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ON THE DETERMINANTS OF STUDENT MOBILITY IN AN INTERREGIONAL PERSPECTIVE: A FOCUS ON CAMPANIA REGION

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Abstract*. This paper analyses the migration flows of university students from Campania who move to other regions to complete their higher education. The data come from a ministerial student database (Anagrafe M.I.U.R) for the 2006–2007 and 2013–2014 academic years. We first discuss migration from Campania to the rest of Italy to compare other southern regions in the framework in terms of the students' mobility phenomena. We use a network approach to determine the role of each region and to analyse the global relationships between Italian regions. Multilevel models are then used to analyse and investigate the key reasons for these migratory decisions. We test and discuss (1) forced migration, (2) anticipatory migration, (3) migration influenced by prestige of universities and (4) mobility due to geographic proximity to the place of residence.*

Keywords*: university student migration, student mobility, brain drain, hubs/authorities, multilevel models*

1. INTRODUCTION

'Intellectual migration' is a complex phenomenon that includes two main macro-categories of people: those who have high-level specialised training, such as professionals, technicians and professors, and those who move to complete their education, such as undergraduate and postgraduate students (Francovich, 2000). Different types of migration should also be taken into consideration within the student population, including pre-enrolment migration, students who migrate during their academic careers or those who move after earning their degree. Further distinctions may be made between external migrations (i.e. migrations abroad) and internal migrations (i.e. among regions of the same country; Ciriaci, 2005) as well as between temporary and permanent migration.

The intellectual migration phenomenon, originally called 'brain drain' (Royal Society, 1963) before later being described as intellectual migration, leads to

declines in the human capital of a country due to migration (Nifo and Vecchione, 2012). Regardless of the term used, the debate over intellectual migration dates back to the 1960s, when a quantitatively and economically significant number of qualified people began to emigrate from less wealthy countries to richer and more advanced countries (Francovich, 2000).

In the case of internal migration, the brain drain phenomenon does not imply a decline of intellect for a country as a whole, but it does imply a decline for the region of origin, which loses a certain number of people who have achieved a higher level of education without yielding substantial gains for their home region. In addition, for internal migration, the usual positive effects due to remittances – which are generally relevant for migration between countries – may be considered miniscule within a country. At least for the initial years of migration, students' families of origin instead provide financial support to students and graduates who emigrate in order to guarantee their subsistence (Nifo *et al.*, 2011). Finally, for return migration, the return of graduates relates to people who have reached the end of their working careers (Gibson and McKenzie, 2011). These factors all point to negative effects for the region of origin caused by internal intellectual migration.

In terms of the motivations of various types of migration, a large segment of the literature refers primarily to cost and benefit assessments (Borjas, 1999). But economic drivers are not the only motivation for highly skilled people to migrate; the choice to move from one's place of residence, even temporarily, is a complex decision that people often make to improve their quality of life. Several classifications for such determinants have been proposed in the literature. Such classifications usually take into account economic, social, cultural, institutional and logistical factors (Nifo and Vecchione, 2012). In this context, we adopt the same definition of mobility used by ANVUR[1], which defines student mobility as the choice of students who reside in one region to enrol in universities located in other regions. Using from this concept, the ANVUR Institute has created an indicator of attractiveness for each university, based on the ratio between students from other regions registered in a particular university and the total number of students enrolled in that university. This indicator and other official indicators are also used to allocate public spending among universities[2], which makes studying the phenomenon of student mobility even more interesting.

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[1] From the Italian for the National Agency for the Evaluation of University and Research Systems.

[2] From the Italian for the Ordinary Financing Fund, which is one of the main sources of revenue for Italian universities.

To be more precise, student mobility has been analysed and linked to the capability to attract, understood as the availability of degree courses and a higher capacity of students' admissions to courses with constraints on the number of students (Dal Bianco et al., 2010). The basic idea is that students are generally considered to be more likely to emigrate towards universities with a wider range of courses available; they might enrol in specific courses in places where such availability is greater and thus move to other regions.

Other motivations are related to the mechanism of social mobility. Most students are aware that moving from a less developed area such as southern Italy (according to most economic indicators) to north-central Italy is a favourable circumstance that can provide them with tools to improve their social status. Embedded in this framework, the migration to attend university in other regions represents the first step for a definitive shift of their residence, where students use territorial mobility as a tool to achieve social mobility (Impicciatore and Tuorto, 2011).

Several authors have discussed how, in the context of students' international mobility, quality assessments related to universities are influential in attracting students. These variables are related to the latent factor of 'prestige' and are the position that a given university is able to reach in a particular ranking (Beine et al., 2014).

Some students also consider the closeness of the university to their place of origin as an important factor in the process that leads to their final decision about enrolment. Distance is an important element to take into account while examining any kind of migratory flows, including students' mobility (Capuano, 2012). Students have a propensity (the entity of which must be estimated) to move towards universities in regions that border their places of residence (Dal Bianco et al., 2010). In general, people who live close to the borders are more inclined to be commuters. For higher education, this situation means that such commuters move to attend courses and sit for exams, but they then return to their region of origin. While this type of mobility does not involve all the negative factors of the other kinds of mobility, it still represents a net loss in numbers of students for the universities of the region of origin. Although this type of migration is not, strictly speaking, a form of intellectual migration, the number of students is still included in analyses of indicators of attractiveness. This phenomenon is thus worth analysing to understand the extent to which this issue affects both the loss of students and reductions in public spending.

For the specific Italian case, the 2016 graduates profile reported by university consortium AlmaLaurea (2017) showed that the more mobile Italian students come

from the most advantaged families, both economically and culturally. From a macro-regional perspective, migration flow is particularly common among young people who decide to study at universities in central and northern Italy, following the historical south-north Italian trajectory of people who move for education or work in search of better living conditions (Daniele and Malanima, 2011).

