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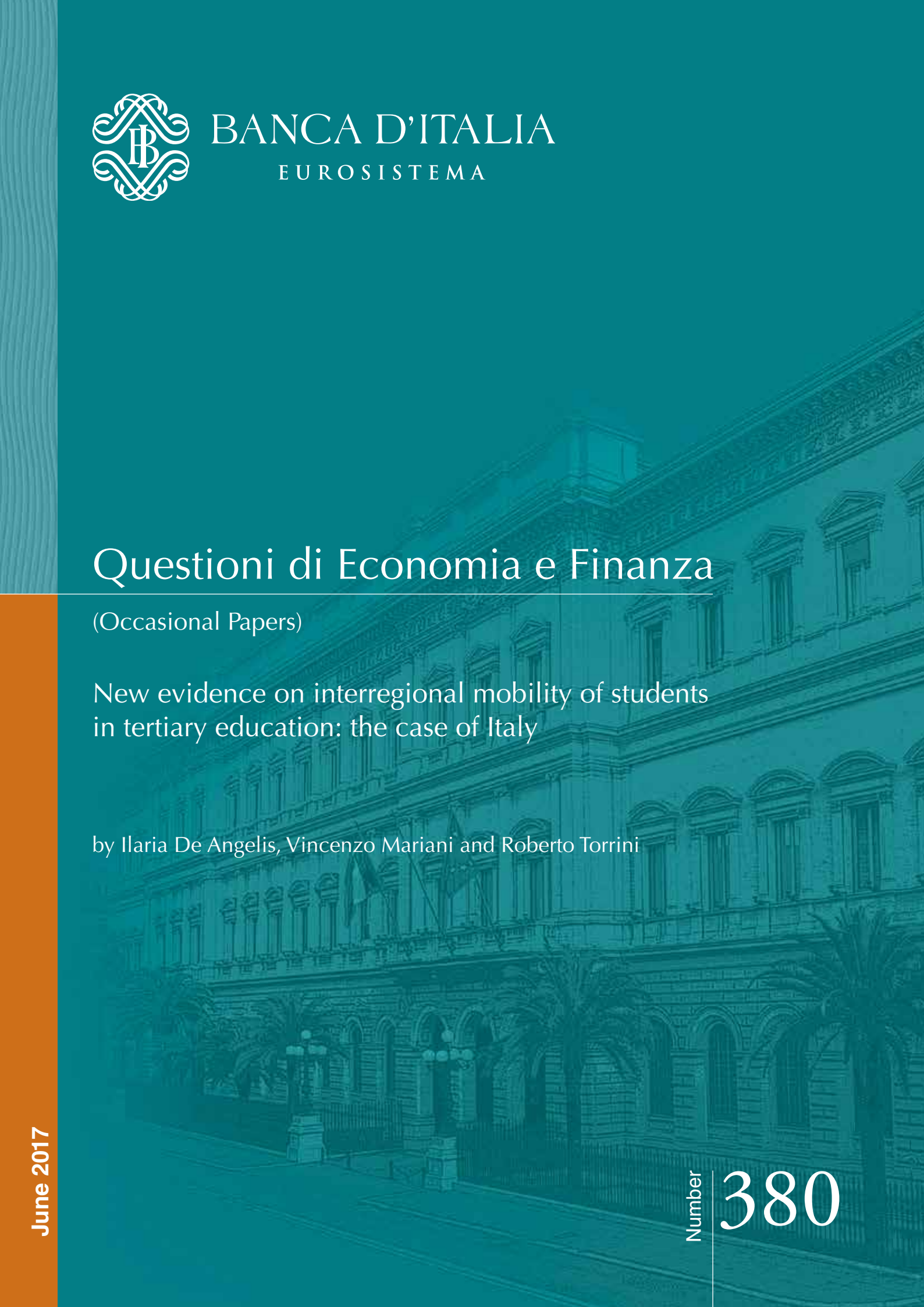

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NEW EVIDENCE ON INTERREGIONAL MOBILITY OF STUDENTS IN TERTIARY EDUCATION: THE CASE OF ITALY

by Ilaria De Angelis*, Vincenzo Mariani** and Roberto Torrini*

Abstract

A relatively low geographical mobility of students in the Centre and North of the country and a large incidence of movers from southern regions to universities located in the Centre and North are well-established features of the Italian academic system. Exploiting a novel administrative dataset on academic enrolments, this paper shows that the interregional mobility of Italian students has increased in recent years. We highlight that the increase in mobility, which has occurred in a period of declining entry rates, is not attributable to a change in the composition of the enrolling students. We investigate some of the main drivers of student mobility by relating regional flows to the attractiveness of universities and show that mobility is positively associated with the quality of research and teaching and with the job prospects offered by the hosting university. Student flows are instead negatively correlated with the distance between the university and the region of origin and with drop-out rates. The empirical evidence also suggests that in recent years the distance from the university of destination has become less relevant in explaining mobility, whereas the role played by university quality has increased.

JEL Classification: I20, I23.
Keywords: university, student mobility, quality of research, labour market.

Contents

* Bank of Italy, Structural Economic Analysis Directorate.

** Bank of Italy, Economic Research Unit, Bari Branch.

1. Introduction[1]

Interregional mobility in tertiary education is likely to have a number of positive implications both for students themselves and for universities: it enlarges the choices available to students, increases the efficiency of the match between personal skills and educational offer, may provide incentives to academic institutions to improve their quality, and can potentially trigger a virtuous competition between universities. Although in principle there is no reason to doubt that this is the case for Italy as well, some concerns may be raised about the peculiar pattern of mobility flows that characterizes the Italian tertiary education system. What makes Italy different from other countries is that mobility flows are largely unbalanced between northern and southern regions. In the academic year 2015-16, less than two thousand new entrants from the Centre and the North (C-N) enrolled in a university in the rest of the country, against approximately 25 thousand that moved in the opposite direction; movers to other areas of the country represent just 1 per cent of new entrants from the C-N and almost a quarter of new entrants from the South and Islands (S-I). As some of the movers tend to remain in the region where they completed their studies, this pattern crucially reinforces the gap in human capital, which is a key aspect of the heterogeneity between the North and the South of the country. Moreover, as long as public resources in Italy are allocated to tertiary education institutions according to the number of students, being less able to attract students weakens the funding capacity of universities located in most disadvantaged areas.

The aim of this paper is to provide empirical evidence on the recent patterns of student mobility in Italy and its main drivers both at the individual and university level. To do so, we exploit a unique dataset (Anagrafe nazionale degli studenti, ANS) that contains administrative records on enrolments, students' schooling background and their academic career in Italian universities and merge it with measures of research and teaching quality and of graduates' labour market outcomes in the same universities. We focus on the period between the academic years 2007/8 and 15/16, which is characterized by declining enrolments at the national level and diverging trends in the number of new entrants between northern and southern regions of the country with, in turn, different interregional mobility patterns. We find that changes in interre-

[1] The paper has been published in "Politica economica/Journal of Economic Policy" 1/2017, pp. 73-96. We are grateful to Giuseppe Marotta and to the two anonymous referees for their valuable comments and to ANVUR for providing us with the data from the Anagrafe nazionale degli studenti (ANS). We also thank Paolo Sestito, Francesca Modena, Pasqualino Montanaro and Giulia Tanzi for their useful suggestions and Federico Giorgi and Christine Anne Stone for their helpful assistance. The views expressed in the paper are those of the authors and do not necessarily reflect those of the Bank of Italy. All the remaining errors are ours.

gional mobility mainly depend on changes in student propensity to move, especially in the South, while students' composition does not seem to play a relevant role. On the university side, we show that student flows are positively correlated with the quality of research and teaching in the hosting university and with the job prospects it offers to graduates. We also provide some, admittedly far from conclusive, evidence that the importance of such characteristics has grown over time.

