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HOUSEHOLD INCOME, FAMILY COMPOSITION, AND HUMAN CAPITAL IN SOUTHERN ITALY

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Abstract

In this paper I analyse the reasons for the low rate of growth of average level of education in the South of Italy from the labour supply side point of view. In particular I try to develop a theoretical and empirical model based on the hypothesis that the lower income of southern families (compared to those of the Centre and the North), along with the different fertility levels and composition of the families at regional level, have a strong effect on the choice on whether or not to continue studying at university level for the individuals living in different areas of the country.

JEL classification: J12, J13, J24

Keywords: family structure, fertility, tertiary education

Household income, family composition, and human capital in Southern Italy

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1. Introduction

Accomplished and ongoing researches brought to light how the process of human capital accumulation in Italy, despite its acceleration in recent decades, is rather weak compared to what occurred in other European and non-European countries[1]. In this context it has been observed, moreover, the existence of increasing territorial differentials in the levels of human capital, which strongly penalize the southern regions of Italy[2], even in the presence of good monetary and non-monetary returns to education for southern workers[3].

The reasons for the low rate of growth of average level of education in the South can be analysed from both the labour supply and labour demand side[4]. This paper will take into consideration the supply side, and in particular it will try to develop a theoretical and empirical model based on the hypothesis that the lower income of southern families (compared to those of the Centre and the

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[1] . Frey, Ghignoni, 2000 e Frey, Ghignoni, 2003.
[2] . Frey, Ghignoni, 2002
[3] . Ghignoni, 2002
[4] . Carillo, 2001; Croce, Ghignoni, 2003.

North), along with the different fertility levels and composition of the families at regional level, have a strong effect on the choice on whether or not to continue studying at university level for the individuals living in different areas of the country. Particularly, in view of the fact that there are fewer university centres in the South, compared to other Italian regions, that seems to force southern students and their families to face larger mobility expenses for educational purposes that can be, at least in part, avoided by students resident in the Centre-North of Italy.

2. Empirical evidence

The analysis of recent data on the supply and demand for education at academic level in the Italian regions, allows some interesting considerations regarding the causes of territorial differences on human capital accumulation in Italy. In particular, Istat data[5] show how the 89 Italian university centres are not homogenously distributed at territorial level (30% of them are located in the South and the Islands, against 70% in the Centre and North). This indicator of education supply at university level is counterchecked by some indexes of the "size" of the universities (e.g. the number of courses per university centre and the relation between the number of courses and the population which falls theoretically in the university enrolment age) that place the South below the national average.

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[5] . Istat, 2001.

However, education supply cannot be examined purely in "quantitative" terms. The available data allows to evaluate the "qualitative" aspect of the university education supply at local level along three dimensions: the level of diversification of the courses, the average number of students per teacher and the degree of satisfaction expressed by the students on the lecturing levels and the teaching equipment. Even these three indicators seem to bring to light a situation of discomfort in the universities of the South compared to those located in other areas of the country (e.g. the percentage of students that declare themselves "very satisfied" of the quality of the lecturers falls from 44% of the universities of the North-West to 33.1% of the South and 32.3% of the Islands, see Istat, 2001).

Even in examining the education supply from a financial point of view, (e.g. the expenditure of the universities for their students, or the expenses concerning the students' facilities, like number of scholarships, meals and student accommodation) marked inequalities emerge between the Centre-North of Italy and the South, rare exceptions made. This confirms how the Italian university system is still far from being able to guarantee equal opportunities to its students, particularly in view of the recent increases of the enrolment taxes[6].

Despite this situation, the education demand (at university level) that the southern students seek in the national education system is notable (see again Istat, 2001). The percentage of 19-25 years old individuals enrolled at

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[6] . The existence of an uneven distribution of public expenditure for education at territorial level, even at pre-university level, has been brought out in P. Lucisano, 2004.

university results higher in the southern regions (31.1%) and in the Centre (37.8%), rather than in the rest of Italy[7]. Such a demand, however, if on the one hand seems to remain largely unsatisfied (the probability of gaining a degree results lower for the southern students compared to their contemporary colleagues of the Centre-North (again Istat 2001), on the other hand, this forces the southern students to an intense, and presumably costly, territorial mobility. For instance, the percentage of students who enrol themselves in their region of residence is on average 68.2% in the southern regions (with a negative peak for the region of Basilicata which retains only 16.9% of its university students) against 81% of the North-West, 75.7% of the North-East and 86,4% of the Centre.

Territorial mobility for study purposes, which southern students seem to be forced into, clearly tends to increase the expenses involved when choosing whether or not to proceed with their studies at university. The paradox, therefore, is that the (direct) cost of further education at university level is higher for the individuals residing in regions where the household incomes (both in overall and "equivalent" household income terms, see Ghignoni, 2002) are lower; and where both the ratio *family components/income earners* and the

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[7] . The higher percentage of enrolment to the universities of students from the Centre and South could be explained by referring to the territorial differences in entry conditions to the labour market for young people (the effect of "opportunities" on educational choices is analysed in Eckstein, Wolpin, 1999). The estimates reported in the following paragraphs will appear to refuse such hypothesis. It is timely to point out, however, that in this case we concentrated on the probability of gaining a degree and not on the probability to enrol in a university course. Since the well-known problem of "drop-outs" in Italian universities these situations are deeply different.

number of children per family are higher[8]. This situation, that implies a careful overall planning for the educational path of all the children concerned, seems to produce the well-known[9] results illustrated in Istat, 2001: the probability of gaining an university degree is less then 30% in the South and the Islands, whereas it is more then 40% in the rest of the country. Similarly, out of 100 individuals (25 years old) of the same region of residence, there are fewer graduates in the South than in the Centre-North.