In this framework, the aim of this paper is to verify the general tendencies associated with pre-enrolment migration in order to discover where students from southern Italy go and why, with a particular focus on the motivations of university students who migrate from Campania to universities in other Italian regions. The analysis is performed using an ecological approach and at an aggregate level.

In the first part of the paper, open data from a ministerial student database (Anagrafe M.I.U.R.[3]) will be used as a base to describe mobility dynamics in the Italian university system. In the second section, in order to perform a comparative analysis of the various migratory phenomena, we examine Italian students enrolled for the first time (freshmen) in the Italian university system over two academic years: 2006–2007 (i.e. before the 2008 economic crisis) and 2013–2014, when some economic indicators showed improvements in Italy's economic context. A social network analysis (SNA) approach was also adopted to better explore the flows among the various Italian regions. In the third section, we focus on the intellectual migration of Campanian university students during the 2013–2014 academic year to analyse the trajectories and rates of migration to Italian universities. Starting from these results, we then attempt to identify the main reasons for such migrations and define our working hypotheses.

In the fourth part, we estimate a multilevel regression model based on the previously defined research hypotheses to quantify the effects of the factors that affect migration. The last section provides concluding remarks and discusses our future intentions to further develop this analysis.

2. THE UNIVERSITY CONTEXT IN ITALY: A FOCUS ON GEOGRAPHICAL INEQUALITY CONDITIONS

From 2008 to 2012 in large European countries, the tertiary education enrolment rate – defined as the percentage of students who end high school and decide to continue their studies at university – continued to rise, and the total number of university students increased. During the same period, the Italian university system

[3] M.I.U.R. is the acronym of the Italian Ministry of Education, Universities and Research.

was greatly affected by a decrease in the availability of income, both in terms of a decrease of public investments and a reduction of overall revenue from university fees (Varghese, 2010). The country also suffered political upheaval due to the lack of connection between the university system and the working world; the lack of available specialised jobs has led many students to believe that studying at university is not useful. Further, Italy is in a limited group of countries that have cut both overall public spending and education spending as well as the even smaller group of countries that have cut public spending on education more than other expenses. Italy's unusual situation is highlighted in the Organisation for Economic Co-operation and Development's (OECD's) 2014 annual report, 'Education at a Glance', which points out the significant reduction in enrolment rates for university studies in Italy.

A comparison of the total number of students enrolled in the university system in the academic year 2006–2007 (the period before the economic crisis) with the figures from 2013–2014 (the first year of plausible recovery from the crisis) shows a 13.30% reduction (293,119 versus 254,143). This situation is primarily caused by demographic conditions: the Italian population has grown but has become older, with a significant reduction in births. The overall population increased from 58,918,471 people in 2006 to 59,771,094 in 2013[4], but enrolments decreased during these years despite this increase. The demographic structure of the Italian population has only a small impact on this drop, considering that the main reason for this fall is from a general decrease in the tertiary enrolment rate described earlier.

Table 1 reports the enrolment rates by Italian regions for the two academic years considered here. The tertiary enrolment rate has fallen across Italy from 2006 and 2013, ranging from -18.7% (Molise) to -3.2% (Liguria); the exceptions are Lombardy and Emilia-Romagna, both of which have shown minor increases of around 4%. The largest drops are visible across the southern regions (especially in Apulia, Molise and Calabria). At the end of 2013, Campania and Sicily showed the lowest tertiary enrolment rate, of less than 50% for both. The only exception for the northern regions is Trentino-South Tyrol, which shows a rate of 43%.

[4] www.populationpyramid.net.

Tab. 1: Tertiary education enrolment rate of students (ISTAT – Italian National Institute of Statistics) in each region: comparison between the years 2006 and 2013

Region of residence	2006 Tertiary enrolment	2013 Tertiary enrolment	% variation
Abruzzo	70.6	61.1	-9.5
Basilicata	68.6	56	-12.6
Calabria	72.6	54.6	-18
Campania	59.4	47.8	-11.6
Molise	79	60.3	-18.7
Apulia	69.2	51.5	-17.7
Sardinia	62.9	58.1	-4.8
Sicily	61.5	49.1	-12.4
E.-Romagna	56.4	60	3.6
Friuli-V.G.	67.7	58	-9.7
Lazio	73.8	61.9	-11.9
Liguria	66.5	63.3	-3.2
Lombardy	56.2	60.2	4
Marches	63.9	57.4	-6.5
Piedmont	68.4	58.8	-9.6
Tuscany	72.2	58.3	-13.9
Trent-S.T.	42.2	43	0.8
Umbria	65.7	60	-5.7
Aosta Valley	78.7	67.3	-11.4
Veneto	68.6	56.8	-11.8

Note: regions above the line in the table are in southern Italy

Given this general reduction in the number of enrolled students, the drop is notably more evident for students who choose to study in their region of residence (-15.37%) and less steep for those who study in other regions of Italy (-5.09%); see Table 3. Thus, the percentage of internal university migration increased from 20.18% to 22.09% between 2006–2007 and 2013–2014, as shown in Table 3. These figures mean that fewer students decided to enrol in university, but when they did decide to do so, they were more inclined to make a higher economic investment in their education and to move from their home region. From the analysis shown in Table 2, however, the increase in university migration is clearly not a common trend, and some regions have suffered more than others from dramatic outflow.