The paper is structured as follows. Section 2 provides a review of the most recent literature on the determinants of student mobility in Italy and abroad. Section 3 describes the dynamics of student mobility across areas and over time. In Section 4 we provide a description of the main drivers of mobility flows at the university level and show the results of a bilateral regression analysis, focusing mainly on the relation between mobility and some characteristics of the universities, namely their ability to provide students with the skills for a satisfactory job, the quality of research and teaching and a measure of academic performance of students.

2. Related literature

Mobility patterns may depend both on students' individual characteristics such as gender, age and socio-economic background and on universities' features in terms of availability of courses, teaching and research quality and labour market prospects. Few studies have provided empirical evidence on the determinants of within-country student mobility in Italy and in other countries.[2]

For Italy, De Angelis et al. (2016) exploit the ANS dataset to show that the average distance between the home town and the chosen university has significantly increased in the last decade among students from the S-I and that the probability of moving is correlated with individual characteristics, such as gender, age and schooling background, and with the local supply of academic courses. They also argue that more mobile students display on average a better academic performance than those who remain in the province of origin. Family income and cultural background also play a role in the decision to move insofar as they reduce the set of opportunities for students from poorer or less educated families (Lupi and Ordine, 2009). Differences in socio-economic conditions are among the major predictors of mobility choices in other

[2] On the contrary, many contributions have examined the determinants of international student mobility and the recent increase in international mobility flows, mostly using aggregated data (see for instance Beine et al. ,2014). Another strand of literature has focused on temporary mobility, which in Europe has been fostered by the introduction of the Erasmus programme (Parey and Waldinger, 2011) and on the relation between international mobility and location choices after graduation (Di Pietro, 2012).

countries as well. Hoxby (2004) provides a review of the determinants of college choice in the US focusing on the role of financial incentives and peer effects. Bocharova and Prakhov (2016) analyse the case of Russia, which is somewhat similar to Italy insofar as it displays wide regional differences in socio-economic development.

Other studies have investigated the main drivers of university attractiveness and their effect on enrolment and mobility decisions. Relying on a gravity model, Florax et al. (2003) find that the distance between the region of origin and the university of destination impacts negatively on the university choices of Dutch high school graduates, whereas a positive impact results from regional and urban amenities rather than from the quality of university programmes. Unlike the Dutch case, the local availability and quality of the supply play a key role in the university choice of Italian students (Ciriaci, 2014; Bratti and Verzillo, 2015; Rizzica, 2013) insofar as it is often associated with local labour market conditions and the labour market outcomes of prospective graduates. Brunello and Cappellari (2008) find that college-related differences are large both within and between Italian regions and that some of these differences (namely, the public or private ownership of the institution) affect labour market outcomes of graduates at the early stages of their careers. Pigini and Staffolani (2015) estimate a nested logit model for the enrolment decision and university choice of Italian students to show that higher quality institutions attract more talented students regardless of their social status and family background, thus encouraging student selection, which is in turn beneficial to the local labour market. On the other hand, Dotti et al. (2015) find that local labour market conditions are essential determinants of university attractiveness and act as a reinforcing channel for brain gain. Other economic characteristics of the areas of destination, such as the availability of fast transport services, may as well affect student mobility in Italy by moderating the negative effect of distance and facilitating university accessibility (Cattaneo et al., 2015).

3. The evolution of geographical patterns of mobility

According to the ANS data, new entrants in first level tertiary education declined between the mid-2000s and 2015, interrupting an upward trend that Italy had shared with other developed countries (OCSE, 2015).[3] Considering the entire period from 2007 to 2015, new entrants

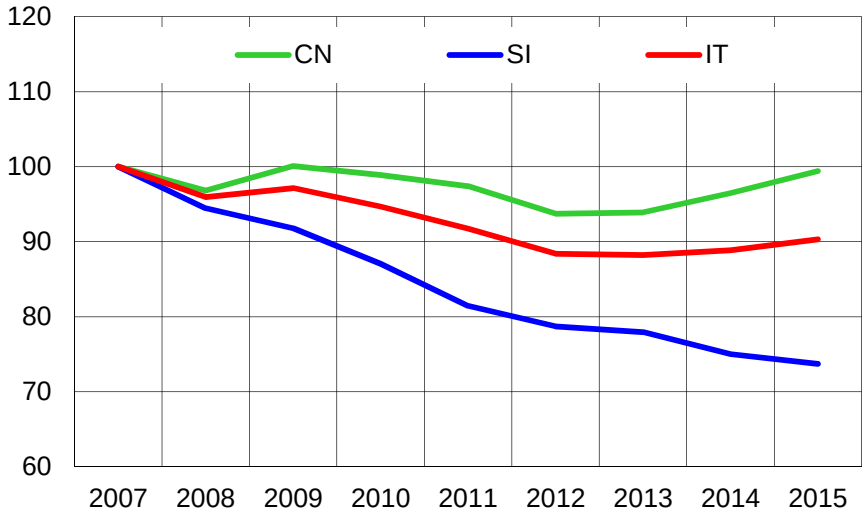
[3] First level courses include three-year and five-year bachelor degrees. Second level courses include two-year master degrees.

in first level programmes dropped by roughly 10 per cent (4 per cent among students aged 18-20).[4]

Data aggregated at the national level hide heterogeneous patterns across geographical areas and universities, which became more pronounced during the Great Recession (Figure 1): between 2007 and 2013, the decline in enrolments mainly involved universities in S-I. Similarly, the recent recovery has only involved the C-N, while new entries have continued to drop in S-I. These dynamics partly reflect opposite demographic trends across areas (De Angelis et. al, 2016).

Southern universities also saw a rise in the share of students who decided to enrol in universities located in the C-N of the country. Considering the period from 2007 to 2015, the demographic decline and the increase in young students' mobility each accounted for about a third of the 25 per cent drop in new enrolments in the S-I (Figure 2).[5] By contrast, universities located in the C-N took advantage of a rise in the mobility flows from the S-I in addition to the growth in the young population. Among new entrants in first level courses, the number of movers from the S-I to the C-N increased by 10 per cent in the same period, reaching approximately a quarter of new entrants in 2015 (Table 1).

Figure 1: Enrolments by area of university (2007=100)

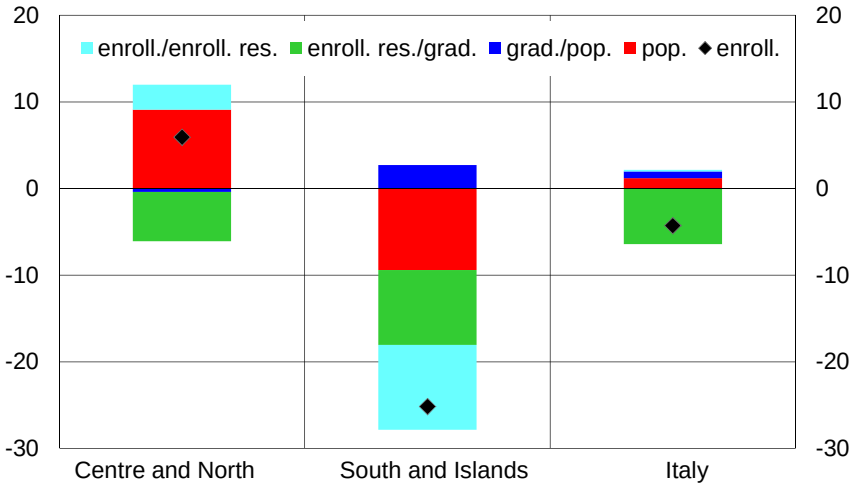


Source: authors' calculations from ANS.

