup>29</sup> Vocational schools in Italy provide job specific training for skilled blue collar jobs. Access to university is allowed with supplementary one year courses.

<sup>30</sup> The only exception is for males: having a father employed in the public administration increases males' probability of studying of about 10 percentage points.

the reference age (24 years), the graphs show that the relevant joint decision collapses to two states, coresiding and working and coresiding and studying (except for a positive and slightly decreasing probability of marrying for females in the northern regions). The intersection point of these probabilities might be interpreted as a “reservation wage”, i.e. the expected wage from a university degree that leaves the young adult indifferent between studying and working (i.e. that wage at which the young adult has an approximately fifty per cent probability of either studying or working).

We would like to stress three important results regarding the “reservation wages” estimated in our model. First, young females have a higher “reservation wage” than young males. This result indicates that young females, for any given increase in expected earnings from a university degree, are less inclined to invest in university education than young males. This “present-orientedness” can be explained with a simple two-period intertemporal labour supply model, where period 1 wages are lower than period 2 wages. For any given increase in future earnings, young women have stronger preferences for working in period 1 than men of the same age, i.e. they substitute leisure in period 2 for leisure in period 1 less easily than young males, because a larger amount of non-market work (leisure for simplicity) is expected to be needed in period 2 in connection with family formation. Second, our model predicts, for both sexes, stronger preferences for work in the North East than in the South (see fig. 1 and 3). This result confirms the evidence presented in many other studies on the regional differences that distinguish the Italian labour market from the rest of Europe. The last result to be underlined on this issue, is that, for a given pattern of expected university earnings, in the north east young women also choose the state “work and marry” more frequently than in the South. This piece of evidence, showing that Mediterranean women are less inclined than northern women to early family formation, denotes an interesting behavioural reversal with respect to the past tradition.