Tab. 2: Percentages of students enrolled in their region of residence in 2006–2007 and 2013–2014

Region of residence	% enrolled in region of residence (2006-2007)	% emigrated in 2006-2007	% enrolled in region of residence (2013-2014)	% emigrated in 2013-2014
Abruzzo	74	25	67	32
Basilicata	23	76	24	75
Calabria	64	35	63	36
Campania	83	16	86	13
Molise	38	61	34	65
Apulia	67	32	66	33
Sardinia	85	14	82	17
Sicily	83	16	71	28
E.-Romagna	85	14	84	15
Friuli-V.G.	79	20	78	21
Lazio	87	12	88	11
Liguria	78	21	73	26
Lombardy	89	10	90	9
Marches	69	30	71	28
Piedmont	81	18	81	18
Tuscany	88	11	87	12
Trent-S.T.	51	48	52	47
Umbria	76	23	68	31
Aosta Valley	28	71	27	72
Veneto	75	24	74	25

Note: regions above the line in the table are in southern Italy

The tendency of southern regions (shown in the top half of Table 2) to 'export' university students has increased significantly, with the two exceptions of Basilicata and Campania. In Basilicata, the reduction in outflow has been negligible (-1.24%), although the fact that this region retains only 25% of the students in its own university system should be taken into account. In other words, three out of four university students from Basilicata choose to pursue higher education in other regions, which thus makes the region the most poorly performing region in Italy from this point of view. The outflow from Campania decreased by 2.2% from 2006-2007 to 2013-2014, and it is the only southern region that regularly retains more than 85% of its students. Because this behaviour differs from the other southern regions, the remainder of this paper will focus on the Campania region, which has emerged as an interesting case study. The largest drop occurred in Sicily, with the

outflow increasing from 16.41% to 28.44% between 2006–2007 and 2013–2014. (For a focus on Sicilian students see Capursi *et al.*, 2015.)

Tab. 3: Total enrolments of students and percentage of emigrants: comparison between 2006–2007 and 2013–2014

Academic year	Total enrolled	Enrolled in the same region	Enrolled in other regions	% of emigrants in total enrolled
2006–07	293,119	233,965	59,154	20.18%
2013–14	254,143	197,999	56,144	22.09%
Variation	**-13.30%**	**-15.37%**	**-5.09%**	

In order to deepen the analysis of migration flows among Italian regions, we adopted an SNA approach, as noted earlier. The aim of this methodology is twofold: (1) to represent in an intuitive way the transitions of students among regions and (2) to calculate two indexes (hubs and authorities) to determine the role of each region in the students' networks. Each region is considered to be a node of a network, and the migration flows (i.e. number of students) are the links. In this way we define a one-mode weighted and directed network; the corresponding graph represents the set of the 20 Italian regions (nodes), and the set of links among the regions. Each link is directed and weighted, and the region of origin and the region of destination provide the direction. The numbers of students who move in each direction provide the weight.

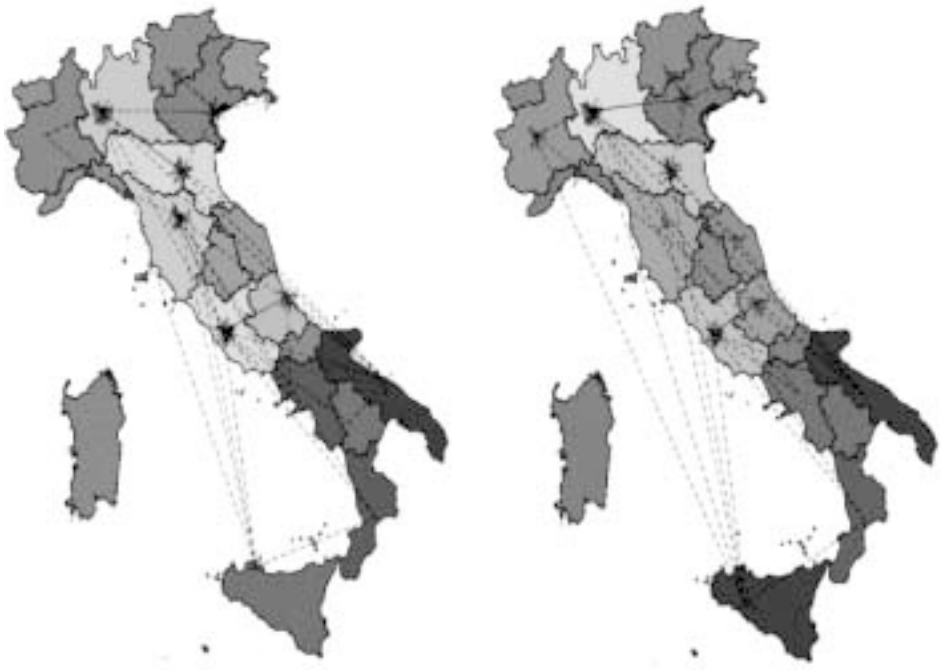
Given two regions, the graph will have two flows: from the first to the second region, and from the second region to the first. We exclude any loops (i.e. students who enrol in their own region of residence) from the analysis.

We define two networks, one for each academic year considered; we georeferenced the nodes to associate each region with the position of its barycentre. On this basis, we then drew two maps that represent the outgoing and incoming flows of students among the regions; note that the flows with a weight of less than 30 are not reported. In the maps, the intensity of the grey shading is proportional to the difference between incoming and outgoing students: the darker the grey, the higher the outgoing flow (white regions are those that present large numbers of incoming students).

Figure 1(a) shows a network for the academic year 2006–2007. A net loss is visible in the south as well as a positive balance between the west and north, with Lazio, Tuscany, Emilia-Romagna and Lombardy playing a central role in attracting students. The only southern region that is able to attract students is Abruzzo. The only region in the north that loses students is Veneto, which exports and imports

students to and from the adjacent regions of Friuli, Trentino-South Tyrol and Lombardy. From the south, students move to central and northern Italy, and migration between southern regions is negligible.