To verify this hypothesis in the following paragraph of this paper a simple model of human capital accumulation with overlapping generations and endogenous fertility will be presented. In this theoretical model the level of human capital accumulation depend on the household income and on the number of children per family. Paragraph 4 will present the results of the estimation of the empirical model, disaggregated at territorial level. Some concluding remarks follow.

3. A simple theoretical model of human capital accumulation with overlapping generations and endogenous fertility

The hypothesis according to, in the presence of imperfect financial markets, the educational choices of the individuals depend on the income of their families[10] and/or from the household income distribution[11] is not new in

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[8] . Note that the lower is the number of income earners per family, other conditions remaining unchanged, the higher is the risk of losing an important share of the household income.
[9] .see, among others, L. Frey, E. Ghignoni, 2002, 2003 and Svimez, 2002(b), 2002(c), and 2003
[10] . J. Shea, 1997.

economic literature. Moreover, most theoretical models of educational economics are based on the assumption that every family has only one (male)[12] child. These models, therefore, are not designed to take into account the effects on individuals and family choices of the "dilution" of the resources destined to education for the families with more than one child, nor of possible gender discrimination to educational access. In actual fact, it does not seem impossible that the families' choices on their children's' educational destinies are significantly influenced, other conditions remaining unchanged, from the number of children per family, nor is it impossible to exclude that family decisions concerning fertility are made partly on the basis of the available resources to be destined for the education of children. For this reason, in this paragraph, a model of human capital accumulation with overlapping generations and *endogenous* fertility[13] is presented. It will serve as a guide in the choice of the variables to insert in empirical analysis.

Supposing that at time t "coexist" four generations. *Nt* is the number of "young adults" (born in *t-1*); *Nt+1* is the number of "youngsters" (born in *t,* will be "young adults" in *t+1)*; *Nt-1* is the number of "adults" (born in *t-2*, were "young adults" in *t-1)*; *Nt-2* is the number of "seniors" (born in *t-3*, were "young adults" in *t-2).* Let's suppose that the "youngsters" dedicate their time to studying and/or leisure, the "young adults" split their time between paid work and looking after their children, the "adults" work full-time, and the

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[11] . D Checchi, 1999a.
[12] . D. Checchi, 1999b, and references.
[13]. The model used is an adapted version of E. Papagni, 2001.

"seniors" sustain themselves with their own working life savings and part of their children's income. If I indicate the fertility rate of the "young adults" with $n_t = N_{t+1}/N_t$, normalizing to 1 the overall endowment of time of the "young adults" and "adults", and assuming that caring for each child takes τ hours, I can state that the amount of time to dedicate to work will be:

$1 - n_t\tau$ for the "young adults" and 1 for the "adults".

Let's suppose, moreover, that the ability[14] of the worker depends on the level of education he/she possessed at the time of entry into the labour market (i.e., in *t* for the "young adults" and in *t-1* for the "adults")[15] and that the wage of workers is a direct function of such ability. Indicating with e_t and e_{t-1} the abilities, respectively, of the "young adults" and the "adults"[16] the labour income perceived by the various workers at time *t* will be:

$(1 - n_t\tau)w_t^t(e_t)$ for the "young adults" and $w_{t-1}^t(e_{t-1})$ for the "adults".

The human capital production function should take into consideration the knowledge conveyed from every generation to the next one, the education expenses, *B,* sustained for each generation by the previous one, and the public expense in education per unit of *pro capite* human capital[17], g_t. The human capital endowment of a youngster who learns at time *t* and which will enter into

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[14] . "Ability" could means "productivity", and it is correlated to the "expected wage".
[15]. I am assuming that there exists no "adult training" or education. This hypothesis, even if very close to the reality of the Italian labour markets (see H. Steedman, J. Vincens, 2000), is not crucial for the validity of the model.
[16] . That is, of the two generations of workers who constitute the labour supply at time *t*.
[17]. E. Ghignoni, 2003.

the labour market at *t+1,* should be, strictly speaking: $e_{t+1} = e_t + B_{t+1}^t + e_t g_t$ .For sake of simplicity, in the rest of this paragraph I will limit to assume: $e_{t+1} = B_{t+1}^t$

The families composed of "young adults" have to take some decisions regarding the best way to allocate consumptions and savings in the various periods of their life, the number of children and the expenses to sustain for each one of them. The preferences of each "young adult" are represented by the following concave utility function:

$$V = \ln C_t^t + \gamma \ln C_t^{t+1} + \gamma^2 \ln C_t^{t+2} + \varphi(e_t) \ln B_{t+1}^t + \beta U(n_t) \qquad \text{where:}$$

C_t^t is the consumption at time *t* of the individuals who belong to the "young adults" generation in *t* ;

C_t^{t+1} is the consumption at time *t+1* of the individuals who belong to the "young adults" generation in *t* ;

C_t^{t+2} is the consumption at time *t+2* of the individuals who belong to the "young adults" generation in *t* ;

γ is a discount factor representing the individuals' temporal preferences;

φ is the individual's propensity to invest in the education of the children, expressed in increasing function of the father's education[18]:

$\varphi(e_t)$ with $\varphi' > 0$, $\varphi'' < 0$;

B_{t+1}^t are the education expenses sustained at time *t* in favour of those who will be "young adults" in *t+1;*

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[18]. In support of this thesis see, among others, D. Checchi, A. Ichino, A. Rustichini, 1999 e L. Frey, E. Ghignoni, 2002.