Fig. 1

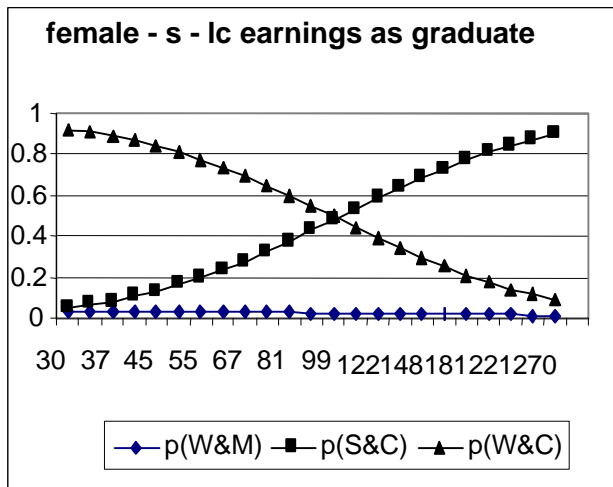


Fig. 2

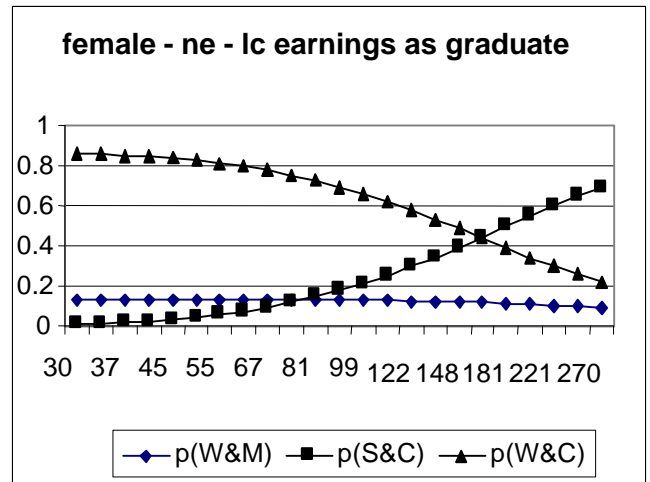


Fig. 3

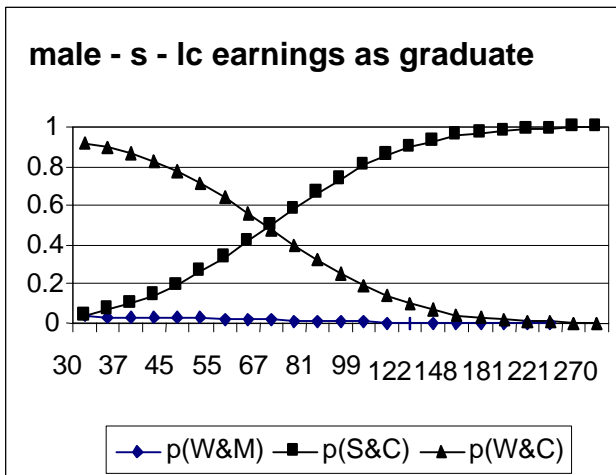
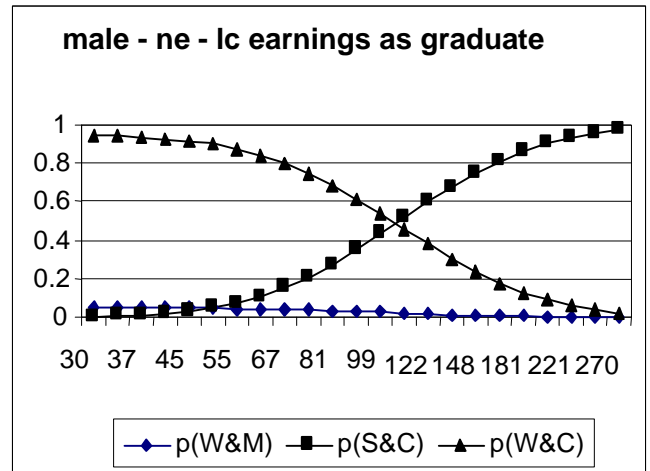


Fig. 4



### 5.3.2 The local cost of housing.

The cost of housing significantly reduces the probability of leaving the parental home for both sexes. To give an idea of the potential effects on family formation of housing policies aimed at reducing the cost of housing, we show the results of some experiments that measure the impact of a specific reduction in the cost of housing relative to the price of the other consumption goods (see table 5). Our index is a measure of the relative increase of housing costs with respect to the whole basket of consumption goods (for example, the average value for the North West, 1.10, means that, since 1985, the base year, the cost of housing price index has increased 10 percentage points above the consumer price index, see appendix II).

Table 5

**Probability of working and being married (percentage) – individuals 30 years old**

HOUSING COST	FEMALES				MALES			
	NORTH EAST		SOUTH		NORTH EAST		SOUTH	
	PROB.	CHANGE	PROB.	CHANGE	PROB.	CHANGE	PROB.	CHANGE
100	79		45		45		32	
90	89	+10	54	+14	60	+15	47	+15
80	95	+6	66	+12	74	+14	62	+15
70	98	+3	77	+11	85	+11	76	+14
60	99	+1	85	+8	92	+7	86	+10
50	100	+1	91	+6	96	+4	93	+7

Taking the two extreme cases of young people living in the South and the North East, we have calculated the increase in the probability of marrying and working for subsequent reductions of 10 percentage points of the housing cost index relative to the consumer price index. The probability of females of 30 in the North East is double than those of the South if the housing costs increase at the same pace as consumer prices. If the index is reduced from 100 to 90, the probability of being married and working increases by 10 percentage points in the North East and 14 percentage points in the South. Further decreases in the index induce larger increases in the South, since females in the North East are nearly all married when the index is reduced to 80. The pattern for males is more similar between the two regions and a reduction of 10 percentage points determines an average increase in the probability of about the same size.

### 5.3.3 Local unemployment.

The phenomenon whereby young people decide to study given the bad labour market opportunities is thought to have reached worrying dimensions in Italy. This is a particular case of the “discouraged worker” effect, whose measure for different reference groups could be very useful for targeting education and labour market policies. Students that are essentially discouraged workers, in fact, contribute to an increase in the average length of studies and the number of university drop-outs, thus determining a loss of human resources. Our model allows us to estimate the effect of unemployment on the decision to invest in university education. In other words, we measure the increase in the probability of choosing to coreside and study for each percentage-point increase in the youth unemployment rate. To illustrate the gist of this argument, we present the estimated measures for the extreme values of the unemployment rate, i.e. for the North East (lowest value) and the South (highest value; see tab. A1). Table 6 shows the change in the probability of studying when the unemployment rate of the other region is substituted to the reference probability.<sup>31</sup> It also gives us some indirect information on work preferences across ages, sexes, and regions. If the unemployment rate of