In 2013–2014 (Figure 1[b]), the network shows several notable differences. Lombardy is the region that is able to attract the largest number of incoming students, relegating Lazio, Tuscany and Emilia-Romagna to a secondary role. Abruzzo has completely lost its positive net balance, while the south (excluding Campania) has lost even more students. Contrary to 2006–2007, Sardinia and Liguria have experienced a net loss. In the south, only a few links are considerable (from Calabria to Sicily, from Sicily to Campania and from Basilicata to Apulia), but similarly to the previous year, southern students who migrate primarily enrol in universities in central and northern Italy – mainly Lombardy.



(a) 2006- 2007 **(b) 2013- 2014**

Fig. 1: Network of Italian regions for enrolments (freshmen) and university migrations in 2006–2007 and 2013–2014; dark grey regions have a negative net balance, light grey regions have a positive balance and white regions have a balanced equilibrium

In order to determine the role of each region inside the migration network, we calculate two indexes: the hub and authority scores. These indexes are related to the eigenvalue decomposition of the adjacency matrix and can help to highlight which regions are good exporters (with high authority index values) and which are good importers (with high hub index values). Of course, a region could also be both a good importer and a good exporter. For the Hyperlink-Induced Topic Search (HITS) algorithm used to estimate these scores, we refer the reader to Kleinberg (1999) and Benzi *et al.* (2013).

In this case study, the authorities of the network are those regions with high authority scores that can be considered good importers and that primarily import from good hubs. Good hubs are those regions from which students primarily migrate to good authorities and can be considered good exporters. Therefore, one measure is defined by the function of the other.

Tab. 4: Standardised hub and authority scores for Italian regions in 2006–2007 and 2013–2014

	Authority 2007	Hub 2007	Authority 2014	Hub 2014
Abruzzo	0.0890	0.0559	0.0579	0.0497
Basilicata	0.0019	0.0407	0.0015	0.0351
Calabria	0.0037	0.0437	0.0020	0.0408
Campania	0.0186	0.0562	0.0303	0.0506
Emilia-Romagna	0.1423	0.0523	0.1353	0.0669
Friuli-Venezia Giulia	0.0149	0.0444	0.1034	0.0409
Lazio	0.1942	0.0405	0.1376	0.0389
Liguria	0.0147	0.0538	0.0169	0.0523
Lombardy	0.1555	0.0460	0.2272	0.0427
Marches	0.0437	0.0561	0.0459	0.0542
Molise	0.0056	0.0551	0.0039	0.0420
Piedmont	0.0552	0.0521	0.0881	0.0731
Apulia	0.0122	0.0518	0.0114	0.0475
Sardinia	0.0006	0.0542	0.0003	0.0503
Sicily	0.0150	0.0570	0.0192	0.0557
Tuscany	0.1219	0.0560	0.0728	0.0562
Trentino-South Tyrol	0.0079	0.0433	0.0097	0.0515
Umbria	0.0316	0.0648	0.0156	0.0523
Aosta Valley	0.0002	0.0355	0.0018	0.0462
Veneto	0.0714	0.0408	0.0191	0.0532

In 2006–2007, Tuscany was a good importer and exporter, Abruzzo, Emilia-Romagna, Lazio and Lombardy were good importers, and Umbria, Sicily, Marches and Campania were good exporters. In 2013–2014, the network structure changed:

Emilia-Romagna, Piedmont and Tuscany were good exporters and importers, Friuli-Venezia Giulia, Lazio and Lombardy were good importers, and Marches and Sicily were good exporters.

A comparison of the indexes for the two academic years reveals several differences. Lombardy's role as a good importer increased (from 0.155 to 0.22) according to the net increase of migration trend. The authority score of Abruzzo, which was a good importer in 2006–2007 and hosted a large number of students from Campania and Lazio, decreased significantly. We should take into account that the students' market is highly elastic and dynamic and is severely affected by various shocks, including natural disasters and economic or political changes. One example of a sudden change in circumstances involves Banca Monte dei Paschi di Siena (MPS), a historic and important bank located in Siena, Tuscany. Due to the 2011 economic crisis (which led to a net loss of about €4.69 million that year) and the interconnection between MPS and local organisations, including the University of Siena, the total number of freshmen was more than halved (from 5.521 in 2006–2007 to 2.278 in 2013–2014). The tendency for Sicily and Marches to export students, mainly to good authorities (like Lombardy, Piedmont or Emilia-Romagna), remained unchanged at that time; Campania increased its authority score but decreased its hub score. The region was a good exporter and is now less so, since it is able to attract other students, primarily from other southern regions.

3. TRAJECTORIES AND MOTIVATIONS FOR STUDENT MIGRATION FROM CAMPANIA TO UNIVERSITIES IN OTHER REGIONS

As noted earlier, the Campania region is affected by the phenomenon of intellectual migration, like the other southern regions, but Campania also differs from the others. For these reasons, in this section we deepen our analysis of migration flows from that region and attempt to identify the trajectories and motivations of students who move from the Campania region to elsewhere in Italy. In particular, by observing in detail the universities and the type of degree for which students enrol, we formulate several hypotheses concerning the main factors to affect migration from Campania.

For students who resided in Campania during the 2013–2014 academic year and who were enrolled in university for the first time in both five-year master's degree (*ciclo unico* in the Italian system) programmes and the standard three-year bachelor's degree programmes, we can observe the destinations and percentages of Campania students compared to the total number of enrolled students in the same year.

