# Chapter 12
# The Effect of University Costs and Institutional Incentives on Enrolments: Empirical Evidence for Italian Regions

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**Abstract** We study the relationship between the enrollment decisions of Italian secondary school graduates and the cost of participating in higher education. In particular, we look into the role of incentives, such as scholarship grants, and of the supply of under-priced accommodation which are policy tools in the hands of regional institutes (Enti Regionali per il diritto allo Studio Universitario, ERSU). We provide empirical evidence by estimating a conditional logit model using the survey of 2004 secondary school graduates issued by the Italian Institute of Statistics (ISTAT). We find that enrollment costs are determinant in students university choices: on average, the elasticity of the probability of enrollment to tuition fees is −0.062, the one to expected grants is 0.028, and the one to expected rent is −0.022. Differences between regions are considerable: southern regions show lower elasticities, while small central and northern regions exhibit the largest ones.

**Keywords** Conditional logit model • Enrolment cost • Graduates' mobility • Regional differentials • University enrolment

**JEL classification:** C25, I21, I23, J24

## 12.1 Introduction and Motivation

The structure of the Italian Higher Education (HE henceforth) system has faced several changes during the last 15 years, mainly due to the need of increasing the graduation rate, one of the lowest among OECD countries: only 20.2 % of Italians between 25 and 34 years of age are graduates compared to the 37.1 % of the OECD

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average (OECD 2011). The "Bologna process"[1] deeply transformed the Italian HE system with the aim of reducing the drop-out rate and creating more educational opportunities. However, the introduction of the so-called "3+2" reform only had the desired effect in the short run, and it affected positively the enrollment rate but not the completion rate (Bratti et al. 2008). Nevertheless, individual inequalities remain in the accessibility to the Italian university system due to the low intergenerational mobility (see Checchi et al. 2013).

Italian students' low geographical mobility is another central issue in the debate on the Italian HE accessibility and completion. High geographical mobility should imply a certain degree of flexibility in the choice by secondary school graduates of which university to attend: in particular, it would ensure a "good" matching between the student's ability and preferences and the university. Moving to study implies higher costs of participation in HE that, in Italy, are usually sustained by the students' families. Even though the Italian university system is for the most part financed by the government, many of the other participation costs must still be sustained by the students' families as well: recently Ichino and Terlizzese (2013) raised crucial issues about the financing of the Italian HE system, such as how much tuition fees affect the enrollment rate and whether financial aid can facilitate the enrollment of poorer students. As a consequence, intergenerational mobility decreases and students from poor families will enroll in universities located close to home (Ordine and Lupi 2009). This may result in a "bad" student-university matching, which may, therefore, raise the drop-out probability.

In this work, we study the relationship between the enrollment decisions of Italian secondary school graduates and the cost of participating in HE: we add to the research on the Italian case by providing extensive empirical evidence on the sensitivity of enrollment rates to the costs perspective students should sustain to participate in HE, namely mobility costs and tuition fees. In addition, we investigate the role of incentives, such as scholarship grants and moving facilitation (under-priced accommodation), that may counteract the deterrence effect of HE monetary costs. Since, in Italy, incentives are managed by regional institutes ERSU,[2] our analyses are developed from a regional perspective.

By doing so, we also give some insight on the role of territorial variables, such as the unemployment rate (see also Pastore 2005) and the quality of life, on HE choices. As emphasized in some recent contributions (Aina and Pastore 2012; Caroleo and Pastore 2012), local labor market conditions can influence the enrollment decisions not only through the unemployment rate but also through overeducation. Differences in unemployment rates, overeducation, and skill premia between labor markets can push secondary school leavers to move outside of their region of origin in order to increase their opportunities for future jobs.

[1] A series of conferences in Paris (1998), Bologna (1999), Prague (2001), Berlin (2003), and Bergen (2005) whose goal was to achieve a higher degree of comparability between European HE systems.

[2] Regional agency for the right to education (Enti Regionali per il diritto allo Studio Universitario).

For the purpose of our analysis, we estimate a conditional logit model for enrollment and university choices of Italian secondary school graduates.[3] We use the Italian Institute of Statistics (ISTAT) survey of secondary school graduates in 2004 interviewed in 2007 linked with data on institutions' characteristics from the Italian Ministry of Education, University and Research (MIUR). We add the information on the socioeconomic condition of Italian provinces in 2003 using the indicators published by the magazine *Il Sole 24 Ore* and the 2003 popular university ranking of *Censis-Repubblica*.[4]

We find that enrollment costs play a major role in students university choices: on average, the elasticity of the probability of enrollment to tuition fees is −0.062, the one to expected grants is 0.028, and the one with respect to expected rent is −0.022. Our results are in line with those found for public universities in the USA by Hemelt and Marcotte (2008) using the Post-secondary Education Data System: from 1991 to 2007, on average, an increase of 100$ in tuition fees decreased enrollments of about 0.25 %, which is similar to our result for an increase of 100 euros (10 % on average in tuition fees).[5]

The remainder of the chapter is organized as follows: Sect. 12.2 contains a brief review of contributions that analyze students' HE choices as function of university characteristics; Sect. 12.3 briefly describes the estimation strategy and how post-estimation elasticities are computed; Sect. 12.4 presents regional descriptive statistics on enrollments and describes the variables used in our empirical analysis; Sect. 12.5 contains the estimation results and Sect. 12.6 concludes.

## 12.2 Literature Review

Theoretical and empirical effort has been put into understanding the behavior of secondary school graduates when facing the decision of whether to participate in HE and, if so, where to enroll. In particular, recent contributions have investigated

[3]The application of this estimation strategy to model HE choices was first proposed by Manski and Wise (1983) and followed in recent analyses by Long (2004) and Gibbons and Vignoles (2012). Drewes and Michael (2006) and Verboven and Kelchtermans (2010) use some variations of the conditional logit model: the rank-ordered conditional logit and the nested logit model, respectively.

[4]Staffolani and Pigini (2012) propose a theoretical model that describes the enrollment and university choices of secondary school graduates and an empirical analysis aimed to test its prediction. The work focuses on a general framework for students' choices that is based on HE costs as well as university quality, while it takes no account of the role of regional incentives. The reader will, however, be referred to Staffolani and Pigini (2012) for a more extensive description of the data.

