The Role of Small Universities in Human Capital Accumulation: A Case Study of Piemonte Orientale

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In the recent past, expectations concerning universities have emphasised their active role to influence industrial and regional development. Obviously, the universities located in provinces suffering from structural problems are required to play this role. Moreover, the correlation between the socioeconomic status (and the schooling) of parents and that of their adult offspring is positive and significant, in both the statistical and practical senses. Thus this paper investigates the experience of a small Italian University, the Piemonte Orientale "Amedeo Avogadro", in order to evaluate its role of human capital accumulation, necessary to economic development. The aim of this article is to verify whether this small university satisfies a specific demand which would never be satisfied by a big or mega University. In this way we demonstrate the important role of small Universities in the human capital accumulation that occurs in the recruitment basin, a phenomenon with medium to long term implications. The empirical results show that the representative student of Piemonte Orientale is characterized by modest parental socioeconomic conditions and schooling. Also its demographic recruitment basin is a specific geographical area. These factors have a positive impact on the choice of enrolment (Piemonte Orientale versus other Universities). The choice is modelled by a probit (logit) binary outcomes model using the Almalaurea cross-section sample.

Keywords: Performance; Human Capital Accumulation; Small Universities

JEL Classifications: I20, I21, I23, R00

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1. Introduction

As in many EU member countries, and in the particular context of the Bologna Convention on tertiary education, the Italian university system has experienced substantial reform in recent years. The key reform aims include increasing the participation, progression and retention rates of students in higher education. Reform has reduced, on the one hand, the length of undergraduate degree programs to three years with the intention that students should be able to graduate at an earlier age than in the past, in line with graduates from other European countries. On the other hand, the reform has introduced greater flexibility in the degree structure along with a wider range of curricula offered to students. At the same time as granting greater autonomy, a territorial decentralization process has been implemented with the proliferation, on the one hand, of "recent" small universities and, on the other, of new split-site schools of the "historical" universities.

More recently a reversal of policy is taking place: many split-sites of the "historical" universities are closing due to new university course requirements (in terms of numbers of students and professors). Furthermore the role, and thus the existence, of "recent" local small universities are put in doubt.

Against this background, this paper analyses the experience of a small Italian university, the Piemonte Orientale¹, assumed as a case study, in order to evaluate its role in human capital accumulation, necessary to economic development. The aim of this article is to verify whether this small university satisfies a specific demand which would never have been satisfied by a bigger university. In fact, absent this small university, a relevant number of potential students could not enroll, attend and graduate without both enormous economic cost for the families and personal efforts (working students, commuting students).

In this way we want to demonstrate the important role of the small Universities in the human capital accumulation that occurs in the recruitment basin, a phenomenon with medium to long term implications. From this perspective, the small Universities not only could ease the congestion that plagues the mega or big Universities but also perform a key role in the development of territorial systems, in particular the decentralized ones (decentralized with respect to economic development axes).

The small universities' evaluation becomes urgent due to the recently instituted university assessment process based on rankings² (productivity, research, teaching, professors' CVs, international

¹ The University of Piemonte Orientale "Amedeo Avogadro", a sin-off of the University of Torino, became autonomous University in 1998. It is based in three medium sized main departmentcities (Alessandria, Novara and Vercelli), has seven Faculties and twelve Research Departments. Enrolled students are about 10,000 and teaching and administrative staff, are each about 350 people.

² Censis, for example, provides Italian universities rankings. Recently the MIUR and the National Evaluation Committee (now ANVUR) started gathering data on research and teaching in order to evaluate the university system.

relations) and efficiency course requirements, the so-called Gelmini Reform. The paper also analyzes the public policy implications vis-à-vis the Gelmini Reform. The new law and its administrative implementation reduce the opportunities for a decentralized supply of academic programs and therefore strengthen the role of student mobility.

The remainder of the paper is organized as follow. In Section 2 tertiary-level education in Italy is examined. Section 3 analyzes the earlier empirical evidence on the matter. In Section 4 the dataset employed in the empirical analysis is described and summary statistics are provided. Section 5 analyzes the selected models, describes the estimation procedures and comments on the empirical findings. Finally Section 6 concludes the paper, summarizing the discussion and suggesting some policy implications.