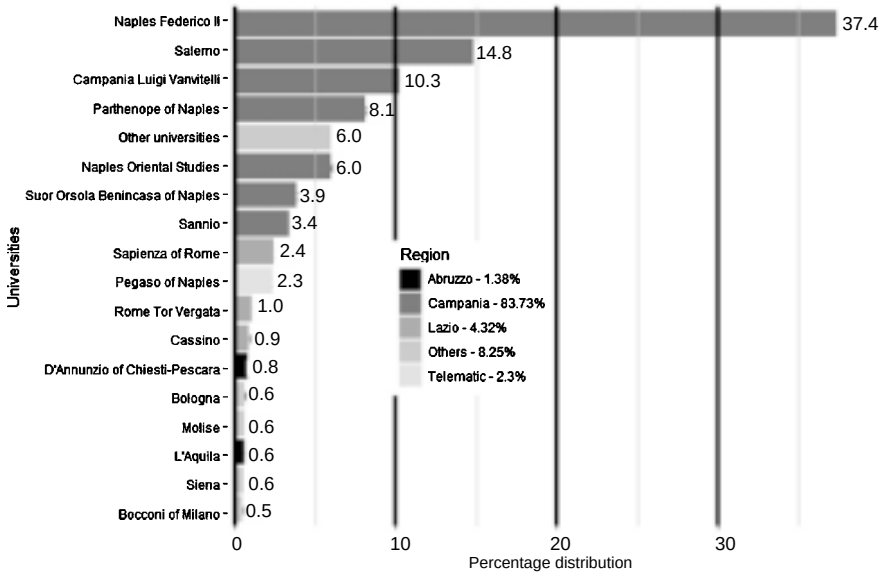


Fig. 2: Percentage of enrolments of students from Campania at the top 17 Italian universities according to the number of Campanian students

The highest frequency is obviously associated with Campanian universities. The University of Naples Federico II features the highest percentage of enrolled Campanian students (37.38%), followed by the University of Salerno (14.82%), the University of Campania Vanvitelli (10.26%), the University of Naples Parthenope (8.09%), the University of Naples Orientale (5.95%), Suor Orsola Benincasa University (3.86%) and the University of Sannio (3.37%). For universities in other regions, Sapienza University of Rome has the highest incidence of students who reside in Campania (2.40%), followed by Pegaso Online University (2.32%) and the University of Rome Tor Vergata (1.03%).

3.1 RESEARCH QUESTIONS

Starting from our observation of the most frequent destinations, we aim to identify the main reasons that push students to attend university elsewhere.

In Campanian universities, the absence of certain degree programmes – such as law services, industrial design and the degree programmes in figurative arts, music, film and fashion, or the existence of degree programmes with a restricted number of students who can enrol in them – means that students might prefer to enrol in other regions where universities have a wider range of degree programmes and/or more admissions might be available.

In Campania, a three-year psychology programme is offered at the University of Naples Federico II, the University of Campania Luigi Vanvitelli and Suor Orsola Benincasa University. Given that only 250 students are admitted to each of these three universities, many students prefer to take the entrance test at the University of Pescara G. D'Annunzio, which admits a higher number of students (914 freshmen from Campania for 2006–2007, 146 of whom intended to study psychology and 331 of whom intended to pursue medicine). The data for both academic years are summarised in Table 5.

Tab. 5: Freshmen from Campania enrolled in other regions ('forced-type' migration) in 2006–2007 and 2013–2014

	Total number emigrants of freshmen	Degree with a limited number of admissions	Degree not available in Campania
2006–07	5,172	1,602 (31%)	2,670 (51%)
2013–14	3,717	1,536 (41%)	1,190 (32%)

It should be noted that some degree programmes with different formal names at different universities are very similar in content; therefore, only the rate of student outflow for degrees that are unavailable in Campania is caused by a lack of available training. The total number of students who migrated to enrol in degree programmes with a limited number of students to be admitted (medicine, nursing, etc.) did not change even when overall emigration decreased, which indicates a lack of opportunity for students to attend such courses in Campania. Consequently, the effect on migration caused by limited numbers of admissions in enrolment increased its relative weight (from 31% to 41%), and the percentage of students who left to earn degrees that were unavailable in Campania decreased (from 51% to 32%). This situation is also caused by the fact that in the last few years, the range of courses available in Campania has consistently increased with the establishment of new degrees. One interesting case is the sports science degree, which is available in the Campania region only at Parthenope University and has a limited number of admissions; for this reason, a few students take such a course at the University of Cassino and Southern Lazio, which is located in the bordering province of Frosinone. In the following, we will refer to such dynamics regarding student mobility as 'forced-type' migration.

The second macro-category of determinants, which we call 'anticipatory migrations', occurs when students from Campania decide to enrol in a university in another region because they think studying in a place where more jobs are available will be useful. They may also choose a location based on its socio-

economic and cultural context in order to improve their quality of life. This choice thus depends on a number of elements – such as higher employment rates, increased average wealth, a comfortable urban environment and a generally improved quality of life – and favours specific territories. Favoured destinations include Turin, Milan, Rome, Bologna, Florence, Pisa and Siena. Although those who decide to move to cities in central and northern Italy to study could stay in Campania, they anticipate migrating in the future based on the classical south-north trajectory. From a theoretical point of view, all centre-north migrations, particularly to areas such as the Milan metropolitan area, Veneto region (with Padua as main destinations) or the Turin metropolitan area, could be assumed to be anticipatory. In practice, however, even a rough quantitative approximation of the reason for migration is very challenging to determine.

Another type of migration is based on the different reputations of Italian universities in the public opinion. Common opinion generally considers a restricted number of universities, public or private, to guarantee both a high level of education and preferential status in the workplace. Prestigious universities can be either private, such as Luiss (Rome) and Bocconi (Milan), or public, such as the polytechnic institutes of Milan and Turin, and are renowned for particular graduate programmes. Students thus choose certain universities because they offer better education, not because of the city in which the university is located.

If we consider only these four universities that can be assumed to have added value due to their prestige, a clear increase is visible in the absolute number of enrolled freshmen from Campania, which shows polarisation in the migration context. Those who decide to emigrate to attend university are more inclined to make a larger investment in exchange for obtaining a more prestigious education. We sum up these flows as 'migration towards prestigious universities', as shown in Table 5.