[4] For simplicity, we indicate new enrolments in an academic year t/t+1 as new enrollment in t. Hence, for instance, enrolments in 2007 refer to the academic year 2007/08.

[5] Note that young students (aged 18-20) represented almost 90 per cent of new enrolments in first level courses between 2007 and 2015 and the trends in their propensity to move by area follow the average trends, as the more pronounced rise in the number of young movers has been associated with a less pronounced drop in the number of new entrants in the same age range.

Figure 2: Decomposition of the variation of young students' enrolments by area of university (2007-2015)



Notes: Only students aged between 18 and 20. The percentage change in new enrolments in a given area has been decomposed as the sum of the following percentage changes: pop. (population 18-20), which measures the demographic trend; grad./pop. (ratio of upper secondary school graduates on population 18-20), which measure the propensity of population to complete upper secondary schools; enrol. res./grad. (ratio of enrolled residents in the area and upper secondary school graduates), measuring the propensity of secondary school graduates to enrol in tertiary education; enrol./enrol. res. (students enrolled according to the area of the university and number of enrolled residents), which is a measure of mobility. Source: authors' calculations from ANS.

Table 1: First level entrants by area of residence and enrollment

Area of enrollment	Center-North		South-Islands		Italy	
	share 2015	share 2007	share 2015	share 2007	share 2015	share 2007
Same as province of residence	50.2	54.6	48.1	52.9	49.4	53.9
Other province in the same region	32.7	30.4	22.6	24.2	28.8	27.8
Other region in the area	16.2	13.5	5.2	5.4	12.0	10.1
Other area	1.0	1.4	24.1	17.5	9.8	8.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: authors' calculations from ANS.

Long-range mobility, that is movements across geographical macro-areas, is only a part of the story. In the S-I, long-range outflows account for roughly half of the overall mobility, the remainder being explained by movements of students within region (short-range mobility) and between regions in the same macro-area (medium-range mobility). Figures for the C-N are very different: while long-range outflows are negligible, the number of students moving to a differ-

ent province of the region or to a different region of the macro-area increased between 2007 and 2015, reaching almost a third and a sixth of residents in the area, respectively (Table 1).[6]

Mobility patterns are further reinforced during the second level of tertiary education, as southern students that complete their first level courses in the C-N are added to the ones that graduate in the S-I and decide to move to complete their education. Overall, between 2007 and 2015, the share of students resident in the S-I and attending a second level programme in the C-N increased from 31 to 38 per cent. For universities located in the C-N, the rise in the number of students from the S-I is associated with an increase in within-area mobility (Table 2).[7]

Table 2: Second level entrants by area of residence and enrolment

Area of enrollment	Center-North		South-Islands		Italy	
	share 2015	share 2007	share 2015	share 2007	share 2015	share 2007
Same as province of residence	44.3	49.3	37.0	39.2	41.4	45.4
Other province in the same region	30.6	31.3	19.4	23.6	26.1	28.3
Other region in the area	23.8	17.9	5.4	5.8	16.5	13.2
Other area	1.3	1.5	38.2	31.3	16	13
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: authors' calculations from ANS.

The increase in student flows both between and within areas probably signals a reallocation towards more attractive universities, possibly related to higher teaching and research quality and better placement opportunities. Indeed, looking at the market shares of movers we observe a substantial reallocation across universities between 2007 and 2015.[8] Universities located in the northern part of the country have benefited the most from the rise in mobility. Some universi-

[6] The number of movers from S-I to C-N has increased in all the main academic fields, but in law, in civil engineering and architecture and in social sciences. In these fields, the reduction of movers has been due to a strong drop of total enrolments, while the incidence of movers has grown in these fields, too.

[7] Mobility may occur at different points of students' careers. Considering only data on newly enrolled students in 2006 along their career, and applying some minor approximations, we found that around 40 per cent of newly enrolled these students were resident in the S-I; 35 per cent were enrolled in a first level course in a university located in S-I; roughly 30 per cent completed a first-cycle course in a university in S-I. Among the students in the same cohort enrolled in a second level course, the share of those enrolled in a university located in S-I was about 28 per cent whereas the share that graduated in an institution located in S-I was near 25 per cent. According to the data from the 2015 Istat survey on the professional placement of 2011 graduates (Indagine 2015 sull'inserimento professionale dei laureati nel 2011, IIPL) four years after graduation roughly a quarter of the same students were living in the S-I, the outflow of graduates returning to the S-I being compensated by the inflow of graduates from universities in the S-I that moved to the C-N to look for a job or to work in that area.

[8] Universities' market shares are measured as their share of inflows from a given area of the country (C-N or S-I).

ties in the Centre, which used to attract a large share of students from the South, have instead lost ground, while several universities from southern Italy have reduced their capacity to retain local students (Table 3 and Table 4).

