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Students Mobility: Assessing the Determinants of Attractiveness Across Competing Territorial Areas

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Abstract

A central question for education authorities has become ñ*which factors make a territory attractive for tertiary students*?ò Tertiary education is recognised as one of the most important assets for the development of a territory, thus studentsô mobility becomes a brain drain issue whenever there are prevalent areas that attract students from other territories. In this paper, we try to identify the most important factors that could affect student mobility in Italy. In doing that we analyse studentsô flows across competing territorial areas which supply tertiary education programs. We will consider a wide range of determinants related to the socio-economic characteristics of the areas as well as resources of the universities in the territories in terms of variety and quantity of the degree programs there available, financial endowments provided by Central Government, and services available to students. The Bradleyï Terry modelling approach based on pair comparisons has been adopted to define the attractiveness of competing territories and assess how much the detected divergences can be attributed to factors directly related to the considered characteristics of the universities in the territory and how much is ascribable to inherent characteristics of the areas where the universities are located such as the labour market conditions. Furthermore, the adopted approach allows us to consider uncertainty in defining territorial attractiveness and making comparisons. In this way, we would like to provide some evidences to assess if the rules currently used by the Central Government to finance public universities on the basis of their capabilities to attract students really reward the efforts made by the university system in the area to improve

their standard of quality or, on the contrary, reward the territorial features.
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Keywords

Student mobility
Bradleyï Terry model
University attractiveness
League tables

1. Introduction

Italian university system is mainly public and funded by central government. The share of the yearly financial provisions transferred from the central government to public universities depends, also, on their capability to attract students from other territories. Consequently, debate has arisen on indicators of quality of universities. Focusing on the ability of universities to attract students in a territory, these debates have rarely investigated on the determinants behind the flows of incoming students with respect to the characteristics of the territories. Furthermore, very often the central education authorities and mass media build league tables of universities, which are also based on their capability to attract students. These rankings do not control for the characteristics of the territory where the university are located, and blow up a public debate that runs the risk of over influencing student choices in the coming years (on the basis of unreal differences among educational institutions), penalising deprived areas.

The use of indicators of attractiveness based on student mobility leave practitioners with many unanswered questions, including (1) the definitions of flows of incoming students, (2) the adjustment for potential confounding factors external to the university institutions and (3) the need to account for uncertainty in the comparisons of the indicators that are used to make rankings/comparisons. For instance, though it is well known that it is easier to drain students from closer provinces or from provinces without universities, this aspect has been never (or only marginally) been considered in the definition of student flows.

In this framework, the purpose of this paper is to analyse student mobility across competing territories in Italy with tertiary education programs, and to consider its determinants in an attempt to propose a reconsideration of policies to support universities and territories. The paper aims to shed some light on how government policies to finance tertiary education based on attractiveness risk to over reward the universities of North, which are located in territories where the attractiveness is partially related to the socio-economic condition of the local system.

The paper is divided as it follows. Section 2 highlights key features from studies of student mobility and provides insight into previous research on this topic that is relevant to the motivations of our research. In Sect. 3, data and a preliminary descriptive analysis of student mobility are provided. Section 4 outlines the methodology based on pair comparisons that has been applied to estimate the territorial areas capability to attract students and outlines the rationales for using the Bradleyï Terry modelling approach to estimate the attractiveness of competing territories in terms of tertiary educational programs. Furthermore, this section advances the authorsô proposal to build up an overall indicator of territory attractiveness on an ordinal scale. Section 5 discusses the results of the modelling approach and summarizes them in terms of the attractiveness of the competing territories. Finally, few concluding remarks are provided.

2. Theoretical Framework

The issue of student mobility primarily refers to studies of the immigration phenomenon, which is currently considered to be made up of a number of push-and-pull factors. Some authors have posed the question of the complexity for providing a unique definition of ñstudent mobilityò (Teichler et al. 2011; Rumbley 2012), defining it in terms of mobile students, that is, for international comparisons, ñstudents who left their country of origin and moved to another country for the purpose of studyò (OECD 2014). For intra-country analysis mobility of students refers to the flows of non-resident freshmen enrolled (expressed in terms of counts of percentage) in a specific university in a given year (Dal Bianco et al. 2009; Agasisti 2007; Brunello and Cappellari 2005). We use the number of non-resident students as this is the information used by the Italian Ministry of Education (MIUR) to build up the indicators of attractiveness. Thus an analysis of the size of the flows of incoming and outcoming students is a starting point to understand the power in absolute terms of an area to drain students from other territories (considering the net flow).

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An analysis based on relative indicators would provide evidence on the attractiveness of areas/TETAs with respect to the size of the universities in the areas/THETAsAuthors have paid attention to studentsô mobility determinants, emphasising the influence of the educational, political, social, cultural and economic conditions of the studentsô origins and destinations on their mobility (Caruso and de Wit 2013; Beine et al. 2012; Kahanec and Kralikova 2011; Kratz 2011; Agarwal et al. 2008; Baryla and Dotterweich 2001). Empirical studies on student mobility can be divided into two main strands: studies on international student mobility, which focus on mobility across countries (e.g., Van Bouwel and Veugelers 2013; De Wit 2008; Kahanec and Kralikova 2011; Caruso and de Wit 2013), and studies on domestic student mobility, which focus on flows among territories within the same country (Ordine and Rose 2007; Agasisti et al. 2007; Dal Bianco et al. 2009). From another point of view, student mobility can be analysed on a micro or macro perspective based on the variety of subjective or objective reasons.

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From the micro perspective, individual motivations and family backgrounds play a key role. With respect to the macro level of analysis, the emphasis falls on the attractiveness of places of destination considering some key ñoriginò and ñdestinationò factors (Agasisti and Dal Bianco 2007; Dal Bianco et al. 2009) or the phenomenon of brain drain (Fratesi and Percoco 2014; Cariaci and Nuzzi 2012; Ordine and Rose 2007; Makovec 2006; Lupi and Ordine 2008; Brunello and Cappellari 2005). Indeed, student mobility has the following two main implications: socio-economic development (i.e., the net loss of human capital) and its impact on the rate of innovation and economic growth of the original regions (Viesti 2005; Fratesi and Riggi 2007) monetary resources transferred by the central government authorities to the universities based on their attractiveness, as measured in terms of student mobility.

AQ5

From a macro perspective, the existing empirical studies, have mainly analysed student mobility in terms of the flows of incoming students (Dal Bianco et al. 2009; Agasisti and Dal Bianco 2007). In these approaches the use of macro-covariates, which vary across territories, help to account for differences among alternative destinations (Dotti et al. 2013; Agasisti and Dal Bianco 2007) in terms of socio-economic characteristics of the origin/destination territories and of the local university system. The first group of covariates includes the type of economy (agrarian, industrial, the level of economic development), the labour market conditions and conditions of work (wage levels, job benefits), the ability of the economy to provide jobs and the types of jobs available; the number of industries, the ability of the national and local government to provide related infrastructures (education, job training) and the distance of the destination region with respect to the native region. The second group of covariates refers to the resources that the universities in the territory receive for their academic supply (in terms of educational and research activities).