[5]Earlier results can be found in Jackson and Weathersby (1975), Leslie and Brinkman (1987), Kane (1995), and Kane (1995). A compact review of these references can be found in http://www.hanoverresearch.com/2012/06/tuition-elasticity-student-responsiveness-to-tuition-increases/.

the determinants of HE choices in Italy with considerable attention to geographical accessibility of the HE system and to possible financial constraints to the choice of which university to attend. Agasisti and Dal Bianco (2007) first explored the determinants of students mobility finding distance to be one of its major deterrents. Their gravity model also suggests that, when a student moves she enrolls in a university located in an area with good socioeconomic conditions rather than choosing on the basis of that university's characteristics. The findings in Ordine and Lupi (2009) show that mobility is constrained by family income. Italian students tend to remain in their own region despite the Italian university system supplies different standards, which may allow a more efficient ability sorting across institutions. The theoretical model of Cesi and Paolini (2011) confirms both the previous results: geographical distance is a strong deterrent to university participation and choice. In addition, secondary school graduates will choose the closest university regardless of the quality of the university-student matching, based on institution's quality and student's ability.

While the findings of the above-cited contributions clearly suggest a negative effect of commuting and moving costs on university choices, the role of the tuition fees charged by universities in affecting HE choices has not been explored. These issues have been more extensively analyzed in other case studies. Long (2004) first examines both the decision of enrolling and into which college for the US from 1972 to 1992. Tuition and distance to the institutions negatively affect the decision of which college to attend; in turn, the negative effect of price and distance on the likelihood of enrolling attenuates over the years. In the particular case of intrastate migration in Georgia, Alm and Winters (2009) confirm the key role of distance in the choice of where to study. In the case of Canada, Frenette (2004, 2006) finds that a greater distance increases the likelihood of attending local colleges and students who live too far to even commute tend not to participate. Drewes and Michael (2006) suggest that the negative effect of price on the university choice attenuates when considering universities charging high tuition fees as they may be associated by students with the supply of better services. The contributions of Sá et al. (2004) and Verboven and Kelchtermans (2010) examine the cases of Netherlands and Flanders, respectively. The former stresses the role of geographical proximity in the enrollment probability along with the students ability and school background (a similar result is also presented in Spiess and Wrohlich (2010) for Germany and in Denzler and Wolter (2011) for Switzerland). Verboven and Kelchtermans (2010) analyze not only if and where to study but also which subject to study: they find that travel costs are a major determinant of the choice of where and what to study; geographical distance, however, seems not to affect the decision of going to university. This same result is found in Gibbons and Vignoles (2012): in UK, geographical distance has a negative role in the choice of the institution, which gets stronger for students coming from lower socioeconomic groups. However, there is only a weak link between geographical inaccessibility of the HE system and the decision to continue with tertiary education.

## 12.3 Estimation Strategy

We assume that each individual compares the expected utilities she can obtain from graduating in alternative universities and the utility achievable by not participating in HE: if the latter is greater than all the other utilities, the student will not enroll, otherwise she will enroll into the university that gives the highest utility. The econometric model used to describe such decision-making process is the conditional logit model (McFadden 1974), which was first advocated by Manski and Wise (1983) to model college choice. This approach has also been followed by Long (2004) and Gibbons and Vignoles (2012). The conditional logit model allows us to model the probability of choosing to enroll and, if so, in which university as a function of university characteristics. However, its fixed-effect nature does not allow for the inclusion of alternative-invariant covariates, such as individual characteristics. They should be interacted with alternative-varying characteristics or alternative-specific intercepts. However, such strategy would lead to an output of difficult interpretation. Another strategy is to estimate a multinomial logit model that would, however, exclude the possibility of including alternative-varying regressors among the covariates.[6]

We assume that student $i$ chooses between $J + 1$ alternatives, of which $J$ are Italian universities and one is the nonparticipation option. Whether to include this last alternative is a critical issue in applications of conditional logit models to HE choices. Long (2004) argues that the estimation of separate models avoids distortions in parameter estimates also because it is not clear whether the observed choice of non-enrollment is given by the student's actual decision or to the rejection of his or her applications. However, this misleading situation is not likely to occur when analyzing the case of Italy where neither applications are needed nor entry tests have to be passed to access the HE system.[7] An alternative approach would be to use a nested logit model as suggested in Verboven and Kelchtermans (2010). Therefore, we should define a nesting structure separating sets of comparable alternatives, and a natural choice would be to divide groups of faculties by macro-subjects. However, as we are not interested in the determinants of choosing a specific field of study but only in the relationship between university choice and its cost, we believe that an extremely time-consuming procedure, such as the estimation of a nested logit model, would be unnecessary in this case.

We, therefore, jointly analyze the university choice and the nonparticipation choice, including the latter in the set of the possible alternatives of the conditional logit model. It is quite straightforward to assign values of university characteristics

[6]More flexible tools that accommodate random utility models, such as multinomial probit or mixed logit models, are, in principle, the best choice in these cases. However, given the high number of student–university combinations in our dataset, the adoption of such models is computationally unfeasible.

[7]The faculties of Medicine and Architecture pose as an exception. However, applicants who cannot access these faculties have no obstacles in enrolling into other faculties without being selected.

in the non-enrollment alternative without making arbitrary choices.[8] The probability that student $i$ chooses $k$ among $J+1$ alternatives is

$$\Pr\left(i \text{ chooses } k\right) = \Pr\left(V_{ik} > V_{ij}\right) \qquad \forall \quad j \neq k, j = 1, \ldots, J+1 \tag{12.1}$$

where $J+1$ are $J$ Italian universities plus the nonparticipation alternative. In general, $V_{ij}$ is the utility of alternative $j$ for student $i$ that is given by:

$$V_{ij} = x_{ij}'\beta + q_j'\gamma + z_h'\theta + \upsilon_{ij} \qquad \text{for} \quad i = 1, \ldots, n \quad \text{and} \quad j = 1, \ldots, J+1. \tag{12.2}$$