Table 3: Market shares of universities in C-N

University	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Market share of new entrants		Market share of movers from other C-N regions		Market share of movers from S-I regions		Market share of students from the province of the university
	2007	Delta 2007/15	2007	Delta 2007/15	2007	Delta 2007/15	Delta 2007/15
Roma La Sapienza	9.4	-1.5	3.5	-0.9	15.3	-5.9	-1.0
Bologna	6.3	0.9	9.5	2.8	8.6	1.9	-0.8
Torino	5.8	0.2	2.2	0.8	1.6	1.8	-1.1
Milano	5.6	0.6	4.0	0.1	2.5	0.8	1.3
Padova	5.6	0.0	4.8	0.1	1.6	0.1	-2.0
Firenze	4.5	-0.2	2.1	0.1	3.7	-0.5	0.0
Pisa	4.0	-0.2	3.3	0.0	6.6	-0.5	-0.6
Milano Cattolica	4.0	-0.2	3.8	1.2	3.6	1.4	-1.4
Milano – Polit.	3.3	0.7	4.5	1.8	2.1	1.1	0.1
Genova	3.3	-0.4	3.3	-0.8	0.6	0.0	-4.0
Milano-Bicocca	3.0	-0.2	1.5	0.2	1.0	0.0	-1.5
Siena	2.9	-1.8	6.8	-5.8	9.8	-6.7	-4.4
Roma Tor Vergata	2.8	-0.1	0.4	0.1	2.9	-0.2	0.1
Roma Tre	2.7	0.2	0.5	0.0	2.3	-0.7	3.0
Parma	2.6	-0.5	5.3	-1.6	3.9	-0.6	-4.0
Perugia	2.5	-0.6	3.7	-1.5	4.1	-2.1	-8.6
Verona	2.4	0.1	4.4	0.1	0.5	0.1	0.0
Torino – Polit.	2.1	0.7	1.4	1.0	2.7	4.9	-0.4
Modena-R. E.	2.0	0.3	1.5	0.1	1.7	0.4	1.7
Pavia	2.0	0.1	3.4	-0.6	1.4	0.8	-0.2
Ferrara	1.6	-0.1	5.0	-1.0	1.7	-0.3	-0.3
Trieste	1.6	-0.3	3.2	-0.5	0.5	0.1	-3.5
Venezia Ca' Foscari	1.6	0.5	1.8	0.9	0.3	0.4	2.2
Udine	1.6	0.0	3.3	-0.5	0.3	0.0	0.8
Ancona	1.5	0.0	0.3	0.0	1.7	1.5	-3.2
Bergamo	1.5	0.5	0.1	0.0	0.1	0.1	2.0
Brescia	1.4	-0.1	0.4	-0.1	0.4	-0.1	-0.4
Trento	1.3	0.2	3.3	2.5	0.3	0.9	-6.5
Milano Bocconi	1.2	0.2	3.2	0.2	3.1	-0.4	0.1
Urbino	1.2	0.2	2.2	0.4	2.0	1.2	0.9
Viterbo Tuscia	1.0	-0.1	1.3	-0.5	2.2	-1.1	0.5
Piemonte orientale	1.0	0.5	0.9	1.5	0.4	0.7	2.5
Varese Insubria	1.0	0.0	0.3	0.0	0.2	0.0	-0.2
Macerata	0.9	0.1	0.4	-0.1	1.0	0.7	1.1
Cassino	0.8	-0.2	0.0	0.0	1.7	-0.5	-0.9
Roma LUISS	0.6	0.2	0.6	0.1	2.6	-0.1	1.4
Camerino	0.6	-0.1	0.8	-0.3	1.2	-0.2	-1.5
Roma LUMSA	0.5	0.0	0.1	-0.1	1.4	-0.5	0.1
Milano IULM	0.5	0.2	1.0	0.3	0.5	0.2	0.2
Venezia Iuav	0.5	-0.1	0.6	-0.1	0.1	0.0	-1.1
Bolzano	0.3	0.0	0.2	0.3	0.0	0.0	-0.5
Perugia	0.2	-0.1	0.3	-0.3	0.3	-0.2	-1.2
Milano S. Raffaele	0.2	0.0	0.2	0.1	0.2	0.3	-0.1
Roma Campus BM	0.1	0.1	0.0	0.1	0.3	0.2	0.4
Roma UNINT	0.1	0.1	0.0	0.0	0.2	0.0	0.4
Castellanza (LIUC)	0.1	0.0	0.2	0.0	0.2	0.2	0.0
Univ. Europea RM	0.1	0.0	0.0	0.0	0.1	-0.1	0.1
Siena - Stranieri	0.1	0.2	0.0	0.1	0.1	0.6	1.5
Roma Foro Italico	0.1	0.1	0.1	0.0	0.1	0.0	0.5
Aosta	0.1	0.0	0.2	0.1	0.0	0.1	-7.8
Sc. Gastronomiche	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Total	**100**		**100**		**100**		

Source: authors' calculations from ANS.

Table 4: Market shares of universities in S-I

University	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Market share of new entrants		Market share of movers from other S-I regions		Market share of movers from C-N regions		Market share of students from the province of the university
	2007	Delta 2007/15	2007	Delta 2007/15	2007	Delta 2007-15	Delta 2007/15
Napoli Federico II	13.5	1.9	3.5	1.9	7.5	6.3	-0.4
Palermo	9.3	-1.2	0.3	-0.1	1.4	-0.1	-6.8
Bari	9.1	0.4	7.3	1.1	1.4	1.1	-1.6
Catania	8.8	-0.5	0.7	-0.2	1.6	-0.4	-4.0
Salerno	5.8	1.4	3.2	1.2	1.5	0.5	1.4
Chieti	5.3	-0.5	33.7	-2.8	22.5	-6.7	-2.2
Cal. – Arc. Rende	5.2	0.0	1.0	-0.2	0.7	0.3	1.3
Messina	4.9	-0.9	19.0	-4.3	1.4	-0.5	-1.7
Cagliari	4.6	0.5	0.2	-0.1	0.8	0.6	1.4
Lecce	4.3	-0.5	1.4	-0.3	1.2	-0.4	-4.0
Napoli II Univ.	4.1	0.3	0.5	1.0	2.2	2.0	-1.0
L'Aquila	3.9	-1.6	9.8	-5.5	40.1	-6.5	-11.8
Napoli –Parth.	2.7	0.1	0.6	0.2	5.0	-4.2	-0.7
Sassari	2.6	-0.4	0.1	0.0	0.7	0.7	-6.4
Catanzaro	1.8	0.0	0.6	0.2	0.7	0.3	0.2
Bari Politecnico	1.8	0.1	1.2	-0.3	0.1	0.0	-0.3
Foggia	1.7	0.2	1.8	-0.4	0.4	-0.2	0.5
Napoli L' Orientale	1.6	1.1	1.0	3.9	1.4	3.9	1.5
Reggio Calabria	1.6	-0.6	1.3	-0.1	0.3	-0.1	-4.7
Napoli Suor Orsola	1.3	0.2	0.2	0.4	0.8	-0.3	0.1
Campobasso	1.3	-0.1	7.0	2.6	2.0	-0.2	-9.0
Potenza	1.3	-0.1	3.7	0.7	0.2	0.0	-5.4
Benevento	1.2	0.0	0.3	0.9	0.2	0.3	-0.5
Enna -KORE	1.1	0.1	0.1	0.0	0.3	-0.2	-0.1
Teramo	1.1	0.1	1.4	0.2	5.3	4.1	0.4
Casam. - LUM	0.2	0.0	0.1	0.0	0.4	-0.3	0.1
Total	**100**		**100**		**100**		

Source: authors' calculations from ANS.

The rise in the share of movers could be due either to a change in the propensity to move or to a change in the composition of student cohorts, possibly related to the decline in enrolments in the period we analyse. De Angelis et al. (2016) show that among young cohorts the probability of moving varies with gender, schooling background and characteristics of the home town and that it has increased since 2010. They find that males, students from licei, those with better high school grades and living in smaller municipalities, especially in the southern regions, are more likely to move. Given the different propensity to move of different groups of students, a larger decline in the enrolment rate of students with a relatively low propensity to move could explain the rise in the share of movers even with no change in student behaviour. To rule

out this possibility, we have conducted a shift-share analysis, classifying students according to the most important variables that have proven to be correlated with the propensity to move: sex, age (less or equal to 20 and more than 20 years old), and type of high school diploma (liceo and others). The change in the share of movers between 2007 and 2015 can be broken up into a 'between' component (the part due to the change in the composition of students between cells), a 'within' component (the part explained by the change in the share of movers within each cell, that is the propensity to move within each group defined by gender, age group and type of high school diploma) and an interaction component, measuring the co-movement of student composition and propensity to move, as in equation [1]:

$$m^{15} - m^{07} = \sum_i (Sh_i^{15} - Sh_i^{07}) m_i^{07} + \sum_i (m_i^{15} - m_i^{07}) Sh_i^{07} + \sum_i (m_i^{15} - m_i^{07})(Sh_i^{15} - Sh_i^{07}) \qquad (1)$$

where m_i is the share of movers in the cell *i*, Sh_i is the share of students in the cell *i*, and the superscript indicates the years 2007 and 2015. We consider a mover any student enrolled in a university located in a region other than that of origin.

The results in Table 5 show that the rise in the movers' share between 2007 and 2015 is mostly due to a positive within component and to a lesser extent to the interaction term, which means that the rise in the propensity to move is stronger in cells that increase their share of students in the same period. The change in the propensity to move also explains macro-area differences in the rise in student mobility, whereas changes in composition make a small and negative contribution that is fairly similar across the two macro-areas.