2. Tertiary-level education in Italy

This Section is missing in the AISRe 2011 version.

3. Earlier empirical evidence

Studies devoted to the analysis of higher education outcomes have attracted a great deal of interest in countries like the UK, where several policy projects have been implemented in recent years. This has led to a growth in the number of academic studies evaluating issues such as the determinants of student progression through university (see, for example, Smith *et al.*, 2000; Smith and Naylor, 2001a, 2001b) and the students' performance as a proxy for the quality of the university. A selective survey of recent work can be found in Boero *et al.* (2001).

Unlike other countries, especially the US and the UK³ where the literature on educational outcomes is well developed, research in this area is not so well-established in Italy. In fact no consistent national dataset is available with full individual student records. This affects the Italian empirical works on the matter. Furthermore the few Italian studies focus on the analysis of the performance of university students in terms of marks, duration of enrollment or dropout rates.

Biggeri *et al.* (2001) focus on the transition from university to work using data from the 1995 ISTAT survey on job opportunities, for students graduating in 1992. Boero *et al.* (2001) compare the performance of Italian university students with the British ones. The Italian dataset includes data from the ISTAT survey on students graduating in 1995 (see ISTAT, 1999, 2000), which highlights the factors affecting graduate performance and the determinants of graduates' pay. This survey contains

³ In the UK, in fact, the existence of a wide and complete database, *University Statistical Records* (USR), on the students for the period 1972-1994, supported the research. For example Smith, McKnight and Naylor (1999) focus on the performance drivers which determine the success of a university in terms of job opportunities of its graduates; Smith and Naylor (2001a) analyze the drivers of the grade point.

data on a sample of 17326 graduates in 1995. This data allows only the identification of university clusters (grouped into nine Regions) not the individual university.

There are also various studies that have used data on individual students from particular universities. For example, Gori and Rampichini (1991), Bulgarelli (2002) and Ferrari and Laureti (2004a, 2004b) have conducted various analyses of the academic performance of students at the University of Florence, Checchi (2000) and Checchi *et al.* (2004) for the University of Milano-Bicocca, and Staffolani and Sterlacchini (2001) for four universities of the Marche.

In particular, Staffolani and Sterlacchini (2001) worked on data from the IPLAM survey ("Inserimento Professionale Laureati Atenei Marchigiani") in order to analyze, among others, drivers of both grade point and effective duration of enrollment, with some OLS regressions. According to their work, enrollment duration is negatively correlated to the grade point. That means the longer the time taken to complete the degree, *ceteris paribus*, the lower the observed performance in terms of grade point will be. Bratti and Staffolani (2001) studied the drivers which influence academic performance and faculty choice, using the IPLAM survey data. This study finds a significant correlation between individual social background and academic performance; it is evident that some inertial factors, i.e. the kind of school attended before university, heavily influence the faculty choice, while some rational factors, such as the expected performance, also play an important role in it.

Bratti and Staffolani (2002) looked into the determinants of first-year single examination performance for students enrolled in 1998 in the Economics Faculty at Ancona University. Concerning Milan University, Checchi (2001) presented a survey on career paths of graduates from Political Science Faculty, and on drop-out trends among students of Economics Faculty (Checchi, 2000). Boero and Pinna (2002) conducted an econometric study of earnings and professional achievement, using the same sample of graduates used in this work. Porcu and Puggioni (2002) analyzed through performance indicators the career of a group of students at Cagliari University and their propensity to drop out. Boero and Pinna (2003) looked at student performance in some Faculties of Cagliari University, through an econometric analysis of grade point drivers and of time needed to complete the degrees.

Lastly, we should mention Montanaro, who recently tried to compare methodologies and results of the most important surveys and studies regarding Italian students' competitiveness in terms of skill (national survey conducted by *Istituto Nazionale per la Valutazione del sistema educativo di istruzione e di formazione* -INVAISI⁴; Coleman, 1966; Jenchs, 1973; Rutter *et al.*, 1980; Büeler, 1998; Grisay, 1997; Card and Krueger, 1992; Cooper *et al.*, 1994; more recently, Bratti *et al.*, 2007).