In analysing the impact of the universities resources we have to consider that the Italian university system, as above said, is mostly public and is organised on a national basis. Universities are largely funded by central government authorities, and student fees are relatively low. Since the early 1990s, universities have become autonomous institutions that decide how to spend their budgets to pursue institutional tasks, such as research, teaching, and services in the area where they are located (primarily in the health sectors with university hospitals). Central authorities assign each institution a yearly monetary provision that is mainly distributed considering the size of the university (i.e., the number of the students enrolled). After more than 20 years of self-government, a number of Italian universities now suffer from the financial crisis, a high rate of dropouts, high unemployment or underemployed graduate rates and a low power to attract students from other territories. For these reasons, private and public stakeholders demand greater accountability from the system, and the central government allocates a portion of the yearly financial provision to each university considering also some indicators of performance. Among these indicators, particular attention is paid to features related to the *student mobility* and university *attractiveness*, both of which are monitored by tracking the number of incoming students from other areas.

Recent empirical evidence has analysed the Italian South-North student mobility divide, indicating that returns for education depend on the specific institution attended and on the location of the universities (Makovec 2006; Brunello and Cappellari 2005). These factors underlie that the labour mobility from Southern to Northern areas is mirrored by student mobility and contributes to increases in the magnitude of the regional disparities (Fratesi and Percoco 2014; Ordine and Rose 2007). Indeed, Southern students who attend Northern universities show very little inclination to return to the South (Svimez 2009), furthering the brain drain phenomenon.

3. Data

In the following, we define the student mobility phenomenon in terms of the number of students who move from their place of residence to attend a university degree program in another territory. The data on students mobility across territories here considered were provided for the year 2012 by the Italian central government department for the university (MiUR).

From the administrative point of view, Italy is divided in 107 different provinces that are clustered into 20 regions. The MiUR database records the number of students enrolled in a certain university by province of residence of students. In 2012 we scored 88 universities, 61 of which were public and 15 private. Among these 88 institutions, 12 were providing only *e*-learning degree programs, whereas 5 were focused on special programs (e.g., Ph.D. programs, schools of medicine). The remaining 71 universities offer traditional first-level or higher tertiary programs. In total, we scored 53 provinces out of 107 without universities.

The traditional universities are located in 54 different provinces; six of these are spread in more than one province due to some partnership between provinces (for example, for the provinces of Modena and Reggio Emilia, there is only one university) and some provinces have more than one traditional university (e.g., Rome has 7, Milan 6, Naples 4).

On the basis of the location of traditional universities in the country, we considered 50 different Tertiary Education Territorial Areas (TETA) which supply educational programmes and thus are in competition to attract students.

To describe the socio-economic characteristics of the TETAs we consider the findings of the survey published yearly and carried out by the daily newspaper *Il Sole-24 Ore* which considers 36 factors related to the six main domains of living conditions in the Italian provinces (that is, the standard of living, business and work, health and environmental services, population, public order, and leisure) and the overall quality of life based on a summary of these six domains.

To describe the effect of the characteristics strictly related to the tertiary education supply in TETAs we consider three indicators: (a) one that measures the TETAsô capability to attract yearly financial provisions from the central government (BENEFIT); (b) one which measures the overall quality of universities located in a TETA with respect to services provided to students (CENSISQUALITY); and (c) two that consider the attractiveness of the TETA in terms of number of the degree programs available for students in the universities located in TETA (DEGREESUPPLY) and their variety across the main scientific areas (VARIETYDEGREE). Specifically, the BENEFIT indicator was calculated by considering the share of ñbenefitò over the total amount of central government provisions for each university. The resulting values were next re-scaled in the interval [0,1] by subtracting from each value the minimum value observed and dividing by the difference between the maximum and the minimum. For TETAs which host different university institutions the average value of the indicators has been calculated.

As a proxy of the quality of the services supply in each TETA has been used the indicator annually published by the Study Center on Social Investment (CENSIS) to measure the overall quality of universities regarding five domains related to services, structures, web sites, internationalisation and grants for students (CENSISQUALITY). Finally the DEGREESUPPLY indicator was obtained using the information provided by MiUR[1] on the number of first- and second-level degree programs supplied in the 2013ï 2014 academic year in each TETA. This counting operation has been done also classifying the degree programs in each TETA in four main scientific areas: humanities (SAU), health care (SAHC), social (SASO) and science-technical (SASCI).

Table 1 provides for the 50 TETAs the information on the flows of incoming and out coming students and the variables above described together with some descriptive statistics. The variables related to the socio-economic characteristics of TETAs have been obtained by averaging (or summing up) the values observed for provinces which have been clustered in the same TETA, whereas the variables related to the quality of the tertiary education supply have been obtained by averaging (or by summing up) the values observed in the universities located in the same TETA. The geographical location of TETAs in the country has been considered to take into account the role of the spatial factors, in terms as the closeness of territories, as a driver of attractiveness. To this aim, according to their geographical location the 50 TETAs are classified in five main areas: North East, North West, Center, South, Islands. We do not consider the distance between TETAs among the geographical factors since in our experience there is not a real correspondence in Italy between physical distances and time and expenditure that students have to afford to reach places. The widespread presence of low cost air services together with high speed railway connections with competitive fairs that are frequently chosen by students for their movements make cheaper and faster in some cases for students to move for instance from South or Centre to North than to reach adjacent TETAs.

Table 1

variable description and some descriptive analysis

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
CHIETI-PESCARA	CHPE	686	904	ī 218	492	601
AQUILA	AQ	870	328	542	478	591
TERAMO	TE	178	627	ī 449	503	610
BOLZANO	BZ	15	270	ī 255	626	650
TRENTO	TN	479	355	124	604	660
MATERA-POTENZA	MTPZ	79	1120	ī 1041	451	499
CATANZARO	CZ	136	634	ī 498	448	543
COSENZA	CS	439	723	ī 284	420	492
REGGIOCALABRIA	RC	83	881	ī 798	424	474
BENEVENTO	BN	34	482	ī 448	445	490
NAPOLI	NA	986	870	116	405	446
SALERNO	SA	317	1391	ī 1074	418	452
BOLOGNA	BO	2376	187	2189	577	681
FERRARA	FE	332	152	180	518	632
MODENA-REGGIO	MORE	152	799	ī 647	573	653
PARMA	PR	434	139	295	586	670
TRIESTE	TS	267	54	213	586	709
UDINE	UD	116	262	ī 146	564	643
FROSINONE	FR	80	771	ī 691	443	567
ROMA	RM	3305	842	2463	557	672
VITERBO	VT	304	385	ī 81	487	572
GENOVA	GE	254	122	132	526	621
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
BERGAMO	BG	87	1000	ī 913	534	631
BRESCIA	BS	148	858	ī 710	549	639
COMO-VARESE	COVA	146	1789	ī 1643	518	658
MILANO	MI	5824	476	5348	564	761
PAVIA	PV	550	214	336	501	659
ANCONA	AN	708	469	239	530	621
MACERATA	MC	355	403	ī 48	544	603
PESARO-URBINO	PU	306	462	ī 156	553	579
MOLISE	ISCB	211	549	ī 338	443	547
PIEMONTE-ORIENTALE	VEATNO	136	1038	ī 902	504	667
TORINO	TO	1271	146	1125	529	666
BARI	BA	602	579	23	412	456
FOGGIA	FG	140	978	ī 838	412	464
LECCE	LE	27	1133	ī 1106	424	459
CAGLIARI	CA	42	110	ī 68	480	591
SASSARI	SS	48	172	ī 124	487	570
CATANIA	CT	193	451	ī 258	429	551
ENNA	EN	126	236	ī 110	438	487
MESSINA	ME	449	360	89	423	504
PALERMO	PA	92	376	ī 284	414	485
FIRENZE	FI	401	256	145	563	631
PISA	PI	663	101	562	542	608
SIENA	SI	473	159	314	616	652
PERUGIA	PG	461	200	261	530	574
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
AOSTA	AO	3	155	ī 152	581	671
PADOVA	PD	1260	451	809	531	648
VENEZIA	VE	361	915	ī 554	531	587
VERONA	VR	238	909	ī 671	565	686
Mean		545	545	0	506	592
SD		961	383	1060	63	79