In this setup, $x_{ij}$ includes the regressors varying across alternatives and individuals, such as the distance between the location of student $i$ and the location of university $j$. Instead, the set $q_j$ contains institution characteristics as, for example, tuition fees. Finally, $z_h$ includes variables that serve as proxy of the socioeconomic conditions of the province where the university is located (unemployment rate, quality of life, etc.), where the subscript $h$ denotes the province, with $h = 1, \ldots, H$. As anticipated in Sect. 12.4, there are universities located in the same province so that $H < J$. Assuming that the $\upsilon_{ij}$ are independent and identically distributed as extreme value distribution, the probability $\mathrm{P}_{ik}$ of $i$ choosing $k$ is

$$\mathrm{P}_{ik} = \frac{e^{V_{ik}}}{\sum_{j=1}^{J+1} e^{V_{ij}}}. \tag{12.3}$$

Central to our paper is the effect evaluation of changes in key policy variables on the enrollment probability; in particular, we want to quantify the variation in regional enrollments in response to changes in tuition fees and incentives that are typically put forward by regional institutions (ERSU). To this aim, it is useful to compute direct elasticities to gain insight on the impact of changes in variables $q_j$ on $P_{ij}$. In the conditional logit model, the direct marginal effect of a change in $q$ on the probability of choosing alternative $j$ can be computed as:

$$\psi_{ij,q_j} = \frac{\partial \hat{P}_{ij}}{\partial q_j} = \hat{P}_{ij}\left(1 - \hat{P}_{ij}\right)\phi\left(q_j, \gamma\right) \tag{12.4}$$

where $\phi\left(q_j, \gamma\right) = \frac{\partial V_{ij}}{\partial q_j}$. When the model specification is linear in $q_j$, $\phi\left(q_j, \gamma\right) = \gamma$. We define $r$ to be the regional index, $r = 1, \ldots, 20$, and we compute regional elasticities as follows:

$$E_{\hat{P}_r, Q_r} = \bar{\psi}_{r,q_r}\frac{Q_r}{\hat{P}_r} \tag{12.5}$$

[8] Such assignment will be explained in detail in Sect. 12.4.

where $\bar{\psi}_{r,q_r}$ is the regional average marginal effect and

$$Q_r = \bar{q_r} * N_r$$
$$\widehat{P_r} = \sum_{j \in r} \widehat{P_j}$$

$Q_r$ is the total amount of $q$ in region $r$; $\bar{q}_r$ is the average $q_j$ in region $r$; $\widehat{P_r}$ is the total probability of enrolling in region $r$; and $\widehat{P_j}$ is the average probability on enrolling in university $j$ with $\widehat{P_j} = \frac{1}{n}\sum_{i=1}^{n} \hat{P}_{ij}$. $N_r$ is the total number of enrolled students in region $r$ in 2004.

## 12.4 Dataset Description

We combine datasets from various sources (see Table 12.1) in order to include variables on the individual and university level and some socioeconomic characteristics of the provinces where universities are located. At the individual level, we use the survey on studying and working experiences of secondary school graduates (Indagine sui percorsi di studio e lavoro dei diplomati) issued by the ISTAT. The students are interviewed 3 years after obtaining their secondary school *diploma*. We use the 2007 survey where 25,880 students, who obtained the title in 2004, were interviewed. The dataset contains information on the students' personal and household characteristics and on their educational background. We observe, in particular, the enrollment decision and, for the enrolled individuals, which university the student has enrolled into. In our analysis, we chose not to consider: universities attended by less that 20 individuals in the sample (so that we drop 142 observations); 371 students for whom we do not observe which university they have chosen (207 have enrolled abroad); 32 students enrolled in universities for foreigners; and 17

**Table 12.1** Source of variables used in the conditional logit model

| ISTAT | MIUR | CENSIS | SOLE 24 ORE |
|---|---|---|---|
| *DISTANCE* | | | |
| | *FEES* | *RANKING* | *EXP. RENT* |
| | *PRIVATE* | | *POPULATION* |
| | *EXP. GRANTS* | | *QUALITY OF LIFE* |
| | *DELAYED GRADUATION* | | |
| | *APTITUDE* | | |
| *UNEMPLOYMENT*[a] | | | |

[a]ISTAT Labor Force Survey (Indagine sulle forze di lavoro)

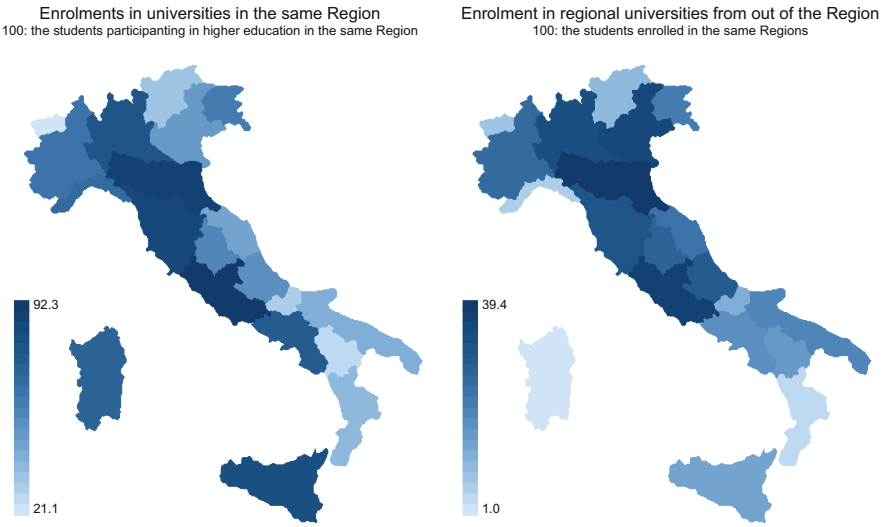


**Fig. 12.1** Percentages of enrolled students staying or moving to Italian regions. *Source*: ISTAT, survey on studying and working experiences of Italian secondary school leavers (graduated in 2004, interviewed in 2007)

students enrolled in online universities.[9] Finally, we end up with a sample of 25,318 secondary school leavers and 79 universities.

One key information contained in these data is the student's province of residence during the secondary school attendance. We can therefore investigate regional mobility of Italian students by considering the attractiveness of Italian regions in two dimensions: by computing the percentage of secondary school graduates in a certain region who enroll in universities located in that same region and the percentage of enrolled students in a certain region coming from other Italian regions. These two statistics are represented in Fig. 12.1.[10] It clearly emerges that the ability to attract students is strongly differentiated between Italian regions: Emilia-Romagna and Lazio seem to be the most attractive as about 40 % of the students enrolled in those regions come from other parts of Italy, whereas these numbers for southern regions and islands are much lower (1 % for Sardegna).[11] Students' mobility can also be

[9] In the appendix, Fig. 12.3, based on UNESCU data, shows the number of foreign students enrolled in Italy and the number of Italian students enrolled abroad for the period 1999–2010.

[10] Detailed percentages are displayed in Table 12.5 in the appendix, where the first and third columns are plotted in the left and right panels of Fig. 12.1, respectively.