Montanaro sought to understand four issues. Firstly, if large territorial differences exist in Italy, secondly, if the outcome significantly varies as a function of age and years of schooling, thirdly if the results of external evaluations differ from those of internal evaluations (school marks), and finally, if the family's social, economic and cultural background influences student performances.

⁴ INValSI produced the survey for each academic year from 2004-2005 to 2007-2008.

Empirical results show that Italian students lag significantly behind those of other countries. According to this study, Italian students' skills are not homogeneous: southern students show a lower performance in all areas (mathematics, science, problem solving, ability in text comprehension). These regional differences among students increase during the schooling period. Also, the dispersion of student performance is very high in Southern Italy. Moreover the correlation between marks (inside evaluation) and preparation assessment (outside evaluation performed in this study) is very small, suggesting the school evaluation's weak ability to assess a student's real preparation. Finally, this study highlights the influence of socio-economic background as performance driver.

The last issue is studied in depth by Hertz *et al.* $(2007)^5$. The authors focus on the intergenerational persistence of educational inequality. The work analyzes 42 countries according to educational persistence across generations. Empirical evidence shows significant differences among countries, in particular between Latin America and Nordic countries. The first group is characterized by a higher intergenerational persistence of educational differences, the second exhibits a low serial correlation. In Italy the significant correlation is further evidence to support the claim that "weak" students (on account of their social economic and cultural background) find it more difficult to graduate. For this reason, it is important to analyze the demand satisfied by small universities to check if they play a specific educational role.

Another research field focuses on the role of universities in terms of human capital accumulation (for Italy see, among others, Baici and Casalone, 2007). In particular these studies analyze the effect of human capital and social capital on productivity dynamics and economic growth (at different geographical levels). The more recent literature confirms the strong link between school quality (in terms of student preparation) and growth. This factor becomes more important than the quantity of education (Barro, 2001). Bosworth and Collins (2003), Ciccone and Papaioannou (2009), Coulombe *et al.* (2004), Coulombe and Tremblay (2006) also confirm the predominance of the quality effect. According to Hanushek and Woessman (2007) education can improve individual income and local economic development through an acceleration of technological progress.

In this view the role of small universities becomes crucial. Actually they are often located in provinces suffering from structural problems.

No paper, to the best of our knowledge, has ever considered the special role of small Italian universities in the human capital accumulation process. This study considers the case of Piemonte Orientale.

⁵ Earlier works on US data are due to Spady (1967); Bowles (1972), Hauser and Featherman (1976) and Blake (1985). Other studies compare different countries: Couch and Dunn (1997) on USA and Germany; De Broucker and Underwood (1998) on 11 countries. On developing countries we mention Heckman and Hotz,(1986) on Panama; Lillard and Willis (1994) on Malaysia; Thomas (1996) and Hertz (2001) on South Africa; Pastore and Zylberstajn (1996) on Brazil; Behrman, Gaviria and Székely (2001) on Brazil, Colombia, Mexico and Peru, Binder and Woodruff (2002) on Mexico, Sato and Shi (2007) on China; finally Ganzeboo and Nieuwbeerta (1999) on six countries.

4. The data

The data on individual socio-economic conditions of the Piedmont graduates are drawn from Almalaurea survey 2008. Almalaurea is a consortium of Italian universities with the support of the Ministry for Education, Universities and Research. Almalaurea covers 77% of Italian graduates and, for the year 2010, the total number of curricula coming from 62 Italian universities was more than 1470000. The Alamalaurea database includes many numerical and qualitative social and economic variables on Italian graduates, based on answers to a questionnaire completed by all graduates from AlmaLaurea universities.

The sample data used in this work is a cross section of 9490⁶ individual observations: students awarded a bachelor's degree⁷ in 2008 (regardless of the year of first enrollment) living in Piedmont (i.e. those who, answering the questionnaire, give as current residence a town in Piedmont). Even though the sample does not include data on Pavia University and the Universities in Milan (also potential and actual choices according to MIUR data), the sample is representative of 87.4% of Piedmont graduates. In Table 1 we compare the sample data with the data produced by MIUR on Piedmont graduates in order to consider the fraction of Piedmont students who graduated in universities not associated to Almalaurea Consortium (in yellow the universities associated to Almalaurea).