Table 5: Shift-share analysis of the change in mobility in 2007-2015

Area of residence	Between component	Within component	Interaction term	Overall change
	$\sum_i (Sh_i^{15} - Sh_i^{07}) m_i^{07}$	$\sum_i (m_i^{15} - m_i^{07}) Sh_i^{07}$	$\sum_i (m_i^{15} - m_i^{07})(Sh_i^{15} - Sh_i^{07})$	
Center-North	-0.4	1.5	0.5	1.7
South and Islands	-0.4	5.6	0.7	5.9
Total	-0.3	2.6	0.6	2.9

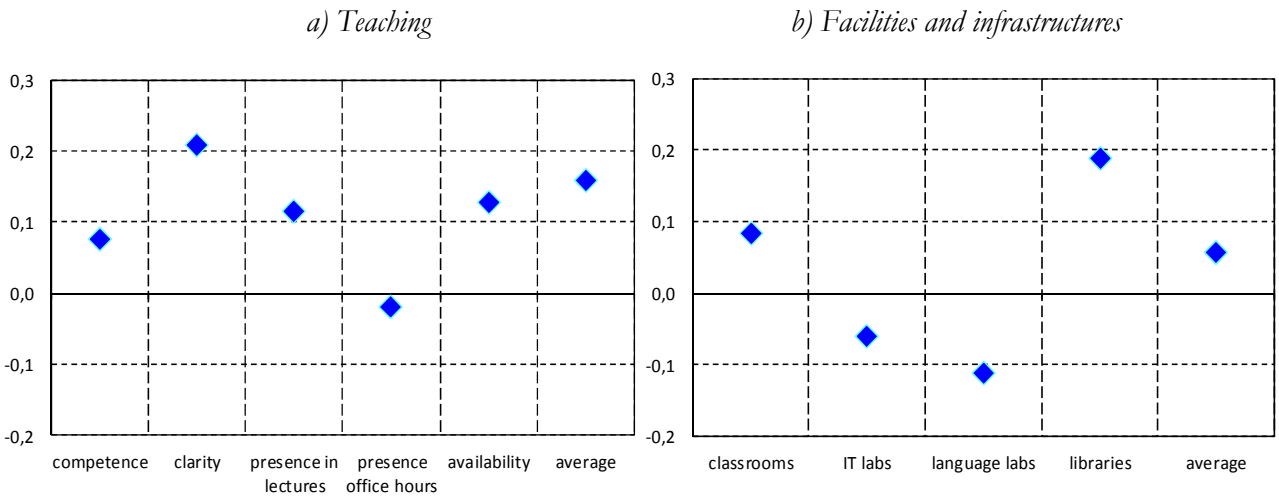
Source: authors' calculations from ANS.

4. Drivers of mobility at the university level

While the geographical patterns of mobility and their change over time are quite clear, from a policy perspective it is important to understand whether the mobility flows are driven by specific attributes that universities can, to some extent, modify to increase their attractiveness. In the following we introduce five measures of university quality and assess their relation to

mobility flows. We first discuss the issue in a descriptive setting and then move on to a regression framework, where we also investigate whether the significance of these measures increased over time.

Figure 3: Movers' evaluation of teaching and university facilities

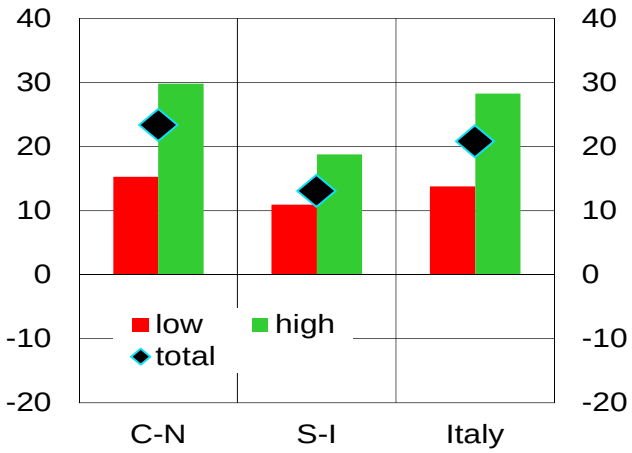


Notes: The figures represent the standardized evaluation given by movers (students enrolled in a university located in a region different from the one of residence) in the IPLSD 2011 with respect to each item. The teaching indicator ("average") has been calculated in two step. First, we have calculated the average evaluation given by each student taking the mean on the items indicated in panel (a). Then the individual evaluations have been averaged at the university level and standardized. This implies that the indicator has zero mean and unit standard deviation. A similar procedure has been used for the infrastructure indicator, on the items indicated in panel (b). Source: authors' calculations from ANS.

We begin with two measures of quality related to teaching and facilities. We take them from the 2011 wave of the Indagine sui percorsi di studio e di lavoro dei diplomati by Istat (IPSLD), in which secondary school graduates (enrolled in university) were asked to evaluate the quality of teaching and infrastructures in their university along several dimensions. Overall, movers better evaluate the quality of teaching in their universities, consistently with the idea that teaching quality can play a role in pushing mobility (Figure 3a).[9] The results are robust when conditioning on students' high school grades, and hence they are unlikely to reflect differences in the composition of movers with respect to stayers in terms of schooling background. Moreover, during the crisis, mobility dynamics were more pronounced in the universities whose teaching quality was above the median (Figure 4). A similar analysis, which compares the evaluations of infrastructures and facilities by movers and stayers, shows mixed results (Figure 3b).

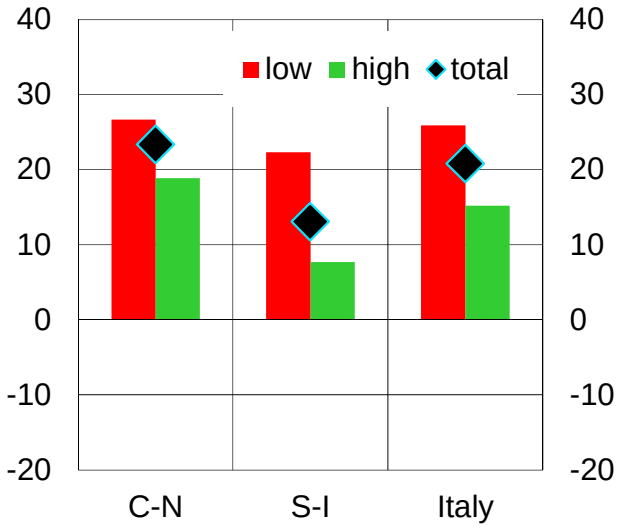
[9] As in the previous shift-share analysis, movers are defined as students newly enrolled in first-level courses in a university located in a region different from the one of residence.

Figure 4: Percentage change in mobility by area of university and teaching quality level



Notes: The green (red) bars represent, for each geographic area - C-N, S-I, Italy - the variation of mobility for universities with high teaching quality, i.e. above (below) the median. The quality of teaching is measured from IPSLD 2011 as the average of the indicators represented in Figure 3a. Movers are defined as students newly enrolled in first-level courses in a university located in a region different from the one of residence. Variations are calculated between 2007 and 2015. Online universities and the *università per stranieri* have been dropped from the sample. Source: authors' calculations from ANS.