TETA	Label	Benefit	Degree supply	Variety degree		
				SAHC	SASCI	SAS
CHIETI-PESCARA	CHPE	0.90	41	17	4	11
AQUILA	AQ	72	19	34	9	10
TERAMO	TE	0.82	17	1	6	10
BOLZANO	BZ		24	6	8	8
TRENTO	TN	0.37	60	5	19	24
MATERA-POTENZA	MTPZ	0.64	34	1	24	2
CATANZARO	CZ	0.75	18	9	4	5
COSENZA	CS	0.77	82	4	40	21
REGGIOCALABRIA	RC	0.69	18	0	16	2
BENEVENTO	BN	0.85	23	1	14	8
NAPOLI	NA	0.70	232	45	94	52
SALERNO	SA	0.79	79	11	29	24
BOLOGNA	BO	0.92	145	21	66	35
FERRARA	FE	0.83	57	18	25	7
MODENA-REGGIO	MORE	0.86	58	12	27	12
PARMA	PR	0.71	78	15	39	13
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
TRIESTE	TS	0.68	69	9	33	17
UDINE	UD	0.92	59	7	34	8
FROSINONE	FR	0.80	39	7	14	13
ROMA	RM	0.63	545	106	181	167
VITERBO	VT	0.74	39	9	16	7
GENOVA	GE	0.62	120	27	55	18
BERGAMO	BG	1.00	30	0	8	14
BRESCIA	BS	0.78	56	25	23	8
COMO-VARESE	COVA	0.87	36	11	16	8
MILANO	MI	0.92	341	50	140	108
PAVIA	PV	0.58	90	26	32	17
ANCONA	AN	0.83	49	17	24	8
MACERATA	MC	31	0	0	16	15
PESARO-URBINO	PU	0.70	38	3	10	15
MOLISE	ISCB	0.85	34	5	13	12
PIEMONTE-ORIENTALE	VEATNO	0.90	43	11	10	16
TORINO	TO	0.86	200	30	97	45
BARI	BA	0.60	134	24	58	31
FOGGIA	FG	0.89	35	12	7	10
LECCE	LE	0.62	62	0	24	19
CAGLIARI	CA	0.58	86	14	38	18
SASSARI	SS	0.68	57	12	18	17
CATANIA	CT	0.59	100	18	46	21
ENNA	EN		16	0	6	7
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
MESSINA	ME	0.47	104	26	32	31
PALERMO	PA	0.56	127	14	65	30
FIRENZE	FI	0.77	145	34	59	29
PISA	PI	0.70	142	22	67	33
SIENA	SI	0.26	72	20	19	18
PERUGIA	PG	0.69	90	12	40	23
AOSTA	AO		5	0	0	3
PADOVA	PD	0.95	197	49	80	42
VENEZIA	VE	0.83	53	5	16	13
VERONA	VR	0.99	64	19	13	17
Mean		0.74	87	16	35	22
SD		0.16	91	18	35	27
TETA	**Label**	**Area**	**Heterog without**	**Incidence without**	**Provinces adjacent**	**Hete with**
CHIETI-PESCARA	CHPE	S	0.86	0.48	4	0.89
AQUILA	AQ	S	0.90	1.00	6	0.89
TERAMO	TE	S	0.55	0.11	4	0.66
BOLZANO	BZ	NE	0.00	0.00	3	0.69
TRENTO	TN	NE	0.78	1.07	6	0.75
MATERA-POTENZA	MTPZ	S	0.61	0.08	6	0.58
CATANZARO	CZ	S	0.63	0.24	4	0.57
COSENZA	CS	S	0.53	0.99	3	0.55
REGGIOCALABRIA	RC	S	0.36	0.14	3	0.71
BENEVENTO	BN	S	0.12	0.55	5	0.79
NAPOLI	NA	S	0.32	6.03	4	0.57
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

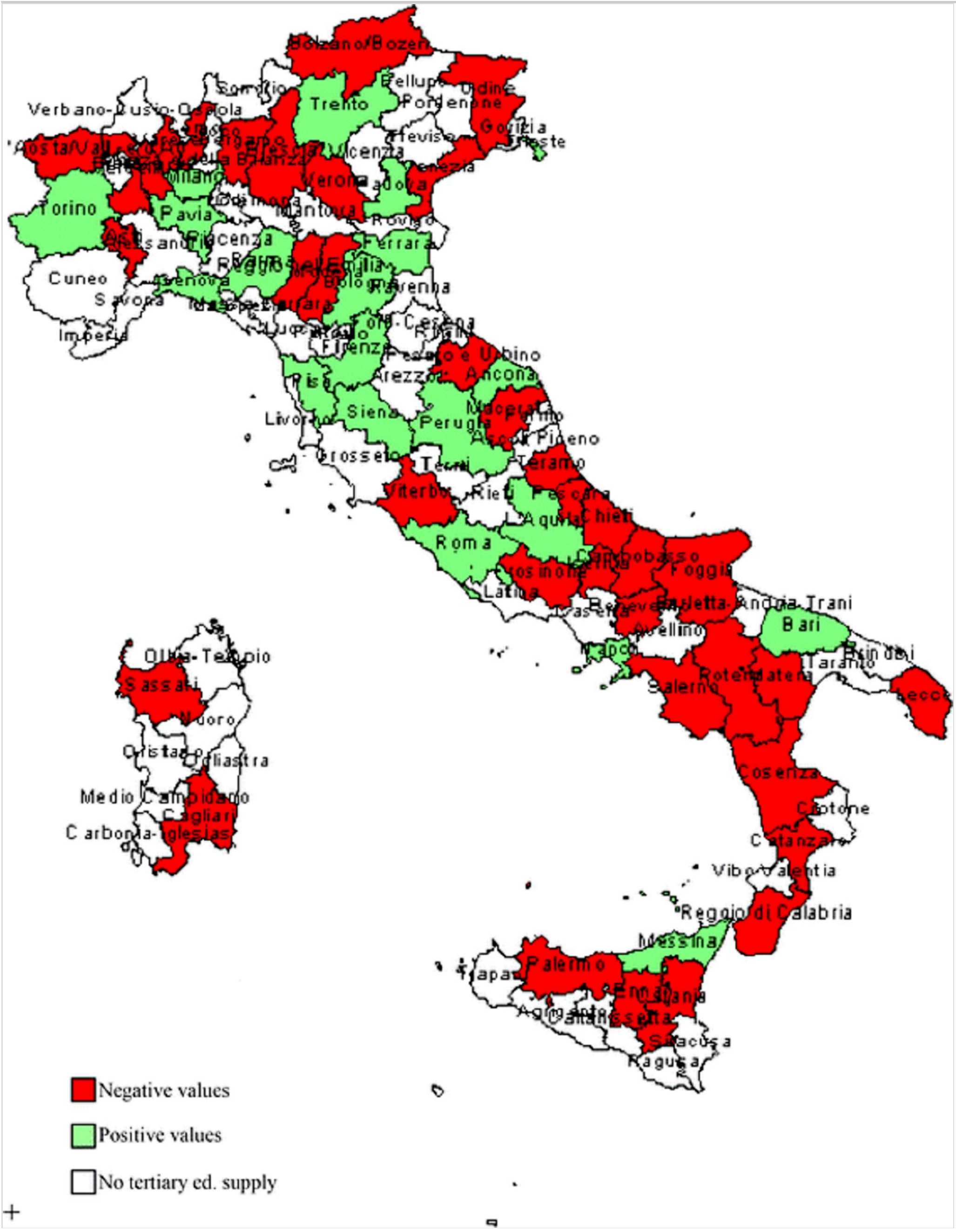
TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
SALERNO	SA	S	0.16	1.26	3	0.47
BOLOGNA	BO	NE	0.87	8.15	5	0.95
FERRARA	FE	NE	0.84	1.21	5	0.86
MODENA-REGGIO	MORE	NE	0.81	0.32	7	0.96
PARMA	PR	NE	0.92	1.73	6	0.79
TRIESTE	TS	NE	0.78	1.36	1	0.70
UDINE	UD	NE	0.70	1.66	4	0.77
FROSINONE	FR	C	0.51	0.62	5	0.69
ROMA	RM	C	0.81	6.87	5	0.94
VITERBO	VT	C	0.92	0.52	4	0.75
GENOVA	GE	NW	0.76	2.41	5	0.69
BERGAMO	BG	NW	0.69	0.36	5	0.71
BRESCIA	BS	NW	0.65	0.34	6	0.57
COMO-VARESE	COVA	NW	0.93	0.20	6	0.59
MILANO	MI	NW	0.87	14.46	6	0.90
PAVIA	PV	NW	0.94	1.48	6	0.86
ANCONA	AN	C	0.51	1.22	3	0.80
MACERATA	MC	C	0.64	0.93	3	0.80
PESARO-URBINO	PU	C	0.91	0.73	4	0.89
MOLISE	ISCB	S	0.74	0.14	6	0.71
PIEMONTE-ORIENTALE	VEATNO	NW	0.82	0.54	10	0.73
TORINO	TO	NW	0.82	5.89	5	0.92
BARI	BA	S	0.65	5.34	4	0.79
FOGGIA	FG	S	0.60	0.18	5	0.58
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it/index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