Universities	TYPOLOGY OF DEGREE										
Universities	CDL	CDU	L	LMCU	LS	LSCU	Total				
Aosta	1	0	6	0	3	0	10				
Bari	3	0	1	0	5	0	9				
Bergamo	1	0	6	0	0	0	7				
Bologna	8	0	64	0	29	3	104				
Bolzano	0	0	0	0	1	0	1				
Bra - Scienze Gastronomiche	0	0	17	0	0	0	17				
Cagliari	0	0	1	0	2	1	4				
Calabria	3	0	2	0	0	0	5				
Camerino	2	0	4	0	0	0	6				
Casamassima - J.Monnet	0	0	3	0	0	0	3				
Cassino	0	0	1	0	0	0	1				
Castellanza LIUC	1	0	13	5	13	0	32				
Catania	1	0	2	1	2	0	6				
Catanzaro	1	0	1	0	0	1	3				
Chieti and Pescara	0	0	121	0	15	0	136				
Enna - KORE	0	0	2	0	0	0	2				
Ferrara	1	0	4	0	4	1	10				
Firenze	0	0	24	0	14	0	38				
Genova	59	1	270	6	99	32	467				
Insubria	0	0	19	0	5	4	28				

⁶ We dropped the observations for which the students have no choice (unique curricula or faculties), thus our sample contains 8703 individual observations.

⁷Among 2008 graduates there are three types of students due to Italian university reform (law n. 509/1999): those who enrolled before 2001 in an "old" type degree program and who graduated within the same program, those enrolled before 2001 in an "old" type degree program who decided to switch to a "new" degree program and who therefore graduated in a 3 years program, and those who enrolled after 2001 in a 3 years program.

L'Aquila	0	0	26	0	3	0	29
Macerata	2	0	7	0	0	0	9
Universities	CDI	CDU	TYPOLOGY	OF DEGREE	IC	LECU	T-4-1
Marche			L 2				1 otal
Messina	36	0	30	0	15	4	85
Milano	40	Ő	225	3	113	18	399
Milano Bicocca	17	0	96	0	37	0	150
Milano Bocconi	6	0	108	0	102	0	216
Milano Cattolica	30	0	162	7	102	0	301
Milano IULM	3	0	58	0	20	0	81
Milano Politecnico	14	0	180	0	107	0	301
Milano San Raffaele	0	0	20	0	9	7	36
Modena and Reggio Emilia	0	0	5	0	2	0	7
Napoli Federico II	1	0	1	0	3	0	5
Napoli II	6	0	7	0	3	1	17
Napoli L'Orientale	0	0	2	0	0	0	2
Padova	4	0	42	0	15	0	61
Palermo	1	0	2	0	0	0	3
Parma	11	0	17	0	15	8	51
Pavia	41	0	277	0	181	6/	566
Perugia	1	0	/	1	1	0	10
Perugia Stranieri	0	0	1027	10	210	0	5 1440
Plemonte Orientale	95	1	1027	18	219	89	1449
Pisa Raggio Calabria	2	0	9	0	52	0	43
Reggio Calabila Roma La Sanjenza	1	0	12	0	0 7	0	23
Roma LUISS	4	0	12	0	1	0	23
Roma LUMSA	1	0	1	0	1	0	5
Roma Marconi	0	0	31	0	1	0	32
Roma San Pio V	0	ů 0	2	0	1	0	3
Roma TEL M.A.	0	ő	6	0	1	ů ů	7
Roma Tor Vergata	1	0	7	0	10	0	18
Roma Tre	1	0	1	1	3	0	6
Roma UNINETTUNO	0	0	1	0	0	0	1
Roma UNISU	0	0	1	1	0	0	2
Salento	0	0	1	0	1	0	2
Salerno	1	0	1	0	0	0	2
Sannio	0	0	1	0	0	0	1
Sassari	0	0	1	0	0	1	2
Siena	1	0	101	0	6	1	109
Teramo	0	0	1	0	4	0	5
Torino	820	1	5769	25	2423	526	9564
Torino Politecnico	188	6	1776	0	1184	0	3154
Torrevecchia Teatina - Leonardo	0	0	2	0	0	0	2
da Vinci		0	2	0	0	0	-
Trento	2	0	3	0	0	0	5
Trieste	3	0	11	0	5	1	20
I uscia	1	0	30	0	2	0	39
Utrhine Carle Re	0	0	1	0	2	0	3 27
Venezia Cà Eoscari	0	0	12	0	10	1	23
Venezia Luav	1	0	12	0	10	0	23
Verona	1	0	3	0	2		0 6
TOTAL	1425	9	10685	68	4848	766	17801
	1.20			OF DECREE	1010		11001
Piedmont Graduates	CDI	Сри	I	IMCU		ISCU	Total
	CDL	000	L	Linco	LD	LISCU	
Piedmont in AlmaLaurea 2008: absolute value	1260	9	9490	57	4144	676	15636
percent	88.42%	100.00%	88.82%	83.82%	85.48%	88.25%	87.84%