the North East rose to the level of the South, young males of 24 there would increase their probability of studying by 9 percentage points. In contrast, if the unemployment rate of the South dropped to the level of the North East, young males of 24 there would decrease their probability of studying by about 12 percentage points. Discouragement is stronger for younger males in the NE and for older males in the South. One particular aspect of region-specific behaviour appears to be very pronounced for females: 20 and 24 year old females of the North East show a stronger preference for work than southern females of the same age (Table 6 shows that if the North East experienced the same unemployment rate as in the South, a large number of young females would study for the only reason that they cannot find a job, whereas this is not the case of the South). In the South, this happens only to older females of 24-28 years. Note that at twenty, the age around which a youth starts his/her university studies, both southern males' and females' human capital decisions are not influenced by the high level of unemployment. This fact indicates that, especially in the South, young people are not initially constrained by the labour market, but that this happens later, when they experience the difficulties connected to the division between the Italian university system and the labour market.

Table 6

**Discouraged worker effect**

Estimated changes in the probabilities of studying and coresiding\*

AGE	FEMALES		MALES	
	NORTH EAST	SOUTH	NORTH EAST	SOUTH
20	25	-2	10	-6
24	19	-13	9	-12
28	6	-27	3	-9

\*The change is calculated by substituting in the reference probability the unemployment rate of the other region

## 6. Conclusions

Our conclusions relate to both substantive and methodological issues. First, among the variables on which we have focused, lifetime earnings expected from a human capital investment in university education have the largest impact on the decision to study and coreside with parents. Conditioning on coresidence, we have estimated a “reservation expected wage”, i.e. that expected wage from a university degree that leaves the young adult indifferent between studying and working. This is significantly different across genders and regions of residence. Young females, having a higher expected reservation wage, are less inclined to invest in university education with respect to young males. For young females, in fact, the returns of this investment in terms of future wage increases may well be made uncertain by the influence on their future work careers of family formation. As to the differences by region of residence, young adults living in the North East have higher reservation wages than young adults of

<sup>31</sup> Note, however, that for males the coefficient of unemployment is poorly estimated.

other regions, a result that gives quantitative support to the observation of a “present orientedness” in the work preferences of people living in this part of Italy.

Second, as far as family background is concerned, father’s education and position in the labour market, used here as a rough approximation of the (unavailable) parental income, have no direct role in determining the decision of whether to study as compared to the type of high school certificate to be obtained by the youth (a lyceum qualification has the strongest effect on this decision). An important indirect effect of family background, however, operates through the formation of expectations for lifetime earnings (for both sexes), where it serves as a control for individual ability.

Third, our results help to explain the widespread tendency of young adult workers to live with their parents. Some policy simulations based on our estimated coefficients support the hypothesis that the increase in the cost of housing relative to other consumer prices observed over the past ten years has contributed to delaying family formation. This is true all over the country and for both sexes. All the rest being equal, a 10 percentage point decrease in this index would induce among workers in their thirties an average increase of about the same size in the probability of leaving their parental homes.

Fourth, the unemployment rate of the region of residence turns out to be a significant proxy of the labour market rationing faced by young Italian people. A strong “discouraged worker” effect induces young people to choose to invest in university education and to coreside with parents given poor labour market opportunities. Paradoxically, it might be argued that unemployment thus has a positive side, increasing in this case investment in education (if this is more productive than investment on the job). However, this is certainly not true for youths living in the South, where discouragement is concentrated among those who should have completed their course of studies (as in the case of females over 24). Indeed, it may well be true for youths living in the North East, where increases of the unemployment rate over the actual frictional level would induce more people to choose to go to university right after leaving high school (like in the case of females of 20). The latter might be interpreted as evidence that levels of unemployment that are too low may indeed constrain investment in university education.