[11] Table 12.6 in the appendix, based on MIUR data, shows the evolution over time for the period 2001–2007 of the "attractiveness" of regional universities, computed by the ratio between the share of students enrolled in regional universities coming from outside the region on students enrolled in the region and the share of students enrolled in universities outside the region on enrolled secondary school leavers living in the region.

represented by flows between regions. For each region, Table 12.7 in the appendix shows which Italian regions have the highest enrollment rates, by the students' region of provenance. The largest flows of students among regions concern students from Valle d'Aosta moving to Piemonte, students from Trentino-Alto-Adige moving to Veneto, and students from Molise moving to Lazio. The dataset allows us to compute the distance between the student's province of residence and the province of each Italian university (measured in 100 km) that will be used in the empirical analyses (*DISTANCE*). This variable takes value zero for universities located in the same province of the student's residence during secondary school studies and for the non-enrollment option.

In order to estimate the conditional logit model, we need to reorganize the data such that the observational unit is the student-university combination. We, therefore, end up with a dataset of 2,025,440 observations given by the product between the 25,318 high school leavers and the 80 possible choices (79 universities plus non-enrollment).

Information on tuition fees, scholarships granted by universities, and the number of assigned accommodation in 2003 is available on the website MIUR. In the estimation, we use the *EXPECTED GRANTS* that are computed by multiplying the amount of grants by the ratio of students who obtained the scholarship over the number of students enrolled in each university in 2003. We also use the *EXPECTED RENT* that is based on the data of monthly renting of a 20 square meters place in the province (data from *Il Sole 24 Ore*), multiplied by the unity minus the probability of getting an accommodation in a student residence. Fees, grants, and rent are set to zero for the non-enrollment option. Additionally, rent is set to zero for those alternatives that have universities located in the same province as the student residence.

Therefore, we have three variables concerning the cost of attending each of the 79 Italian universities considered in the sample. Table 12.2 contains some descriptive statistics of these variables for the Italian macro-areas. In general, the costs of attending a university are higher in the northern regions, where, however, more grants are available to the students. Cost variables are set to zero for the non-enrollment choice.

In order to add some control variables to our specification, we link the ISTAT dataset with other information on universities coming from other sources. We use the popular Italian university ranking (*RANKING*) of *Censis-Repubblica* of 2003[12]: we include this variable in our empirical analyses to control for the university quality in students' choices. Even though ranking is only an imperfect measure of the university quality, it still poses an available signal to the student of universities' reputation. For secondary school leavers who decided not to enroll, we assign the

[12]The methodology note that describes the computation of the university ranking can be found in http://www.repubblica.it/speciale/2002/censis/indicatori.html.

**Table 12.2** Descriptive statistics for *FEES*, *EXP. GRANTS*, and *EXP. RENT* in the Italian macro-areas

| Macro-area | Stat. | *FEES* | *EXP. GRANTS* | *EXP. RENT* |
|---|---|---|---|---|
| North-West | Mean | 12.21 | 17.15 | 1.51 |
| | Min | 3.95 | 5.28 | 0.00 |
| | Max | 58.56 | 24.49 | 4.33 |
| | Sd | 10.32 | 2.76 | 1.71 |
| North-East | Mean | 8.93 | 18.43 | 1.56 |
| | Min | 5.97 | 12.78 | 0.00 |
| | Max | 28.85 | 25.62 | 5.94 |
| | Sd | 2.58 | 4.38 | 1.51 |
| Center | Mean | 8.19 | 14.50 | 1.59 |
| | Min | 3.93 | 7.09 | 0.00 |
| | Max | 46.44 | 25.36 | 3.83 |
| | Sd | 6.32 | 5.18 | 1.52 |
| South | Mean | 5.04 | 8.02 | 0.68 |
| | Min | 3.15 | 2.92 | 0.00 |
| | Max | 9.42 | 14.30 | 2.47 |
| | Sd | 1.25 | 2.83 | 0.87 |
| Island | Mean | 3.91 | 8.96 | 0.59 |
| | Min | 3.21 | 5.00 | 0.00 |
| | Max | 9.33 | 16.00 | 2.90 |
| | Sd | 0.76 | 3.53 | 0.81 |
| Total | Mean | 8.33 | 14.43 | 1.29 |
| | Min | 3.15 | 2.92 | 0.00 |
| | Max | 58.56 | 25.62 | 5.94 |
| | Sd | 6.49 | 5.68 | 1.47 |

Fees and grants are expresses in 100 euros per year. Rent is expressed in 100 euros per month. It is set to 0 for those alternatives that have universities located in the same province as the student residence and for the non-enrollment option

*Source*: ISTAT, survey on studying and working experiences of secondary school leavers

ranking value of 6.4: this choice is motivated by thinking of university quality as some measure of returns to education. Since in 2003 the average wage premium of a university degree over a secondary school title was about 30 % (OECD 2003), we set a ranking value that stands in the same proportion. The model specification also includes ranking square and cube to account for the possibility that the optimal level of university standard may not necessarily correspond to the maximum ranking available.

Control variables related to the socioeconomic characteristics of the provinces where the universities are located are also included.[13] In particular, we use the

[13]Their relevance is discussed in Agasisti and Dal Bianco (2007).

indicator of *QUALITY OF LIFE*, yearly provided by *Il Sole 24 Ore*, as an indicator of the environmental attractiveness. From the ISTAT Labor Force Survey (indagine sulle forze di lavoro) of 2003, we use the unemployment rate (*UNEMPLOYMENT*) and the *POPULATION*[14] of the university province. Moreover, we investigate the effect of indirect costs that may potentially be sustained by the student if, in certain universities, it is likely to take longer to graduate. Therefore, from MIUR data, we include the variable *DELAYED GRADUATION* that represents the share of students, in each of the universities considered, who take more than the legal length of studies to graduate. This variable represents a proxy of the effective length of studies. Descriptive statistics on ranking and other control variables are displayed by Italian macro-areas in Table 12.8 in the appendix.[15]

From MIUR data, we also extract a control variable which takes value 1 if the university is private and 0 if public (*PRIVATE*). The majority of Italian universities are public (66 of the 79 considered in our study) and their fees are relatively low compared to those charged by private universities.[16] We also include the *APTITUDE* variable: for each individual, it is built considering the correspondence between the field of secondary studies and the disciplinary fields offered by each university. If *APTITUDE* is equal to one, there is a good correspondence between previous studies and offered fields.

## 12.5 Estimation Results

The estimation results of the conditional logit model are presented in Table 12.3, where estimates of four different model specifications are included. The first column (model (1)) shows the results of the model estimation using the baseline specification that includes fees, expected grants, expected rent, the geographical distance, and the other control variables listed in Sect. 12.4.