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Source Alamalaurea and Miur

In order to narrow our focus on those students who had a real opportunity to choose a university, we drop the observations for which the particular program allows only one option or excludes the Piemonte Orientale choice. The dataset includes variables which characterize socioeconomic background (proxied by parents' education, parents' job); prior education (high school typology; high school graduation marks); gender; student performance and student mobility (measured by the distance between Faculty location and student address in both kilometers and minutes); working student status.

In	Table 2 we	present	summary	statistics	of the	main	variables	included	in the	dataset	;

Variable	Description of variable	Mean	Std. Dev.	Min	Max
Mark average	mean of the exam marks	26.19394	2.197071	19.64	30
Diploma typology	a categorical variable which takes values of 0 for university-oriented high schools (specializing in classical studies, science, art, modern languages) and progressively higher values for technical or vocational schools.	3.614616	2.659861	0	13
Diploma Score /100	high school diploma score	82.32174	12.63115	60	100
Duration	duration of university enrolment	4.341068	2.845455	1.312329	38.94521
Erasmus	a dummy variable which takes the value 1 if the student accepted the Erasmus program	0.0500717	0.218106	0	1
Age average	average age at graduation	26.58862	5.859711	20.68037	71.78836
Enrolment	difference between actual age at enrolment and standard enrolment age (19 years)	2.13076	5.399009	-2	50
Schooling of mother	a categorical regressor which takes value of 1 if the mother has no certified school attendance; of 2 if she has elementary school certificate; of 3 if secondary school certificate; of 4 if high school certificate; and of 5 if university degree.	3.544575	1.040668	0	5
Schooling of father	same	3.575406	1.086903	0	5
Degree score/110	degree score (the laude is accounted as 3 points)	102.0007	8.610657	74	113
Working Student status	a dummy equal to 1 if the student works	0.1184273	0.3231328	0	1
Diploma year	the year in which the student achieves the high school diploma	2000.799	5.426784	1956	2006
Dummy graduate Mother	a dummy which takes value of one if mother is a university graduate	0.1508675	0.3579403	0	1
Dummy graduate Father	same	0.1838447	0.3873797	0	1
Mother's work	a categorical variable which takes value of 1 if the mother is self-employed (or family co- worker or partner of worker cooperative); 2 if	5.918092	2.32774	1	9

⁸ Most Almalaurea categorical variables are redefined by grouping together the "similar" categories in order to focus on the effects of very different socio-economic background (low, medium and high) and the main typologies of high school diploma (university-oriented schools vs. technical or vocational schools) on university choice.

	entrepreneur; 3 if freelancer; 4 if senior executive or manager; 5 if cadre; 6 if white collar worker; 7 if manual worker; 9 if nonworking.				
Father's work	same	4.57596	2.122384	1	9
Gender	a dummy which takes the value of one if the student is male	0.3805584	0.4855521	0	1
Distance km	distance between student address and university location in kilometers	45.77787	98.65647	0	1467
Distance minutes	distance between student address and university location in minutes of travel	38.88383	61.14969	0	983
Dummy overlapping	a dummy which takes the value of one if both student address and university location belong to the same province	0.3075951	0.4615245	0	1