TETA	Label	Incoming Students	Outcoming students	Net flow	Quality of life	Stan of li
LECCE	LE	S	0.46	0.70	2	0.78
CAGLIARI	CA	ISL	0.82	1.90	5	0.52
SASSARI	SS	ISL	0.76	0.77	3	0.74
CATANIA	CT	ISL	0.65	1.81	5	0.40
ENNA	EN	ISL	0.69	0.69	4	0.54
MESSINA	ME	ISL	0.73	0.73	4	0.51
PALERMO	PA	ISL	0.61	2.57	5	0.46
FIRENZE	FI	C	0.81	3.84	8	0.95
PISA	PI	C	0.87	6.07	6	0.96
SIENA	SI	C	0.92	1.70	6	0.95
PERUGIA	PG	C	0.78	1.47	8	0.96
AOSTA	AO	C	0.00	0.00	3	0.45
PADOVA	PD	NE	0.68	6.03	5	0.70
VENEZIA	VE	NE	0.66	1.97	5	0.67
VERONA	VR	NE	0.56	1.10	6	0.79
Mean			0.67	2.00	5	0.73
SD			0.23	2.72	2	0.16
Data have been downloaded using the link: www.ilsole24ore.com/for indicators related to quality of life and its dimensions; http://anagrafe.miur.it /index.php for students flows; www.miur.it and www.censismaster.it for indicators related to university characteristics						

We detect two flows of migrant students: students who migrate from a territorial area that does not host a university, namely the ñforcedò migrant students (i.e., if they want to attend a university, they must migrate), and students who migrate from an area that has a tertiary education supply, namely ñfreeò migrant students (because they have the opportunity to attend a university where they live but choose to move). Considering both types of student flows, Fig. 1 shows the net flow coming on each TETA as the difference between incoming and out coming students. TETAs in the Centre-North of Italy have positive values, whereas all others have a negative net flow (in line with the main empirical evidence discussed in the literature on the issue of student mobility and brain drainð Fratesi and Percoco 2014; Cariaci and Nuzzi 2012; Ordine and Rose 2007).

Fig. 1

Net Studentsô mobility flows



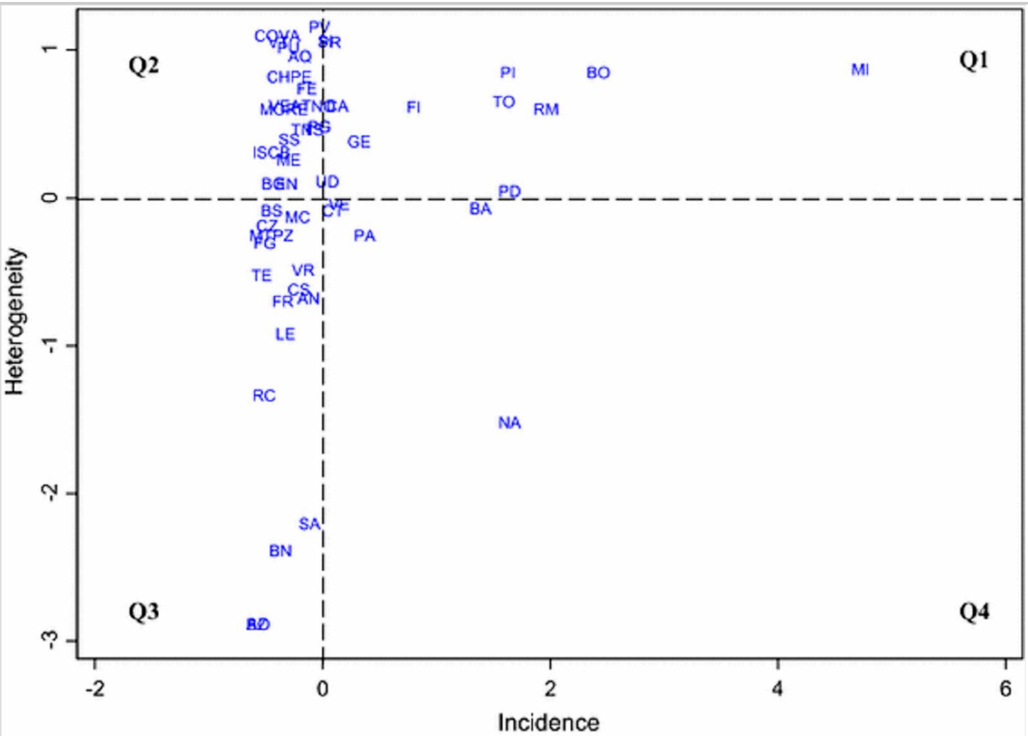
AQ6

Further, for each TETA we consider two measures suitable to account for the capability of each TETA to attract students from territories without universities in terms of amount (incidence) and heterogeneity (variability) of the territories from which they come from. The combination of these measures provides a measure of the *initial advantage* of each TETA with respect to the others in attracting students. Specifically, the *incidence* index (INCIDENCE) measures the percentage of forced migrant movers in each TETA on the total forced movers. Whilst the *heterogeneity* index (HETEROG) stands for the capability of each TETA to attract students from few or many Italian provinces without universities. To this aim the Gini index of heterogeneity (Leti 2001) is used to summarize for each TETA the variability of the distribution of forced mover students by province of residence. The two indexes aim to control for any *initial advantage* of a TETA in measuring its relative capability to attract students. As a further measure of first advantage we also consider for each TETA an indicator which count the number of adjacent provinces without universities (PROVADWITHOUT).