Models (2) and (3) further investigate the effect of tuition fees in students' choices in terms of differences in enrollment costs between public and private universities. We first drop the dummy *PRIVATE* in model (2) and consider the interaction between *PRIVATE* and *FEES* in model (3). In model (4), we add the variable *DELAYED GRADUATION* that represents the share of students, in each of the universities considered, who take more than the legal length of studies to

[14]We want to control for dimension as the return to skill may be higher in big cities. See Addario and Patacchini (2007).

[15]More detailed descriptive statistics on all the variables included in the conditional logit specification, disaggregated by universities and Italian provinces, are available in Staffolani and Pigini (2012).

[16]Average tuition fees are 720 euros in public universities and 2,480 euros in private ones.

**Table 12.3** Estimation results: conditional logit model

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| Variables | Coeff. | St. err. | Coeff. | St. err. | Coeff. | St. err. | Coeff. | St. err. |
| Dependent var.: *CHOICE* | | | | | | | | |
| Independent vars | | | | | | | | |
| ***FEES*** | −0.032 | (0.003) | −0.068 | (0.002) | −0.056 | (0.005) | −0.031 | (0.003) |
| ***EXP. GRANTS*** | 0.008 | (0.002) | 0.012 | (0.002) | 0.012 | (0.002) | 0.007 | (0.002) |
| ***EXP. RENT*** | −0.098 | (0.010) | −0.070 | (0.010) | −0.083 | (0.010) | −0.080 | (0.010) |
| *DISTANCE* | −2.692 | (0.024) | −2.694 | (0.024) | −2.706 | (0.024) | −2.702 | (0.024) |
| *DISTANCE SQ.* | 0.352 | (0.005) | 0.352 | (0.005) | 0.355 | (0.005) | 0.354 | (0.005) |
| *DISTANCE CUBE* | −0.015 | (0.000) | −0.015 | (0.000) | −0.015 | (0.000) | −0.015 | (0.000) |
| *RANKING* | −117.78 | (3.03) | −117.98 | (3.01) | −118.14 | (3.04) | −114.13 | (3.06) |
| *RANKING SQ.* | 13.788 | (0.362) | 13.807 | (0.359) | 13.850 | (0.362) | 13.382 | (0.364) |
| *RANKING CUBE* | −0.533 | (0.014) | −0.533 | (0.014) | −0.536 | (0.014) | −0.518 | (0.014) |
| *QUALITY OF LIFE* | 0.401 | (0.042) | 0.368 | (0.043) | 0.310 | (0.042) | 0.407 | (0.042) |
| *UNEMPL. RATE* | −6.158 | (0.482) | −6.417 | (0.476) | −6.231 | (0.476) | −5.926 | (0.485) |
| *POPULATION* | 0.421 | (0.012) | 0.418 | (0.012) | 0.412 | (0.012) | 0.411 | (0.012) |
| *APTITUDE* | 1.106 | (0.032) | 1.132 | (0.033) | 1.141 | (0.033) | 1.134 | (0.033) |
| *PRIVATE* | −1.038 | (0.053) | | | −1.343 | (0.087) | −1.099 | (0.055) |
| *FEES* × *PRIVATE* | | | | | 0.028 | (0.005) | | |
| *DELAYED GRAD.* | | | | | | | −0.552 | (0.093) |
| Log-lik. | −46974.89 | | −46957.71 | | −47225.99 | | −46961.56 | |
| Pseudo-$R^2$ | 0.5776 | | 0.5767 | | 0.5743 | | 0.5767 | |
| LR test : | $\chi^2_{(14)} = 68499.94$ | | $\chi^2_{(15)} = 68169.50$ | | $\chi^2_{(13)} = 66777.12$ | | $\chi^2_{(15)} = 68469.92$ | |
| Observations | 2,025,440 | | | | | | | |

All coefficients are statistically significant with $p$-value $< 0.01$. Standard Errors are adjusted for 25,318 clusters (students)

graduate. This variable represents a proxy of the effective length of studies which should account for indirect costs that may potentially be sustained by the student if, in certain universities, it is likely to take longer to graduate. All the results presented in Table 12.3 show a positive effect of expected grants and a negative effect of tuition fees and expected rents on university choice. Higher enrollment costs, nets of the contribution of regional institutes through under-priced accommodation, and scholarship grants reduce the probability of enrollment.[17] It is worthwhile to note that in specification (2), where *PRIVATE* is not included, the coefficient associated to *FEES* is more than double the ones in specification. As expected, tuition fees have a stronger effect on the choice of enrolling in a private university (model 4). The negative coefficient of *DELAYED GRADUATION* in model (3) shows that the indirect cost of facing a possibly longer length of studies negatively affects university choices.

The cubic relationship between distance and choice of university can reasonably describe the behavior of Italian secondary school leavers: it may be conjectured that a student is more likely to enroll in a university close to home; therefore, the probability of enrolling in a university located in other provinces decreases in the cost and time of commuting; however, for those universities located too far to commute, the decreasing effect on the choice probability attenuates. This is probably due to moving and renting costs being somewhat constant: it makes sense that transportation and renting costs may not be extremely different for various distances once the student has decided to move in order to enroll. The left panel of Fig. 12.2 confirms this line of reasoning: the probability of enrolling is decreasing for distance below 500 km and remains nearly constant for distance between 500 and 1,200 km.

Nonlinearity also reflects the individual heterogeneity in the choice of university. The optimal level of university standard that does not necessarily corresponds to the maximum ranking available: students may self-sort according to their individual ability across different university standards on which the level of effort required to finish the studies may depend on. This result is also predicted by the theoretical model in Staffolani and Pigini (2012). The right panel of Fig. 12.2 shows that, on average, students prefer the lowest ranked university or medium/high-ranked ones.[18]

[17]The coefficient presented in Table 12.3 are strongly influenced by the familiar background of students. For instance, by selecting the sample of students coming from the richest families (the ones where the highest job position is chief executive officers, executive or self-employed), we obtain the following coefficients: tuition fees −0.007, rent −0.089, grants are not statistically significant. By selecting students coming from poorer families (the one where the breadwinner is executive white collar, blue collar, or unemployed), the three coefficients are strongly higher (in absolute value): −0.07 for fees, 0.007 for grants, and −0.114 for rent. Therefore, regional policies aimed to provide incentives in terms of cost reduction have a strong redistributing effect of enrollment opportunities and university choices for different subgroups of the population (see Staffolani and Pigini 2012).

[18]Quartic specifications in distance and university ranking have also been tested. Results, however, are not remarkably different.