Tab. 6: Freshmen from Campania enrolled in four prestigious universities in 2006–2007 and 2013–2014

	2006–2007	**2013–2014**
Polytechnic University of Milan	40	82
Bocconi University	148	156
LUISS University	161	152
Polytechnic University of Turin	19	105
	368*	**495****

*7% emigrated from Campania; 1% of the freshmen were from Campania

**13% emigrated from Campania; 2% of the freshmen were from Campania

The final type of migration involves geographically close universities in Campania and those that are easily reachable for Campanian students. Students who live near the borders of the provinces of Avellino and Benevento mainly study at the University of Molise, while those who live near the border of the province of Caserta most often study at the University of Cassino and Southern Lazio, followed by the University of Rome. Students from the border of the province of Salerno often move to the University of Basilicata in Potenza. Naples is the least affected by this phenomenon. The main routes for geographic proximity mobility are shown in Table 6. When we take into account the overall figures of this phenomenon, this determinant appears to count for a small number of students, and recent mobility policies are attempting to manage this issue.

Tab. 7: Number of Campanian freshmen enrolled in nearby universities by province of residence (geographic proximity) in 2006–2007 and 2013–2014.

Province of origin (from border municipalities)	**Region of destination**	**Total 2006–2007**	**Total 2013–2014**
Avellino	Molise (Campobasso, Isernia)	29	42
Benevento	Molise (Campobasso, Isernia)	183	136
Caserta	Lazio (Rome, Cassino)	584	281
Salerno	Basilicata (Potenza, Matera)	121	73
	Total	**917**	**532**

As concluding remarks, we must point out that considering and analysing all these motivations as being clearly distinct from one another is a challenge. For example, a student who moves from southern Italy to Bologna likely makes his or her decision based on various factors: the university has a good reputation, and the quality of life and unemployment rate are far better than in southern Italy. As such, discerning the size of each possible motivation is a complex task, and the student will likely make the decision to emigrate after considering a combination of all these determinants.

Based on the literature, on the data and on the examples provided, we may point out the following research questions:

(i) Forced-type migration: students are inclined to move towards the largest universities in terms of student numbers as a proxy of: (a) range of degrees available and (b) number of admissions available for degrees with constraints.

(ii) Anticipatory migration: students follow the south-north trajectory (especially towards the largest metropolitan areas) to achieve a better quality of life in terms of employability and wealth environment.

(iii) Migration due to university prestige: students are influenced by university ranking of both teaching and services, and they tend to enrol in universities that are (a) positioned at the top of the rankings and (b) private universities.

(iv) Geographical-proximity mobility: although this type of migration is not considered intellectual migration in the strict sense, some students who live close to the border of a region could choose to commute to a university (cross-border) and therefore to attend universities in other regions.

4. MULTILEVEL REGRESSION MODEL FOR THE DETERMINANTS OF MIGRATION

With the aim of estimating the effect of the previously discussed determinants of migration in a more analytical way, we have developed a multilevel model (Snijders and Kenny, 1999) in which the response variable Y_{ij} is the number of Campanian students enrolled in the *i-th* university of the *j-th* Italian region. Level 1 is the university level, and level 2 is the regional level. The idea is that people move from Campania to other regions based on both university characteristics and the conditions of the regional environment. The data refer to the academic year 2013–2014.

Universities are considered unique units (level 1), but they could be somewhat inter-dependent due to the fact that they are located in the same region (level 2). Multilevel models, whose units have a hierarchical structure, are suited to perform parameter estimation, taking into account that universities are nested in regions. Formally, the complete multilevel random intercept model with p explanatory variables x_{hii}, $h = 1,\ldots, p$, measured at university level, and q explanatory variables $z_{kj}, k = 1, \ldots, q$, measured at regional level, is as follows:

$$Y_{ij} = \beta_{0j} + \sum_{h=1}^{p} \beta_h x_{hij} + \sum_{k=1}^{q} \beta_k z_{kj} + e_{0ij} \tag{1}$$

$$\beta_{0j} = \beta_0 + u_{0j}, \tag{2}$$

with

$$e_{0ij} \quad N\left(0; \sigma^2_{e0}\right) \text{ and } u_{0j} \quad N\left(0; \sigma^2_{u0}\right),$$

where the response variable Y_{ij} is the number of students from Campania enrolled in each university i in region j. Predictors can refer to university level 1 (i.e. size or ranking) or to regional level 2 (i.e. regional GDP).

The β_{0j} represents the random intercept, while β_h and β_k are the fixed regression coefficients at level 1 and level 2, respectively. In the random intercept model, the random intercept can change across regions with respect to the grand

intercept β_{0j} according to the value, positive or negative, assumed by the random part u_{0j}. The ratio $\sigma^2_{u0} / (\sigma^2_{u0} + \sigma^2_{e0})$ is the intra-level2 unit- correlation (ICC). The presence of a nonzero ICC indicates that the traditional OLS estimation is not appropriate and multilevel model is required (Goldstein, 2011).

To the random intercept model in Eq. (1), it is possible to add random slopes for level 1 predictors, accounting for the possibility that some predictors have different effects across regions (e.g. the capability of universities to attract students due to their ranking is higher in some regions than in others). In the random slope model some β_h can be defined as $\beta_{hj} = \beta_h + u_{hj}$, $u_{hj} \quad N(0;\sigma^2_{uh})$. Again, the random part is the effect due to the different regions, and the interpretation is analogous to that of the random intercept.