Figure 2 indicates the position of each TETA with respect to the standardised values of the *heterogeneity* and *incidence* indexes. In quadrant 1 (Q1), high values on both indexes stand for a higher (i.e., above average) level of attractiveness of a TETA, as it is able to attract not only a high percentage of students (incidence) but also students coming from a wide range of provinces (heterogeneity). For example, TETAs such as Milan (MI), Bologna (BO), Rome (RM), Turin (TO) and Pisa (PI) show better performances in Q1. The opposite is observed for those in quadrant 3 (Q3), which have low values for both indexes and are primarily located in the Southern regions; examples of these are Salerno (SA) and Benevento (BN) and the relevant exceptions of Bolzano (BZ) and Aosta (AO) in the Northern regions. It is interesting to highlight the position of Naples (NA) in quadrant 4 (Q4), with low values of the heterogeneity index for its incoming students. This mean that Naples attracts many students but from few provinces, whereas at the opposite there is Milan, that whit an heterogeneity index close to one, attracts many students from almost all the territories. In quadrant 2 (Q2), the TETAs that are performing below average in terms of incidence.

Fig. 2

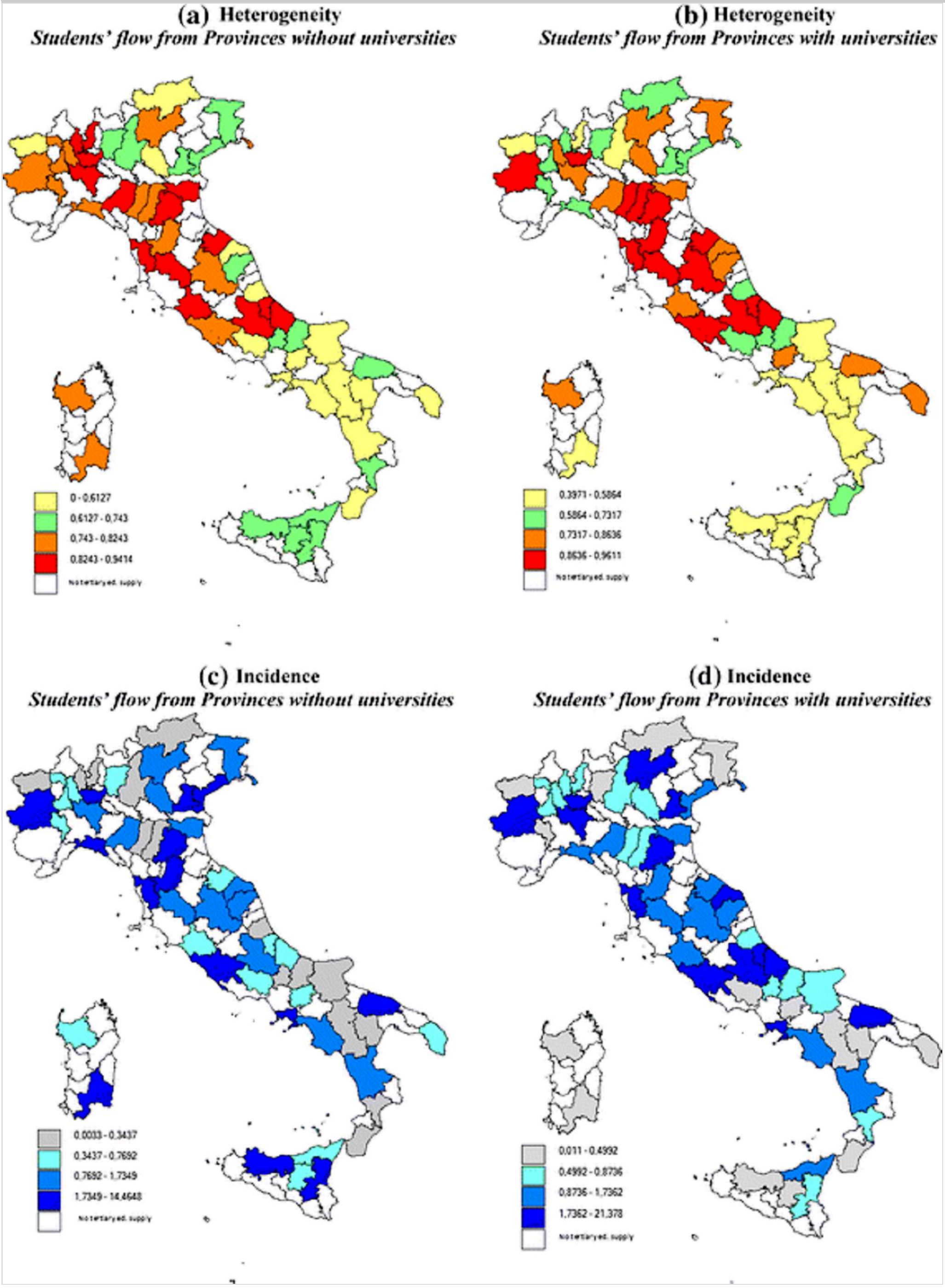
Heterogeneity and Incidence Indexes (standardized values)



Finally, Fig. 3 displays the values of *heterogeneity* and *incidence* indexes calculated using respectively the flows of incoming students from provinces without (Fig. 3a, c) and with (Fig. 3b, d) universities. The main finding here is that TETAs in the Southern areas attract more students from provinces without universities, whereas in terms of heterogeneity, TETAs located in the Centre-North have higher values of both types of flows.

Fig. 3

Heterogeneity and Incidence (quartile classification)



Generally speaking, these analyses seem to indicate that Northern TETAs are more attractive than the Southern ones even accounting for factors which determines a first advantage. From our perspective, analysing the preferences of the ñfreeò migrant students turns is particularly challenging because these students are motivated by individual and familial decisions to seek better educational (or, maybe, working) opportunities. Furthermore, to obtain a relative measure of the attractiveness for each TETA with respect to the others, it is interesting to evaluate its comparative attractiveness considering the factors which determine an initial advantage of the territories, its relevant socio-economic characteristics, and information on the tertiary education supply.

4. Methodological Approach and its Rationale

4.1. The Bradley–Terry Model

The analysis of TETAs attractiveness is primarily focused on modelling *free migrant student* choices and uses an approach based on pairwise comparisons across competing territorial areas in Italy. The standard Bradleyï Terry model (Bradley and Terry 1952; Agresti 2002) considers the territories being compared to be players (e.g., *i* and *j*) with different abilities. If the ability of *i* (*i* = 1, é , *T*) is higher than the ability of *j* (*for all j* Í *i*), the number of times that *i* beats *j* is expected to be higher than the number of times *j* beats *i*.