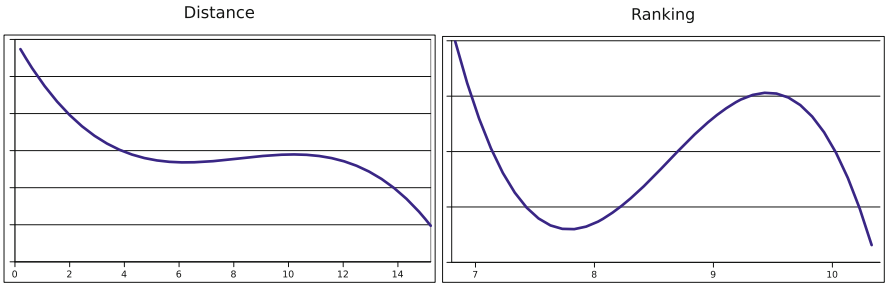


**Fig. 12.2** The relationship between the estimated probability of enrolling, distance, and ranking

In line with the results of Agasisti and Dal Bianco (2007), Table 12.3 shows that the socioeconomic condition of the university province plays a key role in the choice of which institution to attend: the expected signs of the quality of urban life and unemployment rate suggest that the search of better environments and opportunities may hide behind the university choice. As well, the dummy variables for private universities and *APTITUDE* all have the expected sign.

As introduced in Sect. 12.3, we compute elasticities to gain some insight into the effects of variations in key policy variables for academic and regional institutions on university choice and enrollment decision. Table 12.4 displays direct elasticities of the probability of enrollment to university tuition fees, expected grant, and expected rent, computed by evaluating Eq. (12.5) in the estimated parameters of model (1). Instead of reporting these elasticities for the university in the sample, the table shows average elasticities for each Italian region. These elasticities are computed by weighting regional universities with the number of enrolled students.

The elasticity of the enrollment probability faced by universities to changes in their own fees is, on average, −0.062 so that an increase in fees of 10 % decreases the enrollment rate in the universities located in the "average" region of 0.62 percentage point.[19] The elasticities are strongly differentiated across regions, from a minimum of −0.018 in Puglia and −0.019 in Campania to a maximum of −0.172 in Umbria and −0.165 in Liguria. These last two regions are small and located in areas with a high number of universities in neighbor regions. In general, southern Regions seem to show lower elasticities. On average, the elasticity of the enrollment probability to expected grants is 0.028, the one to expected rent is −0.022. Across Italian regions, differences are remarkable: as above, enrollment in universities located in Umbria and Liguria seems to be affected more by the enrollment costs,

[19] We also computed the average elasticity between universities, obtaining the result of −0.3, that is the same presented in Staffolani and Pigini (2012). It is higher, in absolute value, than the average elasticity computed between regions. These results are nevertheless coherent: in fact, considering regions, we do not take into account the substitution between enrolling in universities located in the same region.

**Table 12.4** Direct elasticities of the probability of enrolment to university fees, expected grants, and expected rent, by region

| | *FEES* | *EXPECTED GRANTS* | *EXPECTED RENT* |
|---|---|---|---|
| Piemonte | *−0.042* | *0.020* | *−0.015* |
| Valle d'Aosta | −0.115 | *0.037* | −0.012 |
| Lombardia | −0.039 | 0.009 | *−0.015* |
| Trentino-Alto Adige | *−0.071* | 0.047 | *−0.017* |
| Veneto | *−0.059* | *0.021* | −0.048 |
| Friuli-Venezia Giulia | *−0.078* | 0.041 | −0.035 |
| Liguria | −0.165 | 0.072 | −0.042 |
| Emilia Romagna | −0.033 | 0.015 | −0.014 |
| Toscana | *−0.063* | *0.033* | −0.041 |
| Umbria | −0.172 | 0.094 | −0.064 |
| Marche | −0.029 | 0.016 | −0.014 |
| Lazio | −0.033 | 0.008 | *−0.020* |
| Abruzzo | −0.037 | 0.011 | *−0.020* |
| Molise | −0.084 | *0.030* | −0.012 |
| Campania | −0.019 | 0.006 | −0.008 |
| Puglia | −0.018 | 0.007 | −0.010 |
| Basilicata | −0.096 | 0.043 | *−0.020* |
| Calabria | −0.028 | *0.018* | −0.010 |
| Sicilia | −0.029 | 0.011 | −0.014 |
| Sardegna | −0.028 | *0.023* | −0.012 |
| National Mean | −0.062 | 0.028 | −0.022 |

The *Italic* fonts indicates that elasticities are not significantly different from the national values at 5 %

whereas enrollment in universities located in the south seems to be less sensitive to their increase.

To conclude, secondary school graduates, living in regions where the elasticity to fees is high, have a higher degree of flexibility in their choices because of the large number of universities located in neighbor regions and at a reasonably small distance from their residence. They are, therefore, more sensitive to costs than students who have a lower number of opportunities close to the region they live in. Regional authorities, by fixing grants and by subsidizing housing policies, can therefore affect students' enrollment choices in a measure that depends on "outside" opportunities of the region secondary school graduates come from.

## 12.6 Final Remarks

The ongoing debate on the Italian HE system raises the issues of low participation and graduation rates well below the OECD average. In particular, the empirical research has looked into the effectiveness of the "3 + 2" university reform, that had

also the aim of reducing enrollment costs by shortening the legal length of studies, and into the effect of geographical distance on accessibility and completion.

In this work, we study the relationship between the enrollment decisions of Italian secondary school graduates and the cost of participating in HE. We look into the role of incentives, such as scholarships and the supply of under-priced accommodation. Since in Italy incentives are managed by regional institutes (ERSU), our analyses are developed from a regional perspective.

For the purpose of our analysis, we estimate a conditional logit model for enrollment and university choice of Italian secondary school graduates. We build our analyses on the ISTAT survey of secondary school graduates in 2004 interviewed in 2007 linked with data on institutions characteristics from MIUR.

Our empirical strategy provides us with straightforward post-estimation analyses on three key variables: tuition fees, expected grants, and expected rent, that are the main instruments in the hands of the university and regional management for policy tuning. On average, the elasticity of the probability of enrollment to tuition fees is $-0.062$, the one to expected grants is 0.028, and the one to expected rent is $-0.022$. Differences between regions are quite marked: southern regions show lower elasticities, while small central and northern regions the largest ones. Such differences can be explained by the accessibility to more opportunities to substitute the choice of which university to attend.

The results of the conditional logit model estimation also confirm that the geographical distance plays a major role in students' choice between universities: students prefer to enroll in universities close to home, implying that they may settle for choices that do no fit at best their ability and preferences. Other than university attributes, we show that a key role in university choice is played by the socioeconomic conditions of the institution's geographical location, suggesting that the process of choosing a university may hide the search for better opportunities.