Figure 5: Percentage change in mobility by area of university and drop-out rate

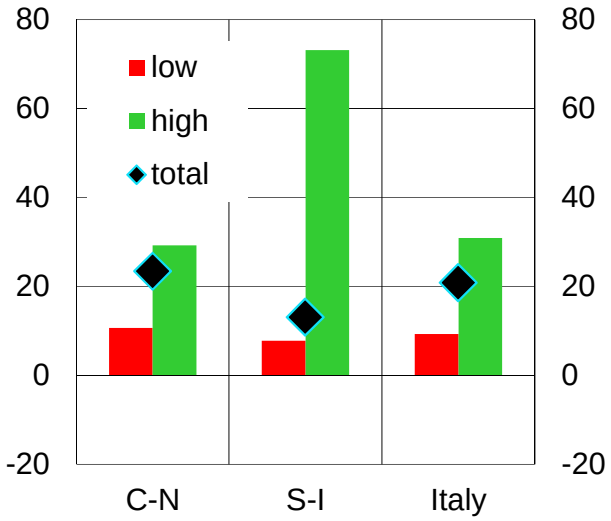


Notes: The green (red) bars represent, for each geographic area - C-N, S-I, Italy - the change in mobility for universities with high (low) drop-out rate, i.e. above (below) the median. Universities have been allocated in one of the two groups (high, low) according to their drop-out rate in 2007. Movers are defined as students newly enrolled in first-level courses in a university located in a region different from the one of residence. Variations are calculated between 2007 and 2015. Online universities and the *università per stranieri* have been dropped from the sample.

Data on student academic performance and quality of research seem to point to similar conclusions. To measure student performance we use the drop-out rate, calculated from ANS as the share of first-year students that did not enrol in any university in the following academic year (ANVUR, 2016; De Angelis et al., 2016) insofar as it measures the university's ability to reduce the anticipated exit and allow students to complete their studies. Research quality is measured using data from the National Agency for the Evaluation of University (ANVUR, 2013) for

the period 2004-10, aggregated by groups of scientific fields and universities.[10] As expected, in both macro areas mobility increases more towards universities with a lower average drop-out rate and higher quality of research (Figures 5 and 6).

Figure 6: Percentage change in mobility by area of university and quality of research



Notes: The green (red) bars represent, for each geographic area - C-N, S-I, Italy - the change in mobility for universities with high (low) quality of research, i.e. above (below) the median. The quality of research is measured by the weighted average of the R indicator calculated by ANVUR for the period 2004-2010. Movers are defined as students newly enrolled in first-level courses in a university located in a region different from the one of residence. Variations are calculated between 2007 and 2015. Online universities and the *università per stranieri* have been dropped from the sample. Source: authors' calculations from ANS.

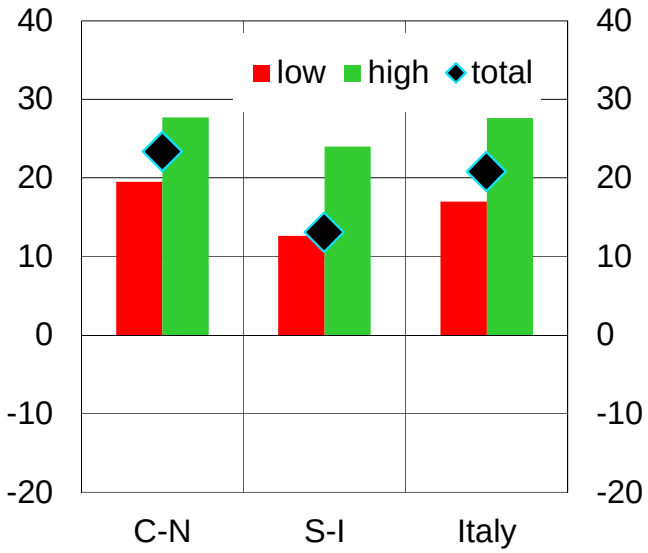
As to the effectiveness of universities in providing students with adequate skills for the labour market, it is quite common (for instance in many university rankings) to use directly the labour market indicators as a parameter. However, such indicators calculated at university level tend to reflect local economic conditions more than university quality. This is a problem for our purposes, especially considering that differentials between geographical areas are very pronounced in Italy. To address the drawbacks of these indicators we rely on a measure of labour market outcomes that accounts for local labour market differentials. For each university we calculate the employment weighted earnings (a possible measure of graduates' success in the labour market) from the Indagine sull'inserimento professionale dei laureati by Istat (IIPL 2015), controlling for student observables and for differences in the local labour markets where universities are located.[11] Although these attributes explain roughly 40 per cent of the raw differen-

[10] We use the 'R' indicator that captures, for each university, the relative quality of research products in a field with respect to the overall quality of the products in the same field at the national level. Evaluations in each field have been aggregated at the university level weighting by the share of research products in each field.

[11] Employment weighted earnings are defined (for each university) as the product of average earnings and employment rate of graduates. We implement the procedure described in Ciani and Mariani (2015) using data from the 2015 IIPL. A similar procedure has been used by Brunello and Cappellari (2008). The estimation procedure also addresses issues relating to the endogeneity between individual labour market performances of graduates and local labour market characteristics.

tial between universities located in the C-N and in the S-I, (conditional) employment weighted earnings are on average higher in the C-N by almost 5 per cent. Hence, universities in the C-N appear, on average, relatively more effective in providing better labour market prospects, even if less than suggested by the raw data. Moreover, universities that performed better in terms of employment weighted earnings between 2007 and 2015 also display a more sustained mobility dynamics (Figure 7).

Figure 7: Percentage change in mobility by area of university and employment weighted earnings



Notes: The green (red) bars represent, for each geographic area - C-N, S-I, Italy - the change in mobility for universities with high (low) employment weighted earnings, i.e. above (below) the median. Employment weighted earnings are estimated on the IIPL 2015 data according to Ciani and Mariani (2015). Movers are defined as students newly enrolled in first-level courses in a university located in a region different from the one of residence. Variations are calculated between 2007 and 2015. Online universities and the *università per stranieri* have been dropped from the sample. Source: authors' calculations from ANS.

The descriptive analysis conducted so far provide some evidence that the quality of the academic offer is likely to affect student mobility. In the following we investigate the issue in a more formal setting, trying to separate the contribution of different aspects of quality. Following Beine et. al (2014), who apply a comparable empirical setting as the counterpart of a theoretical model of student mobility, we estimate a series of bilateral regressions using as dependent variable the log of the yearly number of newly enrolled students from each Italian region of residence *i* to a given university *j*.

We limit the analysis to newly enrolled students and we exclude online universities at a distance and the *università per stranieri* .[12] Our sample is then composed of 74 observations (universities) per Italian region in each year from 2007 to 2014.[13]

As covariates we use the measures of quality previously introduced: the R indicator calculated by ANVUR for its evaluation exercise on the period 2004-10, the drop-out rate (at the end of the first academic year of studies) calculated from ANS, employment weighted earnings at the university level estimated from IIPL 2015 according to the procedure outlined in Ciani and Mariani (2015), the evaluations on teaching, infrastructures and facilities from the IPSLD 2011.[14] All quality measures are time invariant except for drop-out rates.[15] Variables expressed as indicators (R, drop-out, teaching and facilities evaluations) are included linearly in each regression, while employment weighted earnings are included in logs.

Table 6: Pairwise correlations between measures of university quality

	Enrolments	R	Drop-out rate	Empl. weight. earn.	Teaching	Facilities
Enrollments	1					
R	-0.0989	1				
Drop-out rate	-0.1775	-0.4142***	1			
Empl. weight. earn.	-0.1506	0.2822**	-0.0748	1		
Teaching	-0.1495	0.2294*	0.0165	0.4795***	1	
Facilities	-0.2229	-0.1865	0.1698	0.1465	0.4143***	1

Notes: Year 2007. Only first-level entrants. Online universities and the *università per stranieri* have been dropped from the sample.. The variable "R" measures the quality of research and it is computed as the weighted average of the R indicator calculated by ANVUR for the period 2004-2010. The variable "empl. weighted earnings" is the average employment weighted earning in the university estimated according to Ciani and Mariani (2015) from IIPL. The variable "teaching" is the average of high school graduates evaluations on teaching, the variable "facilities" is the average evaluation of high school graduates on facilities and in from IPSLD. *p<0.10, **p<0.05, *** p<0.01. Source: authors' calculations from ANS.