In a competition across territories for attracting students, this concept can be translated as the number of students who prefer the area *i* coming from the area *j*, that is the outcome variable. The model specifies the probability that in a pairwise comparison between *i* and *j* (for *j* that range from 1 to *T* ï 1), students prefer the area *i* to *j*, as follows:

$$\mathrm{pr}(\mathrm{i\ beats\ j}) = \frac{{}_i}{{}_i + {}_j} \qquad 1$$

where ***Ŭ****$_i$* and ***Ŭ****$_j$* are the ability parameters that measure the intensity of an unobservable (latent) trait in the two players. In the analysis of studentsô mobility the ability parameters are the attractiveness parameter of the competing TETAs.

By expressing the model in the *logit* form, Eq. (1) becomes

$$\mathrm{logit}[\mathrm{pr}(\mathrm{i\ beats\ j})] = {}_i \quad {}_j \qquad 2$$

where ǝ$_i$ = log Ŭ$_i$ and ǝ$_j$ are fixed or random parameter. The number of students who prefer TETA *i* to TETA *j* are runs of Binomial variables that are independent from the number of times *j* is preferred to another territorial area *k*. The data structure has at least two levels of analysis: level-1 units are the results of comparisons of each TETA with all the others [with a maximum number of observations (*T*) × (*T* ï 1)], and level-2 units are the *T* TETAs.

Based on the results of comparisons that share a common TETA, the attractiveness parameters are estimated.

In the standard Bradleyï Terry model, ǝs are specified as fixed effects that can be estimated using routines for generalised linear models via maximum likelihood, setting for identification reasons ${}_t = 0$ or $\sum_{i=1}^{T} {}_t = 0$.

The basic model allows generalisations to be made in several directions (Turner and Firth ~~2013~~2012) so that (1) the specification of the ñabilityò as a function of relevant covariates (players or individual covariates) is allowed; (2) general factors that create an advantage for players are considered; (3) ties can be handled; and (4) missing playersô covariates can be easily handled (Turner and Firth ~~2013~~2012). In particular, if player covariates alone are used to explain differences in the playersô abilities, the parameters $_i$ and $_j$ are related by a linear predictor to the covariates

$$_t = \overset{p}{\underset{r=1}{}} \; {}_r x_{ir} + U_i$$

and Eq. (2) becomes

$$\text{logit}[\text{pr}(\text{i beats j})] = \overset{p}{\underset{r=1}{}} \; (x_{ir} \quad x_{jr}) \; {}_r + U_i \quad U_j \qquad 3$$

where U_i and U_j are normally distributed random terms that account for the prediction error and correlation between comparisons that share a common player. Missing observations among covariates are handled (Turner and Firth 2013 2012) by considering the individual parameters of the players containing missing predictor values as fixed effects, which are estimated in addition to the other coefficients. The same generalizations apply in modelling a competition between areas in terms of attractiveness.

In the framework of the Bradleyï Terry models, we consider (1) the number of students who move from their place of residence to attend a university degree program in another territory as dependent variable, (2) territorial areas attractiveness with respect to tertiary education supply to be an unobservable variable that must be scaled in a *continuum* based on the results of multiple assessments between pairs of competitor TETAs and (3) territorial and university factors as independent variables (covariates). Specifically, differences in attractiveness parameters (as measured by a fixed or random parameter that is shared by all pairs in which the same territory is involved) are the factors that lead students to prefer one TETA over another.

4.2. Rationales for Bradley–Terry Model to Measure TETAs Attractiveness

Starting from the findings of previous applications of Bradleyï Terry model in fields posing similar research questions (e.g., Dittrich et al. 1998; Varin et al. 2016 2013 The working paper Varin et al. has been published.

The reference is:

Varin, C, Cattelan, M and Firth, D (2016). Statistical modelling of citation exchange between statistics journals (with discussion). Journal of the Royal Statistical Society A 179, 1-63.), we adopted this approach to control the heterogeneity of the competing territories in our analysis of student mobility along with model uncertainty. Our main aim was to ascertain real differences in attractiveness among territorial areas and assess which factors had the greatest influence on student behaviours.

Dittrich et al. (1998) advanced the first proposal of modelling student preferences regarding foreign universities for their semester abroad, considering pairwise comparisons between a list of competing universities involved in the student exchange programmes. In the case study discussed by Dittrich et al. (1998), two factors characterised the attractiveness of objects in comparison, specifically the characteristics of the universities in the area and those of the people who made the judgments between university locations (i.e., the students who make the choice and their interactions). This approach permits the exclusive consideration of pairs of objects that could be effectively competitors when providing an overall ranking (e.g., geographical areas from which we observed incoming and out coming flows) in terms of the location of the objectôs parameters in a continuum. Moreover, the main advantage of such an approach is that introducing subject and/or object covariates and their interactions addresses different research questions. Specifically, (1) subject-object interactions allow us to assess how the ranking of universities in terms of attractiveness changes considering students with a standard profile, whereas (2) the estimates of the object parameters obtained considering the objectôs characteristics alone are fairest criteria on which to rank a university (Dittrich et al. 1998). Other interesting applications of the Bradleyï Terry approach have been developed in different fields and share the common aim of ranking objects on a *continuum* based on repeated comparisons between pairs. Stigler (1994) proposes the adoption of the Bradleyï Terry models to assess the capability of a scientific journal to export intellectual influence (i.e., relevance) modelling on the exchanging of citations between pairs of journals. That framework fulfils conditions similar to those met in the analysis of the student mobility among universities. As stated by Varin et al. (~~2013~~ 2016), these conditions are as follows: (1) the omission of observations that represent the exchange of units of an object with themselves (e.g., self-citations or, in our framework, students who come from the same area in which the university is located); (2) the independence of the ranking of the objects from a size factor (e.g., the size of the journal in terms of the number of pages can be assimilated to the size of the university in terms of the population living in the area where it is located); (3) modelling observations between pairs alone for which an exchange is effectively observed (e.g., if journal i never cites journal j, the row is omitted, as in the case when no student moves from university i to university j). The last assumption allows us to easily overcome issues related to a huge presence of zeros, which would be due to the missingness of interchange flows between some areas, as frequently arises in analyses of student mobility.

Varin et al. (~~2013~~ 2016), who recognise the potential of the Stigler approach to provide a ranking of journalsô abilities to export intellectual influence, highlight that journal citation exchange is characterised by a high level of variability that should be carefully considered when making a meaningful ranking. Specifically, they focus their analysis on issues related to the risk of over-interpreting non-significant differences between objectsô ratings.

This is a condition even stronger in the analysis of territories attractiveness. Furthermore, the results of many studies have provided evidence that most of the differences based on point estimate are not significant if the 95 % comparison intervals are considered when assessing real differences in ranking (Goldstein and Spiegelhalter 1996; Leckie and Goldstein 2009; Varin et al. ~~2013~~2016).

4.3. Making Comparisons Considering Statistical Uncertainty

Based on the results on previous application of the Bradleyï Terry model for comparisons, the authors suggest considering uncertainty and substantial variability when making comparisons using an outright ranking (Goldstein and Spiegelhalter 1996; Leckie and Goldstein 2009).

The information on territorial attractiveness arising from pairwise comparisons is summarised using an Overall Rating Index (ORI) (Sulis and Porcu 2015). The index is obtained as summary of the comparisons of each TETA with all the others. Specifically, ORI counts for each TETA *i* (1) how many competing TETA *j* have the confidence bound of the attractiveness parameter for tertiary education (ə$_j$) completely below its confidence bound (ə$_j$).