To conclude, enrollment costs and incentives do affect HE choices of Italian secondary school graduates. As most of direct and indirect costs, such as fees and moving/commuting costs, are sustained by the students' families, individual inequalities may be reduced by the financial aid and facilitation managed by the regional governments.

## Appendix (Fig. 12.3; Tables 12.5, 12.6, 12.7 and12.8)

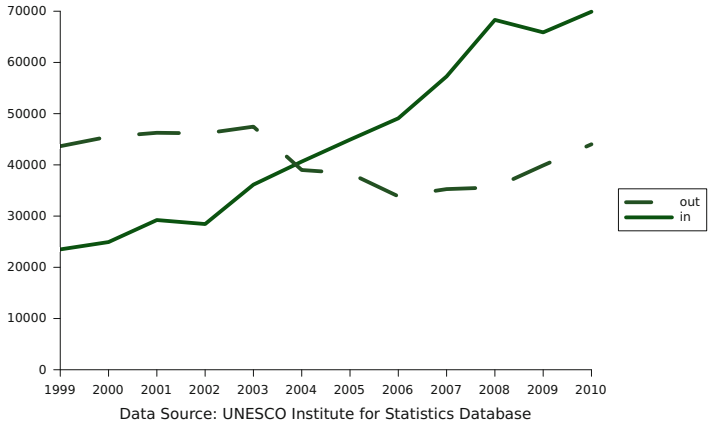


**Fig. 12.3** The number of foreign students enrolled in Italy (in) and the number of Italian students enrolled abroad (out): 1999–2010

**Table 12.5** Enrolments in universities located in the students' region of residence (1) and enrolments in regional universities of students coming from other Italian regions (2)

| | (1) | | (2) | |
|---|---|---|---|---|
| Italian Regions | % | Freq. | % | Freq. |
| Abruzzo | 79.6 | 623 | 25.7 | 668 |
| Basilicata | 31.4 | 477 | 11.2 | 169 |
| Calabria | 67.6 | 707 | 03.6 | 496 |
| Campania | 87.0 | 811 | 12.2 | 804 |
| Emilia-Romagna | 91.3 | 962 | 39.4 | 1,449 |
| Friuli-Venezia Giulia | 82.6 | 835 | 14.7 | 809 |
| Lazio | 92.3 | 807 | 39.0 | 1,221 |
| Liguria | 83.5 | 939 | 06.1 | 835 |
| Lombardia | 88.2 | 1,178 | 31.2 | 1,511 |
| Marche | 74.6 | 567 | 15.7 | 502 |
| Molise | 52.1 | 478 | 7.1 | 268 |
| Piemonte | 83.1 | 952 | 22.2 | 1,017 |
| Puglia | 74.5 | 737 | 13.1 | 632 |
| Sardegna | 86.8 | 570 | 1.0 | 500 |
| Sicilia | 89.3 | 759 | 9.6 | 750 |
| Toscana | 90.6 | 599 | 31.1 | 788 |
| Trentino-Alto Adige | 60.8 | 1,102 | 6.7 | 718 |
| Umbria | 80.8 | 448 | 22.5 | 467 |
| Valle d'Aosta | 21.1 | 284 | 6.2 | 64 |
| Veneto | 77.6 | 1,073 | 32.8 | 1,240 |
| Sample | 77.9 | 14,908 | 22.1 | 14,908 |

Column (1): 100 the students participating in higher education in that same region
Column (2): 100 the students enrolled in that same region

**Table 12.6** Attractiveness of Italian Regions

| Italian Regions | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| Abruzzo | 0.76 | 0.72 | 0.82 | 1.07 | 1.39 | 1.86 | 2.17 |
| Basilicata | 0.25 | 0.25 | 0.25 | 0.27 | 0.27 | 0.27 | 0.25 |
| Calabria | 0.10 | 0.08 | 0.07 | 0.09 | 0.08 | 0.09 | 0.10 |
| Campania | 0.80 | 0.66 | 0.59 | 0.40 | 0.39 | 0.27 | 0.20 |
| Emilia Romagna | 4.29 | 4.14 | 4.28 | 4.21 | 4.39 | 3.72 | 3.46 |
| Friuli Venezia Giulia | 2.06 | 2.39 | 1.83 | 1.71 | 1.56 | 1.44 | 1.45 |
| Lazio | 2.51 | 2.71 | 2.79 | 2.97 | 2.41 | 2.50 | 2.78 |
| Liguria | 0.65 | 0.55 | 0.53 | 0.59 | 0.67 | 0.86 | 0.83 |
| Lombardia | 1.92 | 2.27 | 2.36 | 2.33 | 2.07 | 2.08 | 2.09 |
| Marche | 1.40 | 1.45 | 1.30 | 1.25 | 1.27 | 1.11 | 1.19 |
| Molise | 0.64 | 0.56 | 0.42 | 0.53 | 0.69 | 0.68 | 0.66 |
| Piemonte | 0.82 | 0.83 | 0.77 | 0.80 | 0.74 | 0.74 | 0.74 |
| Puglia | 0.14 | 0.15 | 0.14 | 0.17 | 0.18 | 0.26 | 0.26 |
| Sardegna | 0.05 | 0.06 | 0.05 | 0.05 | 0.04 | 0.06 | 0.06 |
| Sicilia | 0.68 | 0.53 | 0.53 | 0.49 | 0.52 | 0.55 | 0.43 |
| Toscana | 3.00 | 2.72 | 2.85 | 2.92 | 2.90 | 2.78 | 2.62 |
| Trentino Alto Adige | 0.77 | 0.67 | 0.69 | 0.75 | 0.71 | 1.17 | 0.78 |
| Umbria | 1.75 | 2.12 | 2.09 | 1.85 | 1.82 | 1.81 | 1.71 |
| Valle D'Aosta | – | 0.00 | 0.01 | 0.01 | 0.09 | 0.22 | 0.16 |
| Veneto | 0.78 | 0.73 | 0.83 | 0.82 | 0.90 | 0.82 | 0.88 |

*Source*: MIUR—National Committee for evaluation of the Italian university system http://nuclei.cnvsu.it/20071111111100IMMF/provenienze.html. "Attractiveness" of regional universities: it is the ratio between the share of students enrolled in regional universities coming from outside the region on students enrolled in the region and the share of students enrolled in universities outside the region on enrolled secondary school leavers living in the region