5. Model and estimation issues

The probability for a Piedmont student to choose and graduate in Piemonte Orientale instead of other universities (which offer same or similar programs) is modeled by a probit/logit:

$$y_{i,j}^* = X_{i,j}\beta + \varepsilon_{i,j} \tag{1}$$

$$y_{i,j} = \begin{cases} y_{i,j} = 0 \ if \ y_{i,j}^* \le 0 \\ y_{i,j} = 1 \ if \ y_{i,j}^* > 0 \end{cases}$$
(2)

$$\varepsilon_{i,j} \sim N(0, \sigma_{\varepsilon}^2) \tag{3}$$

where the observed values of $y_{i,j}$ are outcomes for individual 'i' enrolled in faculty 'j' generated by the regressors. X is a vector of exogenous variables representing: individual's personal characteristics (such as gender and age), pre-university qualifications (such as score at high school graduation and type of school attended⁹), indicators of family background (for example income proxied by parents' employment typologies), possible peer group effects, and distances to university measured by three variables (the inverse of distance, the time necessary to reach the Faculty, a dummy variable which takes value of one if student address and faculty location belong to the same province). β is a set of parameters to be estimated and ε is the usual white noise error term. The model is a binomial probit/logit for the individual's probability to choose Piemonte Orientale, where $y_{i,j} = 1$ if the individual chooses it and $y_{i,j} = 0$ otherwise. The Piemonte Orientale locations are Alessandria, Novara, Vercelli, Acqui Terme, Alba-Bra, Asti, Biella and Casale Monferrato.

We estimate four main models: two different models, where parent occupation and parent schooling are alternatively entered as additional variables into the model (due to huge correlation), and two distributions in order to model the probability function (logit versus probit). Parent schooling

⁹ Further development of this work should consider also the endogeneity problem which could arise if high school is chosen to credibly signal some information about oneself to the labor market. Thus we are gathering information about neighborhood high school "typologies" for each province in order to control for it.

is proxied by either categorical variables (*Mother's schooling* and *Father's schooling*) or dummy variables (*Dummy Mother graduate* and *Dummy Father graduate*). This generates two further submodels, called "Model A bis" for logit or probit distribution respectively (Probit model A_bis and Logit model A_bis).

The main explanatory variable estimates have all turned out to be significant and their signs are quite stable in all models, as expected.

Empirical results are presented in Table 2. We compute also the marginal effects of each independent variable, that is the derivative of the prediction function, which, by default, is the probability of success following probit/logit, that is the choice of Piemonte Orientale. By default, margins evaluate this derivative for each observation and report the average of the marginal effects.

In particular, the educational and socio-economic background crucially affects university choice. Piemonte Orientale is chosen with higher probability by technical or vocational secondary school students. Further the diploma score is a significant explanatory variable, the higher the score, the lower is the probability of Piemonte Orientale choice. An experience of study abroad (Erasmus) negatively affects the probability of Piemonte Orientale choice. Parents schooling, whether proxied by graduate dummies or categorical variables, negatively affects the small university choice. In particular, if his/her parents are graduates then the student will more likely enrol and graduate in the historical universities which his/her parents had chosen. Predictably, parents' occupations affect university choice through the student's economic opportunities.

The small university is chosen with higher probability by "weaker" students: these would be female, living in municipalities suffering from structural problems, with lower average marks, which is a signal of either lower abilities of the students or stronger selection by the institutions.

The Working Student status plays an unexpected negative role, that is, if the student works then he/she has a smaller probability to choose Piemonte Orientale. This finding can be explained as the net effect of opposite forces: if the working students usually don't attend classes their choice is independent of distance so they choose the university where they work (very likely the bigger city) and not the one where they live; working students choose a local university only because it allows them to effectively keep their job and attend classes. Another explanation focuses on the higher concentration of good jobs in bigger cities where the historical universities are located: this is where, according to the gravitational model of regional economics, government, banking, insurance and financial services, research activities and company headquarters also tend to be located.

Duration is insignificant in all the models. This evidence supports the idea that the educational supply of small universities is comparable to that offered by the bigger universities.

The marginal effects for these explanatory variables are significant, sign coherent, stable and modest in all models, except the distance factor.

In fact, distance, and therefore student mobility, does matter. The role of student mobility in the Italian university system is crucial: the mobility of student is strictly constrained by the accessibility of the supply point. The very low mobility of university students in Italy is mainly due to poor and unequal availability of low cost student accommodation, expensive and inefficient commuting opportunities, and finally to social, economic and cultural constraints.