[12] The 'Foreigners' University' is a public university specializing in the teaching of Italian (and other languages) and in scientific research on the diffusion of Italian language and culture in the world.

[13] Data on 2015 are excluded since, among the explanatory variables, drop-out rates cannot be computed as they are measured at the end of each academic year, whereas enrolments are usually reported at the beginning of the academic year.

[14] Evaluations on teaching, infrastructures and employment weighted earnings are computed only for the universities sampled in the IPSLD and IIPL. This explains why regressions including these variables have a slightly lower number of observations. The teaching and infrastructures indicators are calculated according to the procedure outlined in Figure 3a.

[15] Considering the persistent nature of universities' characteristics and the fact that we mainly exploit cross-sectional variability to estimate the relation between student flows and university quality measures, we do not consider it to be a major problem that most of the measures are time invariant and are taken at given points in time.

Given that all measures are highly correlated with one another (Table 6), we first show a set of regressions in which measures of quality are included singly in order to rule out the effects of multicollinearity.

We include a set of dummies for distance (100-300 km, 300-500 km, more than 500 km, up to 100 km is omitted) to assess how the distance of the university affects interregional flows.[16] Moreover, we control for the size of the university by including the number of enrolled students (in logs). We also add year fixed effects to take account of the increasing trend in mobility during the period considered, and region of origin fixed effects. Standard errors are clustered at the university level.

Table 7: Mobility flows from a region to a university

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Log enrolled	0,662***	0,667***	0,646***	0,765***	0,767***	0,686***
	(0,075)	(0,076)	(0,072)	(0,088)	(0,096)	(0,085)
Distance 100-300 km	-3,187***	-3,209***	-3,210***	-3,210***	-3,257***	-3,219***
	(0,137)	(0,139)	(0,137)	(0,137)	(0,134)	(0,138)
Distance 300-500 km	-4,432***	-4,397***	-4,441***	-4,503***	-4,502***	-4,488***
	(0,167)	(0,160)	(0,163)	(0,162)	(0,167)	(0,169)
Distance more than 500 km	-4,833***	-4,744***	-4,801***	-4,886***	-4,932***	-4,910***
	(0,181)	(0,175)	(0,184)	(0,176)	(0,170)	(0,179)
R		1,823***				
		(0,421)				
Drop-out			-3,660**			
			(1,509)			
Log empl. weight. earnings				2,666***		
				(0,723)		
Teaching					0,728**	
					(0,285)	
Facilities						0,026
						(0,265)
FE year	X	X	X	X	X	X
FE region of residence	X	X	X	X	X	X
Constant	X	X	X	X	X	X
Number of observations	11.840	11.840	11.840	11.520	11.520	11.520
R2	0,594	0,618	0,611	0,613	0,613	0,594

Notes: Period 2007-2014. Only first-level entrants. Online universities and the *università per stranieri* have been dropped from the sample. The dependent variable is the log of the flow of first-level entrants from a region to a university. The variable "R" measures the quality of research and it is computed as the weighted average of the "R" indicator calculated by ANVUR for the period 2004-2010. The variable "empl. weighted earnings" is the average employment weighted earning in the university estimated according to Ciani and Mariani (2015) from IIPL. The variable "teaching" is the average of high school graduates evaluations on teaching, the variable "facilities" is the average evaluation of high school graduates on facilities and in from IPSLD. SE clustered at the university level. *p<0.10, **p<0.05, *** p<0.01. Source: authors' calculations from ANS.

As expected, the coefficients associated with the number of enrolled students is significant and positive. Consistently with previous literature (for instance, Pigini and Staffolani, 2015), distance is negatively correlated with interregional mobility flows. The coefficients of the distance dummies also indicate a concave profile, suggesting that the effect increases at a decreasing

[16] For each flow the distance is calculated from the administrative centre of the region to the university.

rate.[17] These results are stable across specifications. The coefficients associated with university quality have the expected sign and are all significant with the exception of the one on infrastructures and facilities.

Table 8: Mobility flows from a region to a university

Independent variables	(1)	(2)	(3)
Log enrolled	0,790***	0,790***	0,823***
	(0,015)	(0,013)	(0,013)
Distance 100-300 km	-3,328***	-3,266***	-3,317***
	(0,060)	(0,050)	(0,046)
Distance 300-500 km	-4,362***	-4,486***	-4,483***
	(0,060)	(0,051)	(0,046)
Distance more than 500 km	-4,534***	-4,840***	-4,592***
	(0,059)	(0,051)	(0,047)
R	1,345***	1,244***	-0,036
	(0,099)	(0,082)	(0,092)
Drop-out	-2,034***	-2,019***	-2,076***
	(0,222)	(0,183)	(0,178)
Log empl. weight. earnings	1,360***	1,371***	1,723***
	(0,143)	(0,118)	(0,166)
Teaching	0,423***	0,427***	0,220***
	(0,043)	(0,036)	(0,037)
Facilities	0,031	0,028	0,368***
	(0,049)	(0,040)	(0,043)
FE year	X	X	X
FE region of residence		X	X
FE region of the university			X
Constant	X	X	X
Number of observations	11.520	11.520	11.520
R2	0,475	0,642	0,710

Notes: Period 2007-2014. Only first-level entrants. Online universities and the *università per stranieri* have been dropped from the sample. The dependent variable is the log of the flow of first-level entrants from a region to a university. The variable "R" measures the quality of research and it is computed as the weighted average of the "R" indicator calculated by ANVUR for the period 2004-2010. The variable "empl. weighted earnings" is the average employment weighted earning in the university estimated according to Ciani and Mariani (2015) from IIPL. The variable "teaching" is the average of high school graduates evaluations on teaching, the variable "facilities" is the average evaluation of high school graduates on facilities and in from IPSLD. SE clustered at the university level. *p<0.10, **p<0.05, *** p<0.01. Source: authors' calculations from ANS.

In Table 8 we show another set of regressions, where all quality indicators are included together.[18] Each column of the table differs according to the set of geographical dummies used as controls. Even though these regressions are affected by multicollinearity, they have the advantage of highlighting if each quality measure has additional explanatory power. Coefficients relating to the quality of research remain significant and quite small: on average, an increase in R

[17] We obtain the same results when excluding the distance dummies. Alternatively, we include dummies to capture the distance according to the type of mobility (within region, between regions and between areas). The results are not substantially affected, but the interpretation of the coefficients is less clear, as regions differ as to distance to the border of the area.

[18] Here we do not address issues related to endogeneity. This is a limitation especially in specifications where many quality indicators have been included, as long as the presence of an endogenous covariate results in inconsistent estimates of all the coefficients of the regression.

of one unit (which means, for a university, jumping from the bottom of the ranking to the best performing decile) implies, all other things being equal, an increase of about 1.3 per cent in the flows towards the same university. Reducing the drop-out rate by 1 percentage point increases the flows to a university by around 2 per cent. Including additional dummies for the region of the university as a robustness check in column (3) does not change the results, except for the R coefficient, which becomes not significant, meaning that the quality of the university is likely to be highly correlated with other time-invariant regional characteristics.