$U(n_t)$ is the utility deriving from having children, with

$U'(n_t) > 0$ and $U''(n_t) < 0$;

β is the "weight" that each individual attributes to paternity/maternity in his utility function.

Utility maximization for "young adults" takes into consideration a series of constraints:

1. The expenses of the individual at time *t,* for consumption and education, should not exceed his labour income (and the possibility of debt creation, not considered here in order to simplify matters):

$$C_t^t + n_t B_{t+1}^t = w_t^t(e_t)(1 - n_t \tau)$$

2. At time *t+1* the individual is an "adult" and should not incur into further expenses for the education of his children. He works full-time, and with his labour income finances the consumptions relative to time *t+1,* and saves in view of the exit from the labour market:

$$C_t^{t+1} + S_t^{t+1} = w_t^{t+1}(e_t)$$

3. At time *t+2* the individual is a "senior" and consumes the savings accumulated in his working life, as well as a fraction $\alpha < 1$ of the expected working income of his children:

$$C_t^{t+2} = rS_t^{t+1} + \alpha n E\left[w_{t+1}^{t+2}\right] \cdot (B_{t+1}^t)$$

where $E\left[w_{t+1}^{t+2}\right]$ is the expected wage at time *t+2* for the individuals belonging to the "young adult" generation at time *t+1.*

If I hypothesize that an added unit of human capital increases the occupational probability of an individual from $p_{t+1,NQ}^{t+2}$ to $p_{t+1,Q}^{t+2}$ and his wage from $w_{t+1,NQ}^{t+2}$ to $w_{t+1,Q}^{t+2}$, the expected return of a unit of human capital will be a (positive) function of the wage differentials and the unemployment rates:

$$v = v\left(\frac{p_{t+1,Q}^{t+2}}{p_{t+1,NQ}^{t+2}}, \frac{w_{t+1,Q}^{t+2}}{w_{t+1,NQ}^{t+2}} \right)$$

As mentioned above the number of units of human capital accumulated from the individuals is directly proportional to the expenses sustained for education in the previous periods, B_{t+1}^{t}. The result, therefore, is:

$$E\left[w_{t+1}^{t+2} \right] = v(\cdot) \cdot B_{t+1}^{t} \qquad \text{from which:} \qquad C_{t}^{t+2} = rS_{t}^{t+1} + \alpha n v B_{t+1}^{t} \qquad \text{with } v > 0$$

4. In any case, the actual value of the expenses sustained by an individual during his life-cycle should be (at most) equal to the current value of the incomes he perceived, partly in his working activity, and partly as a "gift" received from his children.

$$C_{t}^{t} + \frac{C_{t}^{t+1}}{r} + \frac{C_{t}^{t+2}}{r^2} + n_t B_{t+1}^{t} = (1 - n_t \tau) w_t^t(e_t) + \frac{w_t^{t+1}(e_t)}{r} + \frac{\alpha n v B_{t+1}^{t}}{r^2}$$

To sum up, the maximization problem can be written in the following manner:

$$\underset{C_t^t, C_t^{t+1} C_t^{t+2}, B_{t+1}^{t}, n_t}{Max} V = \ln C_t^t + \gamma \ln C_t^{t+1} + \gamma^2 \ln C_t^{t+2} + \varphi(e_t) \ln B_{t+1}^{t} + \beta U(n_t)$$

$$\text{s.t.:} \quad C_t^t + \frac{C_t^{t+1}}{r} + \frac{C_t^{t+2}}{r^2} + n_t B_{t+1}^{t} = (1 - n_t \tau) w_t^t(e_t) + \frac{w_t^{t+1}(e_t)}{r} + \frac{\alpha n v B_{t+1}^{t}}{r^2}$$

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and can be solved using the Lagrangian:

$$L(C_t^t, C_t^{t+1}, C_t^{t+2}, B_{t+1}^t, n) = \ln C_t^t + \gamma \ln C_t^{t+1} + \gamma^2 \ln C_t^{t+2} + \varphi(e_t) \ln B_{t+1}^t + \beta U(n_t)$$

$$- \lambda \left[C_t^t + \frac{C_t^{t+1}}{r} + \frac{C_t^{t+2}}{r^2} + n_t B_{t+1}^t - (1 - n_t \tau) w_t^t(e_t) - \frac{w_t^{t+1}(e_t)}{r} - \frac{\alpha n v B_{t+1}^t}{r^2} \right]$$

From which I shall obtain the following first order conditions for a maximum:

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\begin{cases}
[1] \quad \dfrac{\partial L}{\partial C_t^t} = \dfrac{1}{C_t^t} - \lambda = 0 \\[3mm]
[2] \quad \dfrac{\partial L}{\partial C_t^{t+1}} = \dfrac{\gamma}{C_t^{t+1}} - \dfrac{\lambda}{r} = 0 \\[3mm]
[3] \quad \dfrac{\partial L}{\partial C_t^{t+2}} = \dfrac{\gamma^2}{C_t^{t+2}} - \dfrac{\lambda}{r^2} = 0 \\[3mm]
[4] \quad \dfrac{\partial L}{\partial B_{t+1}^t} = -\left(n_t - \dfrac{\alpha v n_t}{r^2} \right)\lambda + \dfrac{\varphi(e_t)}{B_{t+1}^t} = 0 \\[3mm]
[5] \quad \dfrac{\partial L}{\partial n_t} = \dfrac{\beta}{n_t} - \lambda\left(B_{t+1}^t - \dfrac{\alpha v B_{t+1}^t}{r^2} + \tau w_t^t(e_t) \right) = 0 \\[3mm]
[6] \quad \dfrac{\partial L}{\partial \lambda} = -C_t^t - \dfrac{C_t^{t+1}}{r} - \dfrac{C_t^{t+2}}{r^2} - n_t B_{t+1}^t + (1 - n_t \tau) w_t^t(e_t) + \dfrac{w_t^{t+1}(e_t)}{r} + \dfrac{\alpha v n_t B_{t+1}^t}{r^2} = 0
\end{cases}
$$