Turning to methodology, we have chosen to adopt a multinomial probit model. The reason for this is that it allows the assumption of Independence of Irrelevant Alternatives (IIA), on which the more commonly used logit model is founded, to relax. The multinomial probit model is now being used increasingly by researchers, but little attention is paid to the identification problem implied by the non availability of the required choice-specific variables. We deal with this problem in depth, and estimate choice-specific earnings by enlarging the model with equations for their explanation and prediction.

Indications for policy might be naturally drawn from the results presented. Housing policy measures targeted to young people, for example, would help to stop the tendency to delaying exit from the parental home observed among young workers. Youth labour market policies, coupled with a university reform, would help to reduce the number of young people who decide to study because of



rationing in the labour market, a phenomenon which has recently reached worrying dimensions especially in the south of Italy.

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## APPENDIX 1: description of the variables

### *Individual variables*

**Age, Age<sup>2</sup>:** age and age squared

#### *Education:*

**Voc. dipl.:** vocational training school diploma. It provides job-specific education (mainly for skilled blue collars jobs) .

**Tech. dipl.:** technical school diploma; it provides technical education (mainly for non-graduate white collars jobs, such as accountancy and engineering jobs).

**Lyceum:** lyceum diploma; it provides general - scientific or classical – education.

**North W., North E., Centre:** regional dummies; north-west, north east, centre of Italy. South is the base.

### *Family background variables*

**Father ret.:** father retired (born before 1931)

**Father 60-65, Father 50-60:** cohort of the father; up to 1936, 1936-1946

**Father univ.:** father with a university degree

**Father dip.:** father with a high school diploma

**Father mid. sch.:** father with middle school diploma

**Father Pub. Adm.:** father working in the public administration

**Father Manager<sup>32</sup>:** father with a managerial job (any position with a managerial content i.e. manager, executive, professional, entrepreneur; the base is unskilled, skilled and clerical workers)

**N. siblings:** total number of siblings in the parental home.<sup>33</sup>

### *Market variables*

These variables are constructed using official statistic provided by the Italian Statistical Office (Istat).

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<sup>32</sup>These last two variables are not fully comparable for both coresident and non-coresident young people. This is because fathers' position in the labour market for: a) coresident youths refers to the time of the interview, since it is derived from the matching of fathers and adult children in the same family (so that this piece of information is reported by fathers themselves, as members of the sample survey); b) non-coresident youths refers to fathers' position at the age of their adult children in the year of the interview (so that this piece of information is reported by young people living in a new household in the dedicated section on their family background). For some members of the sample, therefore, these variables record current father's position, for others fathers' position at their adult children's age. Given this inconsistency, it has not been possible to exploit the available information on fathers' sector of employment. As far as fathers' professional position is concerned, however, one could exploit the information on the managerial content of the job, collapsing all positions with some managerial content in the dummy Father Manager. The measurement error just mentioned is reduced under the assumption that, since non-coresident youths are on average older than their coresident mates, if their fathers are managers at the date of the interview (which is not known), their position at their children's age (which is known) should already have some managerial content (for sure, the transition from blue collar to manager, for example, has low probability.) The same line of reasoning applies to Father Pub. Adm., with the justification that in Italy it is usually observed that a person who has started a career in the public administration tends to stick to that sector for the rest of his working life. Entering any kind of public administrative job, in fact, requires winning a public competition that involves an investment in human capital. Therefore, if fathers of non-coresident young adults were employed in the public administration when they were fairly young, it is conceivable to assume that they are still there at the date of the interview. On the other hand, if they had started a career in the private sector, it is conceivable to assume that they have not switched to the public sector later on.

<sup>33</sup> This variable can be disaggregated into number of brothers and sisters. Since the estimated coefficient of these variables were not significantly different, the total number of sibling has been used instead.

It must be noted that the way the sample has been constructed has the drawback of overrepresenting siblings among coresident young adults with respect to non-coresident ones, since coresident siblings, being members of a surveyed family, are all members of the sample; the number of siblings of non-coresident young adults, instead, not being members of the sample, is derived from the dedicated section on family background. This has the unpleasant consequence of reducing the variability of family background variables for coresident youths (i.e. siblings have the same family background).

**Un. rate 15-29:** this is the unemployment rate by region and sex of people aged 15 to 29 (Source: “Rilevazione delle forze di lavoro – media 1995”, ISTAT. Unemployed people in the rate are : strictly unemployed, looking for the first job, other people looking for a job (see Eurostat definitions).