Given this model formulation, starting from a wide dataset with several variables for each level, and taking into account the determinants defined in the previous section, we can estimate the model using the following variables:

- Bordering dummy: this has a value equal to 1 for universities sited in provinces bordering Campania and 0 otherwise; the dummy is a proxy of geographical proximity (the [*iv*] determinant).
- Regional level: the regional-level variables included in the estimation procedure are unemployment rate, the European regional competitiveness index (RCI)[2] and the index of institution quality[3]. These variables are linked to the (*ii*) determinant (anticipatory migration).
- Ranking of the university: this is drawn from the Sole24Ore newspaper ranking of both public and private universities. The concept is that a ranking has an impact on students' decisions, since the ranking is widespread and legitimised at the public opinion level. The Sole24Ore ranking, which is one of the most discussed in the Italian context, is related (as a proxy) to the determinants (*iii*) of migration to prestigious universities. This ranking is made up of several indicators of two dimensions: teaching and academic research. For the former, indicators are related to attractiveness, sustainability, internship, international mobility, scholarship availability, university dropout, efficacy, satisfaction and employability. For the latter, indicators are related to scientific research, external funding and advanced and higher training.
- Private dummy: this has a value of 1 for private universities and 0 otherwise; this dummy is another proxy, for the determinants (*iii*) of migration to prestigious universities.
- University size: the proxy variable for this dimension is the total number of enrolled students in the university, linked to the (*i*) determinant.

In the model presented in Table 7, the response variable is appropriately transformed by an inverse hyperbolic sine transformation to consistently reduce the variable's high negative skewness. The ranking of university was reversed, so the better universities have higher values to make interpretation of the positive parameter more intuitive. One variable, student population, was collected on a very different scale compared to the other predictors, so it was standardised to obtain more consistent estimates and a more interpretable parameter in terms of comparison with the other variables. In this context, the proposed multilevel model has two levels (universities and regions), so it was impossible to include some variables related to the (*i*) determinant (forced-type migration), which are related to the features of the degree, as in the lower level.

The best final model, according to AIC stepwise variable selection and with a treshold for the significance level of 0.10, includes the following variables, considering that the response variable is the number of enrolled students from Campania:

$$Y_{ij} = 1.35 + u_{0i} + 0.06 * \textit{Ranking} + 1.46 * \textit{Private} + 2.46 * \textit{Bordering} + 0.89 * \textit{Student.Pop.} + e_{0ij}.$$

The total number of observations is 66; starting from the 75 Italian universities (excluding online universities), 7 Campanian universities are removed because the analysis only includes students who decide to migrate to other parts of Italy to enrol in university. From these 68 universities, Bari Jean Monnet and Rome LUMSA University are excluded because data were not available for the first year under analysis. Therefore, no level-2 variable results to be significant. Further, no random slopes are significant, so all predictors computed at level-1 have only fixed effects, common to all regions. A random effect estimated is instead significant for what concerns intercept, and including it in the model significantly improved its goodness of fit, as indicated by the $\chi 2$ test shown at the bottom of Table 7.

Tab. 8: Summary of the final model with four predictors as fixed effects and the random effect given by the random regional intercept.

	Y = Enrolment of Campanian students		
	β	*CI*	*P*
Fixed parts			
(Intercept)	1.35	0.35–2.35	.012
Ranking	0.06	0.02–0.10	.002
Private	1.26	0.01–2.52	.053
Bordering dummy	2.46	0.75–4.18	.014
Student population	0.89	0.50–1.28	<.001
Random parts only random intercept			
σ^2_{e0}	2.069		
σ^2_{u0}	0.928		
N_{region}	19		
ICC_{region}	0.310		
Observations	66		
R^2 / Ω^2_0	.623/.612		
AIC	265.270		
Random effect test	Chi.sq / Chi.D.F. / p-value		
Region	5.36 / 1 / 0.02*		

The predictors with the highest marginal effect is university's student population. This means that students who emigrate from Campania most often decide to go to the larger universities, even though they have the chance to enrol in one of the largest universities in Italy (the University of Naples Federico II); if they decide against taking that opportunity, many will understandably choose a university that is equally as large. As noted earlier, many factors affect this decision, including universities' wide selection of programmes and their location in large metropolitan areas (e.g. Rome, Milan and Turin). Ranking also has a strong impact, and students' choices clearly take into account the universities' reputation. As mentioned above, geographical proximity is also relevant (a significant dummy variable). The competitive advantage of being private is less important (but still significant at 10% level) and can be considered an element to support the (*iv*) determinant. While it is true that some of these motivations could overlap, no multicollinearity was detected between the predictors: all Variance Inflation Factors (VIF) were lower than 3.

If we look at the random intercept effects, which take into account several

aspects of each regional environment given the fixed effects of the model, the two significant positive random intercepts are related to Abruzzo and Marches. This situation is also caused by the fact that this model does not take into account the limited number of admitted enrolments issued, so the students who move to these two regions to enrol in programmes with such restrictions – such as healthcare programmes, of which Chieti-Pescara in Abruzzo has a considerable number – are not made explicit in the model.