Solving [6] for B_{t+1}^t I obtain:

$$B_{t+1}^t = -\frac{C_t^{t+2} + rC_t^{t+1} + r^2 C_t^t + r^2(n_t \tau - 1) w_t^t(e_t) - r w_t^{t+1}(e_t)}{n_t(r^e - \alpha v)} \qquad [7]$$

Obtaining C_t^t from [1], C_t^{t+1} from [2], C_t^{t+2} from [3], λ from [4], $\varphi(e_t)$ from the equality between [4] and [5], substituting in [7] and simplifying I obtain the optimal investment in education:

$$B_{t+1}^t = \frac{\varphi(e_t)}{n_t\left(1+\beta+\gamma+\gamma^2\right)}\left[\frac{r\left(rw_t^t(e_t)+w_t^{t+1}(e_t)\right)}{r^2-\alpha v}\right] \qquad [8]$$

[8] highlights how the optimal investment in children's education depends positively on the level of education of the parents, e_t , which in turn affects the individual propensity of the parents to invest on the education of their children, φ, and on the income which finances such an investment. B_{t+1}^t turns out to be, moreover, positively affected by the fraction $\alpha > 0$ of the income which the children would set aside to finance their "senior" parents' consumptions[19] at time *t+2* and from the expected return of the expenses sustained for education, *v*. On the contrary, the optimal expense on education for each child depends inversely on the fertility[20] rate of the "young adults", n_t. Finally, by solving [4] for n_t and taking into account [8], I obtain the optimal value of the fertility rate:

$$n_t = \frac{\left[\beta-\varphi(e_t)\right]}{\tau\left(1+\beta+\gamma+\gamma^2\right)}\left[1+\frac{w_t^{t+1}(e_t)}{rw_t^t(e_t)}\right] \qquad [9]$$

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[19]. In this case parents' behaviour, when choosing how much to invest in education for their sons, would not be purely "altruistic".

[20]. This result is closely linked to the *trade-off* between 'quality' and 'quantity' of children, previously pointed out by the literature, (see for all G.S. Becker, H.G. Lewis, 1973 and F. Docquier, 2004).

In this case, if I hypothesize that the individuals' wage do not change in the period of a working life span[21], it will turn out to be:

$$n_t = \frac{[\beta - \varphi(e_t)]}{\tau(1 + \beta + \gamma + \gamma^2)}\left(1 + r^{-1}\right) \qquad\qquad [9b]$$

According to [9b] the fertility rate depends inversely on the individuals' propensity to spend for the education of their children, therefore, on the level of education of the parents[22], e_t, as well as on the cost of each child in terms of lost working hours.

In the next paragraph, I will concentrate on the empirical evidence about the relation, highlighted by [8], between the human capital at university level accumulated by the individuals in different areas of the country, household income, number of children per family, and expected returns of investments in education at university level.

4. Econometric model and empirical estimation

The theoretical implications of the model presented in the previous paragraph have been submitted to empirical estimation by utilizing the data from the Italian Household Survey of the Bank of Italy, relative to the years 1995, 1998 and 2000.

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[21]. The hypothesis is quite right, since I assumed that the wages depend on the ability acquired through education, and that the level of education remain unchanged during the workers' adult life.

[22]. Which, given the growth of the average education levels of the population, explains the decrease in the fertility rates.

In particular, bearing in mind that the percentage of individuals who have completed the various order of studies is considered (at international level) a good indicator of the expenses sustained by the families[23] for education, and the fact that such percentage can be interpreted as a measure of the probability to complete a determinate education cycle, it has been tested that the probability of reaching a university level of education depends on a set of explicative variables, amongst which are, according to the forecast of the theoretical model, the household income, the number of children per family, the cultural capital of the family, the income and occupational perspective of the youth after graduation in the different areas of the country.

To this end, on a sample of "children" with 25 years of age[24] or over, I estimated some *probit*/*logit* models[25] in which the dependent binary variable is: $Plaurea = 1$ if the individual is a graduate; $Plaurea = 0$ otherwise; and where the independent variables describe the personal characteristics of the individual, the socio-economic and cultural conditions of his family and the situation of the labour markets in the macro-area of residence.

Obviously this sample cannot contain the children who no longer live with the head of the family. However, the number of children moved out from the

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[23]. R. Millet, 1996. In actual fact, as it has been previously highlighted, enabling a determinate percentage of individuals to graduate generates costs, both direct and indirect, deeply different in the two macro-areas.

[24]. I selected a sample of individuals that, for age reasons, could have theoretically gained a qualification certificate at university level. For more detailed information on data and variables, see the Appendix.

[25]. Not being able, *ex ante*, to assume a specific form for the distribution of errors, both models of binary choice were estimated. Logit estimates are available on request.

family during the two years prior to the interview is less than 2% of the sample size (see Appendix), and it should not produce a relevant risk of sample selection bias.