The marginal effect of distance is always significant and very large: in effect it is greater than one. This seems like a strange result considering that the values of the probability function are bound between 0 and 1. Nevertheless this can be explained by the computation technique of marginal effects. The marginal effect is the derivative, that is the *approximate* change in the dependent variable y for a one-unit change in a regressor x. Because y is between 0 and 1, the change in y obviously cannot be greater than 1, but the marginal effect computes the *approximate* change. The derivative at a point is the slope of the tangent line to the curve at that point. Thus the slope of the tangent line, at the point *Inverse_distance_km* is equal to 13.9, therefore mobility does matter.

Our empirical results show that Piemonte Orientale, a "small" university satisfies a particular tertiary-level education demand. Also its demographic recruitment basin is characterised by a specific geographical area.

Variable	Probit model A		Probit model A_bis		Probit model B		Logit model A		Logit model A_bis		Logit model B	
Diploma typology	0.1930736	***	0.1877444	***	0.1986058	***	0.3514739	***	0.3400375	***	0.3631498	***
Diploma Score /100	-0.0063332	***	-0.0060648	***	-0.0063148	***	-0.0119645	***	-0.01145	***	-0.0119261	***
Erasmus	-0.2898485	***	-0.3043228	***	-0.3497474	***	-0.5763653	***	-0.6017015	***	-0.6990103	***
Parent schooling												
Mother schooling	-0.0204652						-0.0212551					
Father schooling	-0.0993238	***					-0.1851035	***				
Dummy Mother graduate			-0.1481552	***					-0.2780425	**		
Dummy Father graduate			-0.1853156	**					-0.3376159	***		
Working Student status	-0.1659365	***	-0.1538005	***	-0.1527958	**	-0.3066475	***	-0.2806492	***	-0.2804307	**
Mother work					-0.0320895	**					-0.0553512	**
Father work					-0.0178927	•					-0.0278286	
Gender (man==1)	-0.1531113	***	-0.1594376	***	-0.1512158	***	-0.271704	***	-0.2813243	***	-0.2666229	***
Mark average	-0.0401973	***	-0.0399961	***	-0.0385565	***	-0.0730546	***	-0.0719707	***	-0.0695823	***
Duration	-0.0022652		-0.001577		-0.0000456		-0.0077752		-0.0066242		-0.0040002	
Inverse_Distance_km	66.11107	***	66.3036	***	66.08145	***	119.0929	***	119.3543	***	119.0725	***
Distance _minutes	-0.0121669	***	-0.0121238	***	-0.0118654	***	-0.0230637	***	-0.0229418	***	-0.0225088	***
Constant	0.3126587		0.2543957		0.2638964		0.7351999		0.6203103		0.6173739	
Log likelihood	-2833.603		-2912.779		-2770.9677		-2819.1214		-2898.3688		-2756.6194	
$LR\chi^2$	1112.640		1146.010		1073.73		1141.61		1174.83		1102.42	
$Prob > \chi 2$	0.000		0.000		0.000		0.000		0.000		0.000	
Goodness of Fit												
Pseudo R ²	0.164		0.1644		0.1623		0.1684		0.1685		0.167	
Efron's R2	0.197		0.1960		0.1950		0.201		0.2		0.199	
Cragg & Uhler's R ²	0.231		0.2310		0.2280		0.237		0.237		0.234	
McKelvey&Zavoina's R ²	0.364		0.3760		0.3570		0.372		0.385		0.365	
McFadden's Adj R ²	0.161		0.1610		0.1590		0.165		0.165		0.163	
Correctly classified	86.880%		86.930%		87.150%		86.88%		86.96%		87.13%	
The similar categories of the categorical variables have been grouped in order to reduce the categories.												
Signif. codes Pr(> t): 0 **** 0.001 *** 0.01 ** 0.05 • 0.1 • 1 if Pr(> t) around 0.1												