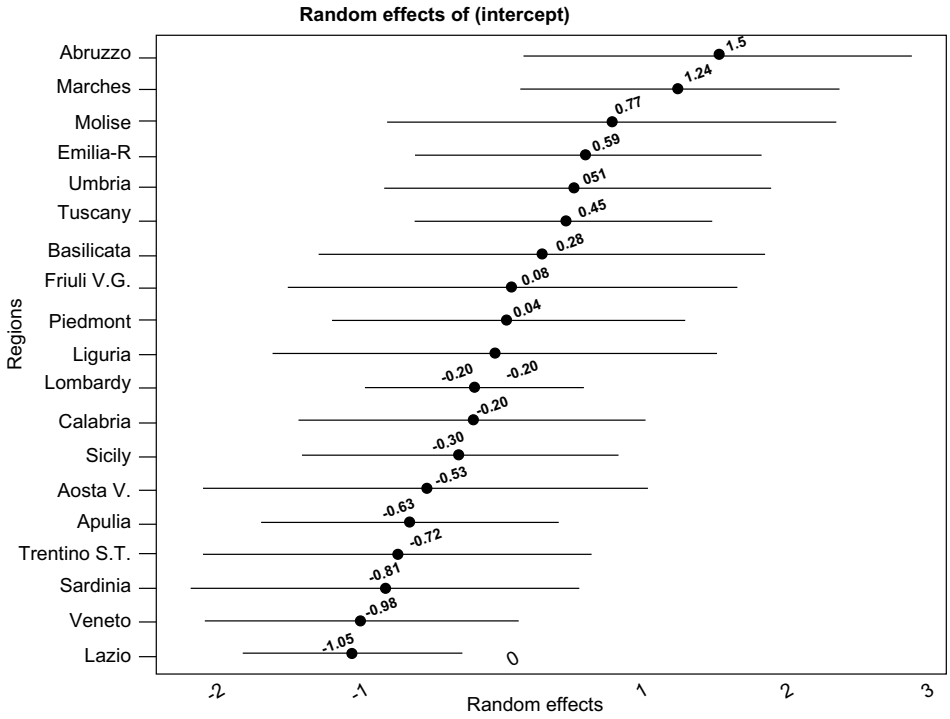


Fig. 3: Random effects (random intercepts) at the regional level in the multilevel model

Negative random intercepts, even if not significant, are associated with those southern regions (Calabria, Apulia, Sicily and Sardinia) that are unable to attract any students from Campania, and to the two most popular regions for Campanian students, Lombardy and Lazio. We should point out that for the former the negative random intercept is not significant (the confidence interval includes a 0 value), while for the latter the negative effect is significant, so this situation requires more investigation. It is likely due to the fact that most of the explanatory variables introduced in the model showed high values for most universities (11 in total) in

Lazio. This region has strong attractive power for students from Campania, but it is unable to take advantage of its theoretical potential to the fullest extent possible. If we consider that the number of universities (11) is among the largest for an Italian region (the same as Lombardy), there is likely a physiological limit to the number of students who can move from Campania to Lazio; this situation also explains why, given fixed effects, a negative random intercept appears. In addition, most of the students choose from among only a few universities in that region and neglect the others.

5. CONCLUSIONS

The motivations that push students to move or migrate when decide to enrol at university are complex. From a micro-perspective view (i.e. the point of view of each student), a variety of variables must be taken into account, and thus many factors may interact to encourage students to pursue higher education in a different region than that which they are from.

In the present paper we have attempted, first, to introduce university students' mobility in the context of intellectual migrations, with particular emphasis on the Italian case. In recent years, competition between universities has increased, leading to create a 'quasi-market' (Agasisti and Catalano, 2007).

Our exploratory analysis of figures drawn from the ministerial student database (Anagrafe M.I.U.R.) on freshmen enrolments, showed a pronounced dynamism in students' choices also due to external contingences such as the economic crisis. The observed changes in the regional authority scores, between the 2007 and 2014, highlighted the possibility to modify the attractive power of the university system of a region even in medium or short term.

With respect to the plausible determinants of such mobility, which in large part follows the historical Italian trajectory from south to north, we analysed four macro-groups of motivations: forced migration due to the lack of a wide range of academic degree in the own region or due to restrictions about the number of available places in given tracks; migration to anticipate an almost sure future migration (i.e. anticipatory migration); migration to study in universities that are perceived as more prestigious; and mobility due geographical proximity between place of residence close to the regional border and universities just beyond such a border. Even if this latter can be considered as a particular kind of daily commuting, we decided to include it in our analysis because it is considered in the computation of some attractiveness indicators used for evaluation purposes by the M.I.U.R. Then, all the student's choices for mobility are counted as intellectual migration,

and such choices have an impact on public spending distribution.

Finally, to deepen the analysis on the drivers related to mobility through a regression model, we focused our interest in Campania for two reasons: it is the southern region with the largest number of students and it is able to keep a largest number of resident students compared to the other southern regions. Indeed, Campania has improved between 2007 and 2014 its attractive power while most of the other southern regions have suffered from student outflow that is becoming larger year by year. The estimated multilevel model confirms that students are more inclined to move to large universities that are in the top position of the ranking (Sole24Ore), with an additional attractive effect for private universities. A significant effect is also due to the mobility over the regional borders. For freshmen of three-year bachelor's and five-year special master's degree programmes, the economic drivers we tested seem to play a secondary role. This may be because students could achieve their expectations in terms of employment and quality of life after earning their bachelor degree and thus plan further migration to earn their master's degree.

These results have suggested that the Campania University system as a whole, in order to improve the capability to reduce further the students outflow, could pursue two strategies. One consists in increasing the availability in places, especially in healthcare related university degrees, and in broadening the range of available tracks. The other should aim at increasing the perceived prestige and quality of Campania universities by improving both the student services and welfare.

Finally, we recall that the proposed analysis is of the ecological type, in the sense that elementary units (i.e. students) are not themselves considered to be response variables, but instead the model examines upper-level entities (i.e. universities and regions) that contain the elementary units. We can thus attempt to use the model to highlight global trends and trajectories without being able to predict and perform analyses at the individual level.

For researchers who are interested in the determinants at the individual level, only an ad-hoc survey would be able to determine the reasons behind people's decisions to migrate. We intend to extend and compare this analysis to students who decide to migrate after earning their bachelor's degrees, when economic factors will likely play a more important role in their lives. Further, mobility for geographical proximity comes out as an interesting issue, due to its relationship with important official indicators of attractiveness of universities and its controversial relevancy in intellectual migration phenomenon strictly speaking.

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