The covariates have been grouped in four categories (tab. 1).

The *individual characteristics* include the gender and the age of the individual. In particular the dummy of gender should take into account the influence of eventual differences in expected return to education between males and females[26] and/or of the existence of gender discrimination in the families' investment decisions regarding education[27]. On the other hand, the age variable ought to highlight the existence of the typical "delay" of the Italian educational system in the "production" of university graduates.

The set of variables that describe the *household's economic situation* should measure the influence on the probability of reaching the highest educational level of the eventual economic constraints (current and future ones) in the family environment of the individual, keeping in mind the "dilution" of the resources for education, determined by the number of children per family. In particular, the short term liquidity constraints are represented by the overall household income and by the number of children, or alternatively, by the "equivalent" household income[28], whereas the long-term economic constraints, particularly important if we hypothesize the existence of indivisibility of returns

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[26]. G. Brunello *et al.,* 1999.

[27]. In reality, for the evolution of the participation rates in education, the problem of educational segregation by gender, in Italy, appears to approach a rapid solution. On the contrary, it persists a strong difference by gender on the choice of the kind of study courses to attend.

[28] . For a more detailed description of the variables, see the Appendix.

to education based on a "credential" approach[29], are represented by the age of the head of the family and by a "single-parent" *dummy.*

The *cultural capital of the family* is roughly approximated by a series of *dummies* indicating the highest qualification certificate gained by both parents.

Amongst the *characteristics of the local labour markets* are included the variables that ought to grave upon the monetary expected return of a degree: the regional differentials in individuals' incomes (total and labour income) between graduates and non-graduates and the regional differentials in the unemployment rates between graduates and non-graduates, which should take into account the comparative advantage of the individuals with a degree to find a job[30].

In order to highlight the possible behavioural differences of families' and individuals' choices about university education at macro-area level, separate models have been estimated for the Centre-North and the South. As well known, the estimated coefficients for the different models are not directly comparable[31]. For this reason it has been decided to transform them in "marginal effects" calculated at the sample mean of the variables. The marginal

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[29]. M. Bratti, 2000.
[30]. To test the hypothesis of "human capital parking" some empirical models included, among the explicative variables, the rate of youth unemployment at regional level. Such estimates do not show a significant effect of this variable on the probability of gaining a tertiary degree. It should be noted, however, that a test for the "parking" hypothesis, which considers the choice of studying as an alternative to unemployment, would have required the evaluation of the impact of the rate of youth unemployment at regional level on the probability to *enrol* in a university course, not on the probability *to succeed* in obtaining a qualification certificate.
[31]. W.H. Greene, 1997.

effects calculated for the binary variables, shown in table 1, refer to the discrete variations of the dummies variables from 0 to 1.

The results of the estimated empirical models (see table 1) confirm, at least in part, the predictions of the theoretical model presented in the previous paragraph.

Amongst the *individual characteristics*, the dummy of gender (female) seems to have a significantly positive influence on the probability of being graduate, only in the southern regions, thereby confirming the growth of young women's human capital in the South, compared to their male counterparts[32]. Always in the South, the probability of having a degree at university level seems to grow significantly (at decreasing rates) in relation to the age of individuals. The fact that the same variable does not appear to be significant in the estimated models for the Centre-North highlights how the "delays" in the acquisition of a university certificate, which has characterized the Italian educational system for a long period of time[33], appears to be a more consistent problem for the southern students.

In as much as the *economic situation of the family* is concerned, the household income/equivalent household income shows a strong and significantly positive effect on the probability of studying (successfully) at university level in both macro-areas. The analysis of the marginal effects, however, highlights that the impact of this variable is systematically higher for

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[32]. L. Frey, E. Ghignoni, 2003, 2003.
[33] . The reduction of this delay constitutes one of the principal objectives of the recent reform of the university cycles.

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the southern families. Even the number of children per family seems to have a strong (negative) influence on the probability of getting a tertiary education degree. The impact of this variable, moreover, appears slightly stronger for the families of the South.

For the purpose of this analysis, it is important to stress that the difference at territorial level of the marginal effect of the variable which takes into account the effect of "household income" is higher in the models which include separate variables (such as the "overall household income" and the "number of children"), as opposed to the models in which the household income is introduced in "equivalent" terms, namely, in a way which immediately takes into account the different composition of the family. This seems to confirm how the need to dilute the resources available for education within a family with a higher number of children influences the family's decision concerning the educational choices to pursue for its members.

The *cultural capital of the family*, measured through the educational certificates obtained by both parents, seems to have a decisively important effect on the educational choices of the children within the families resident in the central and northern regions. Conversely, in the southern regions the probability of gaining a university degree seems less connected to the level of education of parents.