The index is specified for each area *i* as follows:

$$ORI_i = \sum_{j \quad i}^{T} CB(ij) \qquad (4)$$

for all j Í i, where *CB*(*ij*) is an indicator variable that takes the value 1 if the confidence bound of the attractiveness parameter of territorial area *i* lays above the confidence bound of the area *j*, 0 otherwise. Thus each TETA is compared with the competing (*T* ī 1) TETAs with respect to its capability to attract students in its tertiary programmes of education. The ORI index ranges between 0 and *T* ī 1: in the worst scenario the index takes value 0, highlighting that none territorial area is worse than *i*, whereas in the best scenario it assumes value equal to *T* ī 1, highlighting that the attractiveness parameter of all the other territories are below. This index has two interesting features; it helps to detect real divergences while considering the uncertainty of measures in pairwise comparisons. It also locates TETAs on an ordinal scale on the basis of their capability to attract students for tertiary education by counting how many territories have a significantly worst performance (without quantifying the magnitude of those differences).

5. Empirical Analysis

We analyse the attractiveness of the 50 TETAs considering them in competition to attract students. The Bradleyï Terry modelling approach based on pair comparisons between TETAs has been specified to assess both the attractiveness of TETAs and relationships between factors that can affect the probability that one TETA is preferred to another one. The analysis considers 50 TETAs (level-2 units) involved in 929 comparisons (level-1 units).

We first estimate the null model presented in Eq. (1) to assess the attractiveness of competing TETAs without considering the effect of covariates. The attractiveness is estimated as a fixed parameter using only the information on the flows of incoming free migrant students in each TETA. Comparisons across the attractiveness parameters ($_t$) of TETAs are made by considering their related quasi variance standard errors (Firth and de Menezes ~~2005~~ 2004), suitable for plotting the 95 % confidence intervals of each point estimate and making direct comparisons (Firth 2012, Turner and Firth 2012). The caterpillar plot built up with quasi variance standard errors allow to highlight significant divergences in the attractiveness of the TETAs making direct comparisons across pairs. Specifically, the plot in Fig. 4 displays the outstanding position of Bologna, the confidence interval of which does not overlap the others, followed by Pisa, Pavia, Turin and Ferrara which show similar performances. From the plot it arises that even considering the whole confidence intervals in the comparisons, several clusters of TETAs, which show significant divergences in their attractiveness, can be detected. Table 2 lists TETAs attractiveness based on ORI indexes (see Eq. 4).

Fig. 4

Caterpillar plot of TETAs attractiveness parameters (null model)

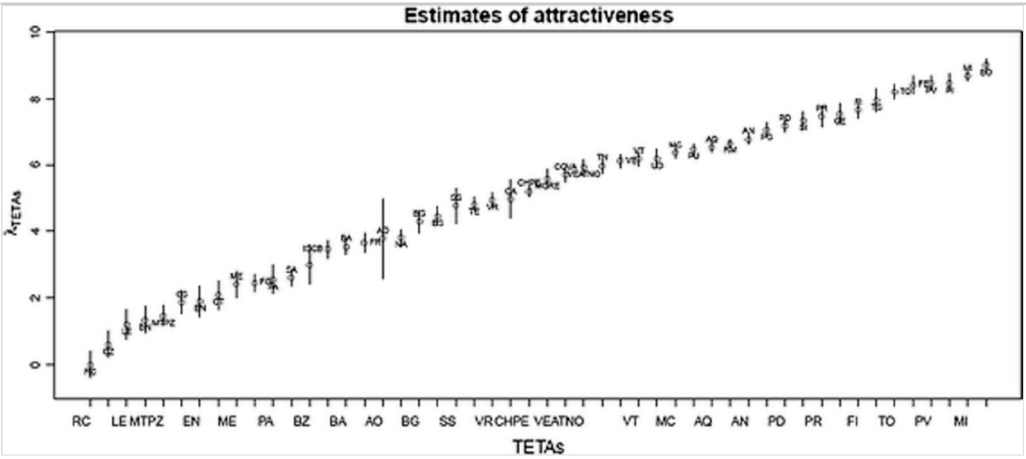


Table 2

confidence intervals of log-ability scores and ORI index (null model)

TETAs	95 % CI		ORI null model
	Lower bound	Upper bound	
AN	6.62	6.98	33
AO	2.59	4.98	8
AQ	6.37	6.71	31
BA	3.30	3.79	12
BG	3.96	4.62	16
BN	0.95	1.74	1

TETAs	95 % CI		ORI null model
	Lower bound	Upper bound	
BO	8.84	9.21	49
BS	4.18	4.73	17
BZ	2.42	3.60	7
CA	4.40	5.53	17
CHPE	5.03	5.36	20
COVA	5.47	5.93	24
CS	1.52	2.24	2
CT	1.66	2.53	2
CZ	0.21	1.01	0
EN	1.45	2.37	2
FE	8.16	8.68	43
FG	2.19	2.71	5
FI	7.44	7.92	39
FR	3.36	3.94	12
GE	7.26	7.86	37
ISCB	3.20	3.72	12
LE	0.76	1.67	1
MC	6.17	6.57	28
ME	2.02	2.81	5
MI	8.54	8.83	45
MORE	5.30	5.85	22
MTPZ	1.18	1.78	2
NA	3.60	4.04	13
PA	2.12	3.00	5
PD	7.02	7.39	37
PG	6.87	7.30	36
PI	8.21	8.76	43
PR	7.18	7.77	37
PU	6.25	6.67	29
PV	8.25	8.70	43
RC	-0.40	0.40	0

TETAs	95 % CI		ORI null model
	Lower bound	Upper bound	
RM	6.55	6.78	32
SA	2.37	2.83	6
SI	7.08	7.63	37
SS	4.25	5.30	17
TE	4.61	5.03	17
TN	5.74	6.20	25
TO	7.98	8.44	43
TS	7.61	8.32	39
UD	5.89	6.48	26
VE	5.91	6.30	26
VEATNO	5.69	6.16	25
VR	4.72	5.16	18
VT	5.97	6.36	27

The distribution of the ORI indexes show that the 50 TETAs take 29 different values, it highlights the meaninglessness of a straight rank based for evaluating attractiveness using a point estimate.

A second aim of the analysis is to assess how much of the variability in the attractiveness parameters of TETAs is due to the heterogeneity of the territories under comparisons and how much is due to the divergences in the efficiency of the tertiary education supply of the areas. For this sake we evaluate the share of variability in the value of the attractiveness parameters explained by the in introduction of covariates and the related variation in the value of the ORI index.

Table 3 reports the results of fitting four specifications of the Bradleyï Terry model which consider different type of covariates to explain divergences in attractiveness of TETAs. For LôAquila, Bolzano, Macerata, Enna and Aosta some information on covariates is missing, thus their attractiveness parameters have been estimated as fixed effects given the presence of missing data in the predictors. Model 0 considers the effect that factors strictly related to the tertiary education supply play on the attractiveness parameters. The results indicate that the three indicators related to the university characteristics have significant and positive effects, specifically BENEFIT, CENSISQUALITY and DEGREESUPPLY. The variety of the degree supply measured through the variable VARIETYDEGREE did not play a significant effect in explaining differences across TETAs, thus it has not been considered in the model.