Table 9: Mobility flows from a region to a university with interactions

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
Log enrolled	0,790***	0,789***	0,792***	0,790***	0,790***	0,790***
	(0,077)	(0,077)	(0,076)	(0,077)	(0,077)	(0,077)
Distance 100-300 km	-3,291***	-3,290***	-3,281***	-3,290***	-3,293***	-3,291***
	(0,143)	(0,143)	(0,142)	(0,144)	(0,143)	(0,143)
Distance 300-500 km	-4,506***	-4,508***	-4,503***	-4,507***	-4,507***	-4,507***
	(0,165)	(0,165)	(0,166)	(0,164)	(0,164)	(0,164)
Distance >500 km	-4,887***	-4,893***	-4,893***	-4,885***	-4,888***	-4,888***
	(0,172)	(0,172)	(0,172)	(0,172)	(0,171)	(0,172)
Distance 100-300 km*Period2	0,051	0,048	0,032	0,048	0,054	0,050
	(0,039)	(0,038)	(0,040)	(0,039)	(0,037)	(0,039)
Distance 300-500 km Period2	0,039	0,043	0,033	0,042	0,041	0,041
	(0,049)	(0,050)	(0,049)	(0,047)	(0,047)	(0,047)
Distance >500 km*Period2	0,094**	0,107**	0,114**	0,090**	0,096**	0,096**
	(0,041)	(0,042)	(0,046)	(0,041)	(0,041)	(0,041)
R	1,244**	1,090**	1,151**	1,241**	1,241**	1,241**
	(0,481)	(0,498)	(0,482)	(0,479)	(0,479)	(0,480)
Drop-out	-2,021*	-2,041*	-1,096	-2,038*	-2,035*	-2,035*
	(1,116)	(1,118)	(1,043)	(1,100)	(1,105)	(1,110)
Log empl. w.. earnings	1,371*	1,370*	1,339*	1,601*	1,371*	1,371*
	(0,770)	(0,770)	(0,761)	(0,835)	(0,770)	(0,770)
Teaching	0,427	0,427	0,418	0,427	0,463	0,427
	(0,284)	(0,284)	(0,280)	(0,284)	(0,304)	(0,284)
Facilities	0,028	0,028	0,039	0,029	0,029	0,082
	(0,291)	(0,290)	(0,289)	(0,291)	(0,291)	(0,303)
R X Period2		0,299**				
		(0,118)				
Drop-out X Period2			-3,233***			
			(0,796)			
Log empl. w. earnings X Period2				-0,458		
				(0,386)		
Teaching X Period2					-0,073	
					(0,116)	
Facilities X Period2						-0,107
						(0,110)
FE year	X	X	X	X	X	X
FE region of residence	X	X	X	X	X	X
Constant	X	X	X	X	X	X
Number of observations	11.520	11.520	11.520	11.520	11.520	11.520
R2	0,642	0,642	0,645	0,642	0,642	0,642

Notes: Period 2007-2014. Only first-level entrants. Online universities and the *università per stranieri* have been dropped from the sample. The dependent variable is the flow of first-cycle entrants from a region to a university. The variable "R" measures the quality of research and it is computed as the weighted average of the "R" indicator calculated by ANVUR for the period 2004-2010. The variable "empl. weighted earnings" is the average employment weighted earning in the university estimated according to Ciani and Mariani (2015) from IIPL. The variable "teaching" is the average of high school graduates evaluations on teaching, the variable "facilities" is the average evaluation of high school graduates on facilities and in from IPSLD. The variable Period2 is equal to 1 for the years 2011-2014. SE clustered at the university level. *p<0.10, **p<0.05, *** p<0.01. Source: authors' calculations from ANS.

In order to assess whether and how the effect of quality measures has changed during the period, we split it into two sub-periods of equal length (period 1: 2007-10 and period 2: 2011-14) and add interactions of the quality measures with the most recent sub-period one by one (Table 9).

The coefficients associated with the interaction between distance and the sub-period dummy turn out to be all positive as expected, indicating the declining importance of distance in explaining mobility flows from the region of residence to the university of destination. The magnitude of the interactions is larger for the dummy indicating longer range mobility, which is also significant at the 10 per cent level. Most importantly, we observe that the positive effect of quality of research and the negative effect of the drop-out rate tend to increase in the most recent sub-period: in other words, according to this, admittedly limited, evidence recent mobility flows appear to have been more strongly driven by these attributes of the academic institutions. On the contrary, the interactions with the other covariates are not significant.[19]

5. Conclusions

Using data from ANS, in this paper we document a significant rise in interregional mobility of Italian students in tertiary education since the end of the 2000s. Central and northern regions have been interested by an increase in the mobility within the area. In the South and the Islands, on the contrary, only long-distance flows towards central and northern regions have grown, reinforcing a well-established mobility pattern which now involves about one out of four students from southern regions.

The rise in student mobility occurred during a period of declining enrolment rates. This may have affected the composition of students, possibly reducing the participation of those with a lower propensity to move and boosting the overall mobility rate. However, a shift-share analysis shows that this was not the case: the rise in mobility was only driven by a genuine change in the within-group propensity to move.

In the second part of the paper we analyse the possible drivers of mobility, by associating regional mobility flows (from each Italian region towards each Italian university) during the years from 2007 to 2014 with a series of university quality measures. With no ambition of identifying a causal relation and by exploiting cross-sectional variability, we find, in line with the

[19] These results do not change when removing the interaction between time period and distance.

previous literature, a positive correlation between regional flows and these quality measures, controlling for the distance between the region of residence and each university, time trends and time invariant characteristics of the region of origin. In most cases, the coefficients associated to quality measures remain significant even once we include fixed effects for the region of destination, which absorb most of the variability.

The interactions with a time fixed effect show a rise over time of the importance of the drop-out rate and of the research quality measure in driving student flows. This evidence may signal a change in the attitude of students, that might now pay more attention to the quality and effectiveness of their tertiary education experience, partly in order to improve their chances of finding rewarding employment after graduation, in a labour market that has deteriorated considerably since the onset of the Great Recession.

Another complementary explanation for the rise in the importance of quality is related to the availability of information on university performance. Although measuring the quality of universities, which is a multidimensional feature, is not easy, in recent years, guides and evaluation exercises have certainly enriched the information set of students and their families, conveying the message that universities and programmes are not all the same.

We believe that our results raise some policy issues that deserve to be tackled. Although the growth of mobility is quite a general phenomenon, recent developments described in the paper have clearly reinforced the asymmetry in the mobility of students between southern and northern regions, with a substantial rise in the outflows of students from the South to universities located in the North. Though the North-South gap in employment opportunities is obviously beyond the reach of education policies, the quality of tertiary education remains the responsibility of education institutions and central government. As discussed by Asso and Trigilia (2016), with the transition to mass tertiary education and, more recently, with the increase in the autonomy granted to tertiary education institutions, universities in the S-I have suffered from a growing quality gap with respect to the rest of the country, mostly because of the way in which they have been managed by local elites. According to the authors, what has been called 'autonomy without responsibility' (to describe the growing autonomy gradually given to Italian public universities with no adequate control from central government) has resulted in poorer recruitment standards and lower overall quality. Although one should not disregard the resource disadvantage of most southern universities, owing to the lower ability to pay of southern families (ANVUR, 2016), our results suggest that policy makers should reinforce the incentives provided to institutions, professors and administrative workers to improve quality. In this respect, although we believe that the relative disadvantage of the southern regions should be assessed care-

fully and taken into account in the funding policy for public universities, we also believe that this should not interfere with the incentive mechanisms recently introduced to improve the performance of tertiary education institutions. Only quality-oriented institutions can prevent southern students from moving to better performing northern universities.

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