Tab. 2 – Probit estimates, dummies references in parenthesis, (** 1% significance level; * significance level 5%)

Variables	Italy		Centre-North				South and Islands			
	Coef.	dy/dx	Coef.(1)	dy/dx (1)	Coef.(2)	dy/dx (2)	Coef.(1)	dy/dx (1)	Coef.(2)	dy/dx (2)
Individuals characteristics										
South (Centre-North)	-0.2057*	-0.0496	-	-	-	-	-	-	-	-
Female (male)	0.2274**	0.0484**	0.0787	0.0157	0.0686	0.0137	0.2818**	0.0531**	0.2841**	0.0541**
Age	0.1937**	0.0401**	0.0705	0.0139	0.0694	0.0137	0.3108**	0.0571**	0.3124**	0.0580**
Age^2	-0.0027**	-0.0006**	-0.0012*	-0.0002*	-0.0012*	-0.0002*	-0.0043**	-0.0008**	-0.0043**	-0.0008**
Economic situation of the family										
South · ln(household income)	0.1693**	0.0351**	-	-	-	-	-	-	-	-
South · Number of children	-0.1032**	-0.0207**	-	-	-	-	-	-	-	-
ln(household income)	0.4672**	0.0968**	0.3543**	0.0699**	-	-	0.4671**	0.0858**	-	-
Number of children	-0.1079**	-0.0224**	-0.1077**	-0.0213**	-	-	-0.1207**	-0.0222**	-	-
ln(equivalent household income)	-	-	-	-	0.3583**	0.0708**	-	-	0.4452**	0.0826**
Age of the family head	0.0179**	0.0037**	0.0234**	0.0046**	0.0249**	0.0049**	0.0180**	0.0033**	0.0192**	0.0036**
Single parent (both parents)	0.0617	0.0130	0.0607	0.0122	-0.0213	-0.0042	0.1070	0.0203	0.0196	0.0037
Cultural capital of the family (laurea)										
Father without any certification	-1.4868**	-0.1528**	-1.9113**	-0.1386**	-1.9024**	-0.1387**	-1.3214**	-0.1518**	-1.3646**	-0.1566**
Father with primary education	-0.8321**	-0.1597**	-0.9961**	-0.1835**	-0.9879**	-0.1822**	-0.6874**	-0.1180**	-0.7039**	-0.1219**
Father with lower secondary education	-0.5313**	-0.0927**	-0.6086**	-0.1001**	-0.5945**	-0.0984**	-0.3457**	-0.0553**	-0.3531*	-0.0569*
Father with upper secondary education	-0.2465**	-0.0469**	-0.5170**	-0.0858**	-0.5110**	-0.0851**	-0.2080	-0.0348	-0.2044	-0.0347
Mother without any certification	-0.6260**	-0.0955**	-1.2275**	-0.1204**	-1.2356**	-0.1209**	-0.4851*	-0.0737*	-0.4891*	-0.0750*
Mother with primary education	-0.4332**	-0.0867**	-0.4123**	-0.0789**	-0.4106**	-0.0787**	-0.2191	-0.0394	-0.2295	-0.0416
Mother with lower secondary education	-0.4172**	-0.0759**	-0.4448**	-0.0773**	-0.4553**	-0.0790**	-0.3371*	-0.0550*	-0.3391*	-0.0559*
Mother with upper secondary education	-0.2154	-0.0414	-0.1116	-0.0212	-0.1245	-0.0236	-0.2829	-0.0455	-0.3109	-0.0499
Characteristics of local labour markets										
Differential in total individual's income g./n.g.	-	-	-	-	-0.1587	-0.0314	-	-	0.0519	0.0096
Differential in labour individual's income g./n.g.	0.0703	0.0146	-0.1364	-0.0269	-	-	0.0853	0.0157	-	-
Differential in regional rates of unemployment	0.1223	0.0253	0.4665	0.0921	0.9130	0.1804	0.2593	0.0476	0.2436	0.0452
Constant	-9.6488**		-6.0228**		-6.1564		-11.6787**		-11.4891**	

Source: Bank of Italy and Istat, 1995, 1998, 2000.

This seems to confirm the results of a recently published[34] analysis on the intergenerational mobility in education, disaggregated at territorial level, which shows how the southern families' educational choices strongly tend to trace those of the "father" only in the cases in which the education certificate of parents is very low. On the contrary, there is a low percentage (by comparison to the Centre and North) of graduates among the southern graduates' children, for whom it is evidently harder to exploit the possibilities offered by a good cultural environment within the family.

The picture that appears, therefore, suggests that the southern families' educational choices at university level are guided more by the *pro capite* household income rather than by the cultural level of the family. After all, it has already been mentioned how the North/South differentials in household income does not only concern families with a low cultural capital, but also the families with a graduate "family head", which in the South dispose of a lower household income compared to the families of the Centre-North[35] with a graduate householder.

The *characteristics of the labour markets at local level* (differentials in the rates of unemployment and wage differentials between graduates and non-graduates) do not seem to have a significant influence on the educational paths chosen by the families and the individuals. As a matter of fact, for both macro-areas, neither the income differentials nor the unemployment rate differentials

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[34] . L. Frey, E. Ghignoni, 2002 and E. Ghignoni, 2002.
[35] . E. Ghignoni, 2002.

between graduates and non-graduates, seems to influence significantly the probability of obtaining a degree at university level.

The picture that emerges seems to indicate that the individuals, when taking decisions regarding university education, feel strongly conditioned by the family background and the *direct costs* involved for such forms of education rather than the forgone earnings, due to the delayed entry into the labour market of those who decide to enrol at university. This dependence would seem to be stronger in the regions in which the families' economic constraints are more stringent, as a cause of the lower overall household income, a higher number of children per family, and higher direct costs of university education.