**Housing cost:** it is a measure of the relative increase of housing costs with respect to the whole basket of consumption. It is the ratio of the housing cost index over the consumer price index. The base year is 1985. (For example the average value for the NORTH W., 1.10, means that, since 1985, the base year, the cost of housing price index has increased 10 percentage points above the consumer price index). The housing cost index is included in the basket for the calculation of general consumption price index. The housing cost index takes account of the following costs: rent, water, maintenance and repair of domestic equipment (see Metodi e Norme, Consumption prices, base 85=100, Series A, no.23, Istat). The time series used cover the years 1981 to 1995 and refer to the main town in each Italian region.<sup>34</sup>

### *Lifetime expected earnings*

**ln(Un. L.C. Exp. Earn.)<sup>35</sup>**

logarithm of expected life-cycle wages from the achievement of university degree (actual value).

**ln(Dip. L.C. Exp. Earn.)**

logarithm of expected life-cycle wages with a high school diploma (actual value).

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<sup>34</sup> The construction of this variable has required several steps.

1) Distinction by region, in order to approximate the housing costs by region of residence. This is an approximation because the Istat index is calculated only for the main town in the region (i.e. Florence for Tuscany).

2) It is assumed that co-resident youths may revise their decision to form a new household at each point in time. The relative housing costs variable for them is therefore measured in the year of the interview.

3) For non-co-resident youths who have already formed a new household it is assumed that the relevant housing costs measure is that of the year of their marriage or union (in other words their cohabitation decision after having left the parental home is assumed to be irreversible at least until they become 32). Since the year of marriage is not recorded in the survey, the non-co-resident sample has been divided into two groups, married with children and married without children.

*Married with children:* the year of marriage is derived assuming that they had the first child two years after their marriage i.e.: 1995 (year of the interview) - age of first child (available in the survey) - 2;

*Married without children:* the year of marriage is derived imputing to each individual the modal age at marriage of his/her age cohort by region of residence. This has required the collection of the following official statistics: Number of marriages by sex, age cohort at marriage and by region for the years 1981-1995 (source: “Annuario di statistiche demografiche” years 1981, 1983 and “Annuario matrimoni, separazioni e divorzi”, years 1985, 1987-95, Istat). The time series was needed in order to take account of all possibilities ranging from being 32 in 1995 and having married at 18 (year of marriage 1981) to being 18 and having married in 1995.

<sup>35</sup> The interest rate used for the calculation of the actual value of life-time earnings is 9.37% ; 2005 BTP (Treasury bonds) issued 29.12.1995. Since the date of the survey is 1995, this is a ten year interest rate. Source: Banca Commerciale Italiana, Ufficio Studi, “Vademecum del risparmiatore”, Anno LXIII, Gennaio 1996, n.1.

## APPENDIX 2

Table A.1

### Reference individual by region

<b>FEMALE</b>	<b>North W.</b>	<b>North E.</b>	<b>Centre</b>	<b>South</b>	
age	24.80	24.77	24.19	24.09	
age <sup>2</sup>	630.90	628.41	602.26	597	
voc.dipl.	0	0	0	0	
tech.dip	1	1	1	0	
lyceum	0	0	0	1	
Father ret.	0	0	0	0	
Father 60-65	0	0	0	0	
Father 50-60	1	1	1	1	
Father univ. or dip.	0	0	1	0	
Father mid. sch.	0	0	0	0	
Father Pub. Adm.	0	0	0	0	
Father manager	0	0	0	0	
N. siblings	1	1	1	1	
Un. rate 15-29	21.73	16.92	30.33	53.45	
Housing cost	1.11	1.11	1.04	1.07	
ln(Un. L.C. Exp.Earn.)		4.35	4.32	4.26	4.29
ln(Dip. L.C.Exp.Earn.)		4.22	4.21	4.09	4.10
<b>MALE</b>					
age	24.93	24.45	24.77	24.30	
age <sup>2</sup>	637.84	611.39	629.21	606.77	
voc.dipl.	0	0	0	0	
tech.dipl.	1	1	1	1	
lyceum	0	0	0	0	
Father ret.	0	0	0	0	
Father 60-65	0	0	0	0	
Father 50-60	1	1	1	1	
Father univ..	0	0	0	0	
Father dip.	0	0	0	0	
Father mid. sch.	0	0	0	0	
Father Pub. Adm.	0	0	0	0	
Father manager	0	0	0	0	
N. siblings	1	1	1	1	
Un. rate 15-29	14.30	8.31	17.90	36.22	
Housing cost	1.12	1.13	1.05	1.092	
ln(Un. L.C. Exp.Earn.)		4.45	4.37	4.40	4.38
ln(Dip. L.C.Exp.Earn.)		4.30	4.26	4.21	4.19