**Table 12.7** Students' top choices, by region of residence (row)

| Italian Regions | Sample most frequent choices % | | | |
|---|---|---|---|---|
| Abruzzo | Abruzzo | Lazio | Em. Rom. | Marche |
| | 79.6 | 8.83 | 3.85 | 3.37 |
| Basilicata | Basilicata | Lazio | Puglia | Campania |
| | 31.4 | 15.93 | 14.68 | 9.64 |
| Calabria | Calabria | Lazio | Sicilia | Em. Rom. |
| | 67.6 | 9.05 | 8.77 | 3.68 |
| Campania | Campania | Lazio | Abruzzo | Basilicata |
| | 87.0 | 5.45 | 1.85 | 1.11 |
| Emilia-Romagna | Em. Rom. | Lombardia | Marche | Veneto |
| | 91.3 | 4.37 | 1.25 | 0.73 |
| Friuli-Venezia Giulia | F.V. Giulia | Veneto | Lombardia | Em. Rom. |
| | 82.6 | 11.38 | 4.37 | 1.44 |

(continued)

**Table 12.7** (continued)

| Italian Regions | Sample most frequent choices % | | | |
|---|---|---|---|---|
| Lazio | Lazio | Abruzzo | Umbria | Campania |
| | 92.3 | 2.11 | 1.98 | 0.99 |
| Liguria | Liguria | Toscana | Lombardia | Em. Rom. |
| | 83.5 | 5.22 | 4.58 | 2.98 |
| Lombardia | Lombardia | Em. Rom. | Veneto | Piemonte |
| | 88.2 | 5.69 | 3.06 | 0.85 |
| Marche | Marche | Em. Rom. | Lazio | Umbria |
| | 74.6 | 13.05 | 4.23 | 3.17 |
| Molise | Molise | Lazio | Abruzzo | Em. Rom. |
| | 52.1 | 17.15 | 14.02 | 5.02 |
| Piemonte | Piemonte | Lombardia | Liguria | Em. Rom. |
| | 83.1 | 10.82 | 4.10 | 0.42 |
| Puglia | Puglia | Em. Rom. | Abruzzo | Lazio |
| | 74.5 | 5.83 | 5.02 | 3.93 |
| Sardegna | Sardegna | Em. Rom. | Lazio | Lombardia |
| | 86.8 | 2.98 | 2.81 | 2.46 |
| Sicilia | Sicilia | Toscana | Lombardia | Em. Rom. |
| | 89.3 | 2.24 | 1.98 | 1.58 |
| Toscana | Toscana | Umbria | Em. Rom. | Lazio |
| | 90.6 | 3.51 | 3.34 | 0.83 |
| Trentino-Alto Adige | Trentino-A.A. | Veneto | Em. Rom. | Lombardia |
| | 60.8 | 21.14 | 7.26 | 5.99 |
| Umbria | Umbria | Toscana | Em. Rom. | Abruzzo |
| | 80.8 | 4.46 | 2.46 | 1.34 |
| Valle d'Aosta | Piemonte | Valle d'Aosta | Lombardia | Toscana |
| | 51.76 | 21.13 | 19.01 | 2.11 |
| Veneto | Veneto | Em. Rom. | F.V. Giulia | Trentino-A.A. |
| | 77.6 | 7.83 | 7.64 | 2.98 |

*Source*: ISTAT, survey on studying and working experiences of secondary school leavers (graduated in 2004, interviewed in 2007). Italian regions that have the highest enrollment rates (columns) by the students region of provenance (row)

**Table 12.8** Descriptive statistics for *DISTANCE*, *RANKING*, *QUALITY OF LIFE*, *UNEMPLOYMENT RATE*, *POPULATION*, and *DELAYED GRADUATION* in the Italian macro-areas

| Macro-area | Stat. | *DISTANCE* | *RANKING* | *QUAL. OF LIFE* | *UNEMP. RATE* | *POP.* | *DELAYED GRAD.* |
|---|---|---|---|---|---|---|---|
| North-West | Mean | 0.93 | 8.84 | 4.71 | 0.05 | 1.99 | 0.24 |
| | Min | 0.00 | 7.66 | 4.19 | 0.03 | 0.01 | 0.03 |
| | Max | 15.59 | 10.08 | 5.06 | 0.06 | 3.16 | 0.45 |
| | Sd | 2.06 | 0.48 | 0.28 | 0.01 | 1.03 | 0.12 |
| Nord-East | Mean | 1.02 | 9.13 | 4.77 | 0.04 | 0.65 | 0.32 |
| | Min | 0.00 | 8.55 | 4.30 | 0.04 | 0.04 | 0.14 |
| | Max | 14.22 | 10.13 | 5.07 | 0.06 | 0.99 | 0.46 |
| | Sd | 1.84 | 0.46 | 0.26 | 0.01 | 0.30 | 0.06 |
| Center | Mean | 1.40 | 8.96 | 4.58 | 0.06 | 1.92 | 0.35 |
| | Min | 0.00 | 7.90 | 3.88 | 0.03 | 0.21 | 0.16 |
| | Max | 13.04 | 10.30 | 4.99 | 0.11 | 4.19 | 0.45 |
| | Sd | 2.16 | 0.49 | 0.34 | 0.01 | 1.76 | 0.05 |
| South | Mean | 0.48 | 8.56 | 3.88 | 0.13 | 1.08 | 0.37 |
| | Min | 0.00 | 6.83 | 3.44 | 0.06 | 0.03 | 0.23 |
| | Max | 13.22 | 9.83 | 4.40 | 0.19 | 3.08 | 0.54 |
| | Sd | 0.93 | 0.60 | 0.28 | 0.04 | 1.04 | 0.10 |
| Islands | Mean | 0.46 | 8.75 | 3.77 | 0.17 | 0.71 | 0.41 |
| | Min | 0.00 | 8.23 | 3.43 | 0.05 | 0.06 | 0.33 |
| | Max | 11.85 | 9.50 | 4.99 | 0.20 | 1.25 | 0.49 |
| | Sd | 0.88 | 0.36 | 0.32 | 0.02 | 0.49 | 0.05 |
| Total | Mean | 0.92 | 8.88 | 4.47 | 0.07 | 1.31 | 0.33 |
| | Min | 0.00 | 6.83 | 3.43 | 0.03 | 0.01 | 0.03 |
| | Max | 15.58 | 10.30 | 5.07 | 0.20 | 4.19 | 0.54 |
| | Sd | 1.79 | 0.53 | 0.49 | 0.05 | 1.21 | 0.10 |

Distance, traveled by the students enrolled in universities located in the macro-areas, is in 100 km. Population is in millions of people

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