As previously mentioned, the marginal effects of the variables introduced in the estimations, presented in table 1, have been calculated at the sample mean of the variables. In actual fact, it appears interesting to analyse, in the two macro-areas, the probability of gaining an education certificate at university level for *different levels* of equivalent household income and for *different number* of children per family. To this end, for these two variables the marginal effects have been recalculated, respectively, for percentiles of income and for number of children per family that, according to the sample *range*, is between 1 and 8. This type of calculation has been assessed on the *probit* models keeping fixed to the sample mean the value of the other variables introduced in the estimates. The resulting estimated probabilities of gaining a degree are reported in graphs 1 and 2. In particular, graph 1 shows how the estimated probability of reaching a university degree grows with the increase in the household income

in both macro-areas, even if the slope of the curve appears lower for the Centre-North. Moreover, the probability of getting a certificate at university level for the individuals in "poor" families (up to the 60° percentile of the distribution of equivalent household income) appears higher in the central and northern regions rather than in the South. On the contrary, for the individuals coming from "richer" families (over the 70° percentile of the income distribution) the estimated probability of gaining a degree results higher for those who reside in the insular and southern regions compared to the Centre-North.

It clearly seems to emerge, therefore, that the young southerners coming from families with a medium/low equivalent[36] household income are penalized compared to their contemporaries residing in the Centre-North whose families are characterised by *similar* economic conditions. Evidently, it cannot be excluded that this result is influenced, at least in part, by higher mobility costs for study purposes sustained by southern students who decide to continue studying at university level. This seems to be confirmed by the fact that, as soon as family economic constraints loosen up, the estimated probability of gaining a degree for the southern students reaches or supersedes the probability calculated for their contemporaries of the Centre-North.

This type of consideration does not seem to be disapproved by the simulated results reported in graph. 2.

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[36]. Note that, the equivalent income takes into account the different number of family components, therefore, indirectly the number of sons.

Graph. 1 – Estimated probability of gaining a degree by percentile of equivalent household income and macro-area of residence
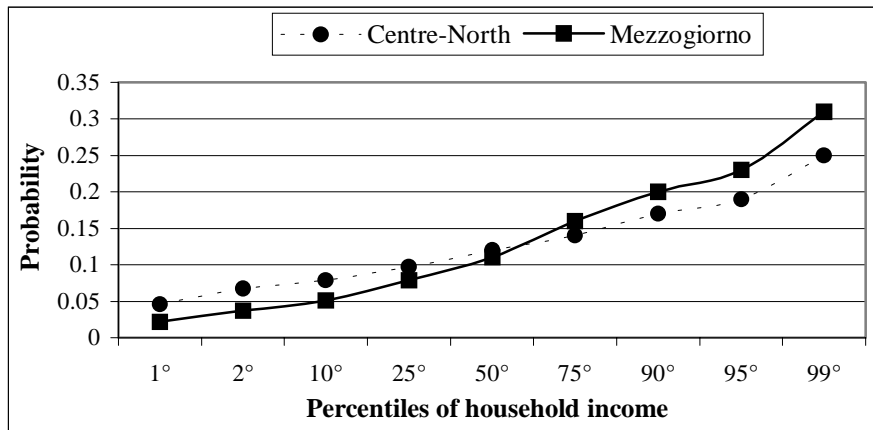
Source: Bank of Italy, 1995, 1998, 2000

Graph. 2 - Estimated probability to gain a degree by number of children per family and macro-area of residence

Source: Bank of Italy, 1995, 1998, 2000

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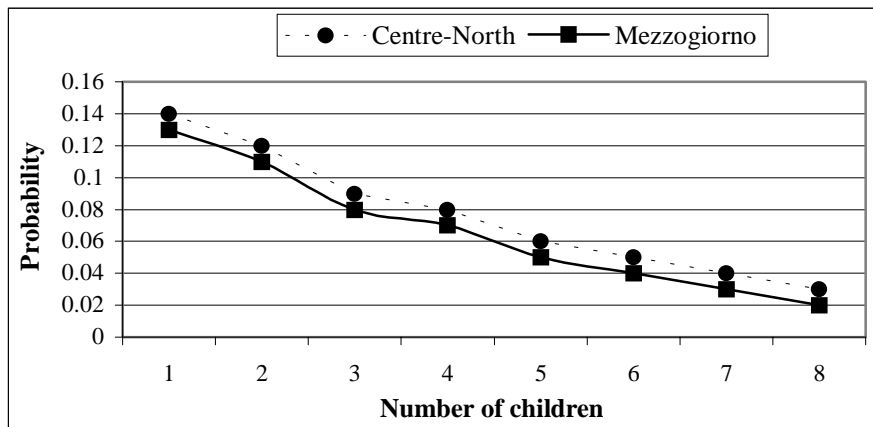
This graph, in fact, shows that the estimated probability of gaining a degree for each individual diminishes as the number of "contenders" within the family increases in Italy as a whole. The calculated probability for the southern individuals, however, remains systematically below that calculated for the central and northern students, irrespective of the number of children per family. Actually, the difference between the two probabilities is very little and it might not be significant from a statistical point of view[37]. However, the empirical model that includes the dummies *South·ln(household income)* and *South·number of children* confirms the different impact, at regional level, of these two variables on the probability of getting a tertiary degree.

Even in this case it does not seem incoherent to explain the empirical evidence on the basis of the territorial differentials in the *direct* costs sustained, on average, by the families for their children's university education. The higher necessity for the southern students of facing long and frequent mobility hardships in order to reach the university would be a burden on the family budget making it onerous to send a child (or a child more) to university for the southern families, compared to those in other areas of the country. In brief, the picture that appears seems to confirm the existence of strong economic constraints capable of limiting investments in human capital at university level for southern families, deriving from the territorial differentials in the distribution of household income, from the different composition of the families at macro-area level, and from the territorial differentials in the *direct* costs of

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[37] . The confidence intervals are not completely separated.

university education. On the contrary, the labour markets conditions at local level and the indirect cost of this type of education, represented by the expected values of the forgone earnings, do not seem to influence significantly the educational choices of the Italian youth and of their families in *both* the geographical areas, even though these two areas are notoriously characterised by very different labour markets conditions.