	Marginal Effects												
Variable	Probit mode	el A	Probit model A bis		Probit model B		Logit model	Logit model A		Logit model A bis		B	
Diploma typology	0.04063	***	0.039155	***	0.041592	***	0.037705	***	0.036078	***	0.038726	***	
Diploma Score /100	-0.00133	***	-0.00126	***	-0.00132	***	-0.00128	***	-0.00121	***	-0.00127	***	
Erasmus	-0.05231	***	-0.05394	***	-0.06073	***	-0.05083	***	-0.052	***	-0.05878	***	
Parent schooling													
Mother schooling	-0.00431						-0.00228						
Father schooling	-0.0209	***					-0.01986	***					
Dummy Mother graduate			-0.02912	**					-0.02744	**			
Dummy Father graduate			-0.03615	***					-0.0331	***			
Working Student status	-0.03244	**	-0.02996	***	-0.02989	***	-0.0301	***	-0.02745	**	-0.02756	**	
Mother work					-0.00672	***					-0.0059	**	
Father work					-0.00375						-0.00297		
Gender (man==1)	-0.03156	***	-0.03255	***	-0.03104	***	-0.02847	***	-0.02914	***	-0.02779	***	
Mark average	-0.00846	***	-0.00834	***	-0.00807	***	-0.00784	***	-0.00764	***	-0.00742	***	
Duration	-0.00048		-0.00033		-9.55E-06		-0.00083		-0.0007		-0.00043		
Inverse Distance km	13.9124	***	13.82805	***	13.83878	***	12.776	***	12.66343	***	12.6979	***	
Distance minutes	-0.00256	***	-0.00253	***	-0.00248	***	-0.00247	***	-0.00243	***	-0.0024	***	

6. Concluding remarks

Over the last twenty years, the Italian university system has been undergoing an important reform process which was launched in the 1990s and is still going on with the implementation of a new new Reform Law (Act 240/2010),. This latter is actually a Counterreform, a typical Italian specialty, which is going to reverse the trend experienced in the former 15 years..

Due to the need for greater institutional autonomy and self-regulation, the first set of reforms affected the management model of the higher education system which moved away from external, highly centralized control to more decentralized and internal control.

More recently a policy reversal has occurred, with a view to limit the excessive proliferation of spin-offs (and/or new universities) and curricula, and therefore to control the financial viability of the system.

Within this framework, many controversial issues emerge. These include university autonomy, efficiency and role of the recent small universities, affordability of higher education and intergenerational mobility versus student mobility.

In this work we have provided a first analysis of the role that small universities play in human capital accumulation, focusing on Piemonte Orientale as a case study. We have estimated four main binary outcome models (plus two sub models for the parents' schooling variables): two models where parent occupation and parent schooling are alternatively entered as variables, and two distributions in order to model the probability function (logit versus probit).

The econometric exercise carried out in this paper highlights the important role played by small universities in both reducing the congestion in mega universities (and therefore improving the efficiency of the educational process), and promoting the development of human capital, and through this, contributing to economic growth and social mobility.

The most important findings of this paper can be summarized as follow:

(i) small universities satisfy a specific demand which cannot be satisfied by larger universities, because of distance, socio-economic family background, educational background, gender, parents schooling;

(ii) student mobility is strictly constrained by the accessibility of the supply point: the very low mobility of university students in Italy is mainly due to poor and unequal availability of low cost student accommodation, to expensive and inefficient commuting opportunities, and to social, economic and cultural constraints;

(iii) family background, as measured by parental schooling, crucially affects the university choice of the children, at least in the sense that a low indicator of parents education is the dominant

factor of the "generated" demand for higher education in small universities, without necessarily meaning a reduction in the "attracted demand"

(iv) educational background is a choice driver, i.e. the small university is chosen with a higher probability by vocational school students (not by university-oriented high school students)

(v) the small university is chosen with higher probability by "weaker" students (female, living in municipalities suffering from structural problems, etc.)

Further developments of this research will aim at updating the dataset and re-estimate the models in order to verify the robustness of empirical results and/or identify changes in the representative student of small universities, comparing these results with those related to other small universities. In this way it will be possible to analyze the evolution of small university recruitment.

Another development will address the endogeneity problem which could arise if the high school choice is a signal for future enrollment in university. In this perspective it's necessary to control for the high school typologies located in the same province of each student and for the distance between the high school and the student's address.

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