Table A.2

**Effects on probabilities of variations in categorical variables**

	WOMEN			MEN		
	WORK & CORES	WORK & MARRIED	STUDY & CORES	WORK & CORES	WORK & MARRIED	STUDY & CORES
NORTH WEST						
<i>Reference</i>	0.70	0.14	0.16	0.74	0.05	0.21
Voc. Dipl.	0.72	0.21	0.07	0.84	0.09	0.07
Lyceum	0.28	0.05	0.67	0.27	0.02	0.71
0 sibling	0.61	0.05	0.34	0.74	0.01	0.25
2 siblings	0.50	0.29	0.21	0.67	0.18	0.15
3 siblings	0.35	0.50	0.15	0.50	0.40	0.10
NORTH EAST						
<i>Reference</i>	0.78	0.12	0.10	0.81	0.01	0.18
Voc. Dipl.	0.79	0.17	0.04	0.92	0.02	0.06
Lyceum	0.49	0.05	0.56	0.33	0.00	0.67
0 sibling	0.82	0.04	0.14	0.79	0.00	0.21
2 siblings	0.66	0.27	0.07	0.81	0.05	0.14
3 siblings	0.48	0.48	0.04	0.74	0.16	0.10
CENTRE						
<i>Reference</i>	0.74	0.02	0.24	0.79	0.01	0.19
Voc. Dipl.	0.84	0.03	0.12	0.90	0.03	0.07
Lyceum	0.23	0.00	0.77	0.31	0.00	0.69
0 sibling	0.70	0.00	0.30	0.77	0.00	0.23
2 siblings	0.75	0.07	0.18	0.78	0.07	0.15
3 siblings	0.69	0.18	0.13	0.69	0.21	0.10
SOUTH						
<i>Reference</i>	0.40	0.04	0.55	0.46	0.01	0.53
Voc. Dipl.	0.55	0.07	0.38	0.68	0.02	0.30
Lyceum	0.05	0.01	0.94	0.07	0.00	0.93
0 sibling	0.04	0.00	0.96	0.41	0.00	0.58
2 siblings	0.06	0.03	0.91	0.49	0.04	0.47
3 siblings	0.07	0.08	0.85	0.47	0.14	0.39

Table A.3

**Marginal effects and elasticities**

	STUDY & CORES			
	WOMEN		MEN	
	m.e.	el.	m.e.	el.
NORTH WEST				
Un. Rate 15-29	0.00501	0.57687	0.00395	0.19433
Housing cost	0.17494	1.0301	-0.02225	-0.08604
Ln (ULCEE)	0.35545	8.18671	0.73154	11.19261
Ln (DLCEE)	-0.01126	-0.25142	-0.140967	-2.08373
NORTH EAST				
Un. Rate 15-29	0.00372	0.52015	0.00346	0.112431
Housing cost	0.11732	1.07608	-0.0759	-0.33592
Ln (ULCEE)	0.26690	9.51265	0.68483	11.7096
Ln (DLCEE)	-0.00466	-0.16221	-0.07332	-1.22304
CENTRE				
Un. Rate 15-29	0.00650	0.63717	0.00408	0.21264
Housing cost	0.18474	0.62029	-0.05889	-0.17912
Ln (ULCEE)	0.47080	6.48934	0.78442	10.03009
Ln (DLCEE)	-0.00222	-0.02939	-0.11386	-1.39498
SOUTH				
Un. Rate 15-29	0.00172	0.09613	0.00384	0.21337
Housing cost	0.07596	0.08481	-0.11526	-0.19296
Ln (ULCEE)	0.11818	0.52986	0.78524	5.27990