Concluding remarks

In this paper I tried to analyse the causes, on the labour supply side, of the low human capital accumulation at university level in the "Mezzogiorno" of Italy.

In particular, I presented a theoretical model of human capital accumulation with overlapping generations and endogenous fertility, that attributes the optimal value of investment in education chosen by the families directly, to (1) the level of education of the parents, (2) the household income, (3) the expected returns to education for the young graduates (according to a hypothesis of not completely "altruistic" behaviour on behalf of the parents) and, inversely, to the number of sons per family.

Having accepted a synthetic cost indicator of human capital, used at international level and based on the percentage of individuals who completed a

determined education cycle[38], I estimated a series of *probit/logit* models in which the individual probability of reaching a university certificate at macro-area level depends on the variables indicated by the previous theoretical model.

The results obtained seem to clearly highlight the role of the household's income and of the number of sons present within the household nucleus, in affecting the choices of the individuals and families regarding the investment in human capital beyond upper secondary school. The impact of these two variables appeared particularly marked for the families of the South with a low income and a larger number of sons, whereas the southern students who belong to families with a higher income seem to have a *higher* probability of gaining a university degree compared to their contemporaries of the Centre-North coming from families characterised by similar economic situations. The fact that the loosening household economic constraints seem to push the southern students, in larger measures compared to others, to successfully further their studies at university level, along with the apparently low significance of the impact of the indirect costs of university education on the choices of the individuals, induced to concentrate on the role of *direct* costs of this type of education. In particular, the analysis has been directed towards the role of mobility costs for study purposes, (due to the inadequate territorial distribution of the universities, both in terms of quantity/quality of university sites and in terms of the variety of courses available), which on average seem to grave mostly upon the southern

[38]. In this paper this percentage has been interpreted as an individual probability of gaining a tertiary degree and not as an index of the resources engaged to finance university education at territorial level.

students rather than the students from the Centre-North. The analysis conducted did not allow excluding that these type of costs, which weigh heavily upon the southern families, notoriously disadvantaged by the household income distribution inequalities at national level, and on average "burdened" by an higher number of sons compared to the families of the Centre-North, have an important role among the causes of the lower percentage of graduates and youth graduates in the southern regions[39].

Appendix: data and variables description

The data used for the estimations are obtained from the Italian Household Survey of the Bank of Italy in relation to the years 1995, 1998, and 2000. In order to consider in the analysis only the individuals who are old enough to (theoretically) possess a university qualification certificate, the sample has been selected so as to include only the "children" aged 25 years old or over. On the whole, I considered 5,698 subjects, of whom 3,269 are resident in the Centre-North and 2,402 are resident in the South and the Islands. The risk of sample selection bias seems to be very low, because the number of children moved out from the family (for any reason) during a period of two years before the interview is only 114 (61 in the northern families and 53 in the southern families).

The variables used in the estimations were built in this manner:

Plaurea: the dependent variable of the probit/logit estimated models assume value 1 if the individual possesses a university qualification certificate ("laurea breve", "laurea" and/or specialization "post-laurea") and value 0 otherwise;

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[39]. Anyway, I wish to highlight how a human capital "cost" indicator, based exclusively upon the percentage of individuals who reached a university qualification certificate, even though generally accepted and recognized at international level, may reveal itself not satisfactory in case of uneven territorial costs, particularly *direct* costs, of university education. In fact, if this kind of costs are higher in one area than in another, the comparison of the percentages of graduates at regional level does not seem an acceptable indicator of the territorial differentials in invested resources (by the families, the local communities or the State) in order to finance the educational processes of its members.

South: dummy variable, South and Islands = 1; otherwise = 0

Female: dummy variable (1=female; 0= male)

Age: is the age of the individual at the time of the interview;

Age^2: the introduction in the estimate of the individual's age to the square ought to take into account the presence of non-linear effects.

South · ln(household income): $\int \begin{array}{l} ln(household\ income)\ if\ "South" \\ 0\ otherwise \end{array}$

South · Number of children: $\int \begin{array}{l} n°\ of\ children\ if\ "South" \\ 0\ otherwise \end{array}$

ln(household income): neperian logarithm of the household income;

Number of children: number of children, of any age, living with the head of the family;

ln(equivalent household income): neperian logarithm of the equivalent household income. The equivalence scale used takes into account the number of individuals the family is composed of and has been proposed by G. Carbonaro, 1985.

Age of the head of family: is the age of the individual of reference of the family at the time of the interview;

Single-parent family: is a dummy variable that assumes value 1 if there is only one parent in the family, and value 0 if there are both parents;

Cultural capital of the family: series of dummy variables referring to the educational levels reached by the parents of subject i, category of reference: father/mother possessing a university qualification certificate.

Regional differentials in the total individual income graduate/non-graduate:

$E[\ln(total\ individual\ income\ of\ graduates)] - E[\ln(total\ individual\ income\ of\ non\text{-}graduates)]$

Regional differentials in the unemployment rates graduates/non-graduates: difference between the rate of unemployment of graduates and the rate of unemployment of non-graduates. (Source: Istat).

The monetary variables used in the estimates have been deflated through the C.P.I., Istat, 1995=100.

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