Table 3

Estimates of Bradleyï Terry models

	Model 0			Model 1			Model 2		
	Est.	**SE**	***p* value**	**Est.**	**SE**	***p* value**	**Est.**	**SE**	***p* va**
Fixed effects									
AQ	16.379	4.131	***	17.413	2.843	***	18.098	2.335	**
BZ	12.836	4.144	**	13.901	2.862	***	14.585	2.359	**
MC	16.199	4.133	***	17.236	2.846	***	17.920	2.338	**
EN	11.848	4.119	**	12.886	2.827	***	13.602	2.316	**
AO	13.601	4.177	**	14.650	2.910	***	15.341	2.416	**
BENEFIT	4.315	2.137	*	0.673	1.547		1.996	1.362	
CENSISQUALITY	0.124	0.037	***	0.029	0.028		0.061	0.024	*
DEGREESUPPLY	0.013	0.003	***	0.004	0.003		ī 0.003	0.003	
STANDARDOFLIVING				0.017	0.004	***	0.007	0.004	.
LEISURE				0.006	0.003	*	0.006	0.003	*
HETEROGENEITY							4.271	1.310	**
INCIDENCE							0.367	0.110	**
PROVADWITHOUT							ī 0.057	0.151	
AREA (baseline = centre)									
Nord-East									
Nord-West									
South									
Islands									
	SD	**SE**	***p* value**	**SD**	**SE**	***p* value**	**SD**	**SE**	***p* va**
Random effects									
	2.080	0.231	***	1.361	0.156	***	1.099	0.132	**
Significance ó***ô; 0.001 ó**ô; 0.01 ó*ô; 0.05 ó.ô									

A difference of 10 % in the amount of BENEFIT is associated with an estimated average odd of 1.53; specifically, the TETA with the highest endowment of BENEFIT has an odd of (approximately) 23 of being preferred to another TETA with the lowest endowment of this metric.

However, the high standard errors of the three parameter suggest that these average results should be interpreted with caution. The effect of the CENSISQUALITY indicator is also relevant, as an advantage of 10 points in the indicator corresponds to a difference between the TETA values in the 1st and 4th quartiles associated with an odd of approximately 3.5 of being preferred by a student. The increase in the degree supply for approximately 20 degree programs is associated with an odd of approximately 1.3 of being preferred by a studentõs choice. Model 0 shows that the joint effect of the three indicators plays a significant role in explaining the differences among TETAs. For example, if we compare the TETA of Bologna, which has a top ranking, with ones located on the bottom, such as Reggio Calabria, using these three factors, the odds for Bologna to be preferred to Reggio Calabria are approximately 110. In Model 1, we consider also the six dimensions of the QUALITYOFLIFE index, specifically we retain LEISURE and STANDARDOFLIVING as their effect is significant and positive. It is worth highlighting that controlling for these two domains we observed two relevant consequences. First, the three predictors related to the characteristics of the universities lost their significance, and second, the size of the unexplained variability of the attractiveness parameter at TETA level (measured by the random component) undergoes a reduction of about 35 % (from 2.08 to 1.36).

In Models 2 and 3 further attempts to find out significant differences/advantages in attractiveness among the TETAs are made by assessing the role played by the three indicators that account for the initial advantage of TETA (Model 2) plus the territorial area where TETA is located (Model 3).

In explaining the role played by the *initial advantage* in producing differences between TETAs, it is interesting to highlight the further reduction (about 12 %) in the variability parameter of the random term; it decreases from 1.36 in Model 1 to 1.10 in Model 2. Overall, nearly a half (47 %) of the differences detected in values of the attractiveness parameter in Model 0 is explained by the covariates related to the domains of quality of life (specifically LEISURE and STANDARDOFLIVING) and the initial advantage (specifically HETEROG, INCIDENCE and PROVADWITHOUT). This means that about half of the variability in the values of the attractiveness of TETAs plotted in Fig. 2 is explained by factors not directly related to the university. The estimates of parameters in Model 2 show that even after adjusting for these further sources of heterogeneity that create a real advantage for some TETAs, the two domains of quality of life related to leisure and standard of living are still significant and relevant.

The introduction of the AREA covariate shows that only CENSISQUALITY and HETEROG and INCIDENCE keep a significant effect, while LEISURE and STANDARDOFLIVING effects are hidden by the location of TETAs in the five geographical areas. The coefficients of SOUTH and ISLAND highlight a clear and strong disadvantage in the attractiveness of the TETAs located in these areas with respect to the centre of Italy, whilst no significant differences in attractiveness arise between the Northern and the Centre accounting for the other covariates.

From modelôs results arise also the independence of the parameters of attractiveness from factors that consider the size of the population living in the geographical areas in which the universities are located. We also attempted to assess the relationship between student flow and the effect of the population densities of different provinces, as this covariate was initially among the predictors but was removed due to its not-significant statistical effect in all of the fitted models.

As with the null model, comparisons across the attractiveness parameters ($\tilde{\alpha}_i$) of TETAs estimated using Model 3 are made by plotting the point estimates with the related 95 % confidence intervals. For those TETAs that have missing covariates the log-attractiveness parameter are obtained as fix-effect estimates. The plot displays that the high uncertainty in the estimates of ability parameters produces differences in the attractiveness of these TETAs that are not significant with respect to many other TETAs involved in these comparisons. This result holds by examining both the top and the bottom of the distribution. For instance, no fair ranking can be made based on the TETAs of Reggio Calabria, Cosenza, and Lecce. The same occurs when considering these TETAs against Benevento, Matera-Potenza, Catania, Messina, Palermo, and Foggia. Table 4 lists TETAs based on their ORI indexes based on Model 3.

Table 4

Confidence intervals of log-ability scores and ORI index (model 3)

TETAs	95 % CI		ORI Model 3
	Lower bound	Upper bound	
AN	10.64	12.94	15
AO	8.48	10.95	3
AQ	12.78	15.39	28
BA	8.74	10.78	3
BG	10.69	12.49	15
BN	5.91	7.95	0
BO	14.41	16.99	42
BS	10.81	12.51	16
BZ	7.96	10.52	3
CA	9.38	11.94	8
CHPE	9.02	11.48	6
COVA	10.99	12.72	17

TETAs	95 % CI		ORI Model 3
	Lower bound	Upper bound	
CS	8.06	9.80	3
CT	7.52	9.64	0
CZ	7.66	9.11	0
EN	8.36	11.08	3
FE	11.34	12.83	19
FG	7.44	9.02	0
FI	12.52	14.12	24
FR	8.85	11.17	3
GE	11.43	13.33	19
ISCB	7.99	10.05	3
LE	7.65	9.00	0
MC	11.89	12.72	21
ME	6.94	9.80	0
MI	13.22	16.84	33
MORE	11.33	13.06	19
MTPZ	7.77	8.97	0
NA	7.39	9.32	0
PA	7.61	9.68	0
PD	12.26	14.17	22
PG	11.55	12.95	20
PI	13.20	15.10	33
PR	12.10	13.80	22
PU	11.95	13.67	22
PV	11.40	13.64	19
RC	6.48	7.85	0
RM	11.35	15.20	19
SA	6.11	7.78	0
SI	12.77	15.51	27
SS	9.28	11.72	7
TE	8.38	10.55	3
TN	11.02	13.51	17

TETAs	95 % CI		ORI Model 3
	Lower bound	Upper bound	
TO	13.04	15.05	32
TS	12.14	14.42	22
UD	11.95	13.52	22
VE	11.01	13.36	17
VEATNO	10.70	12.78	15
VR	10.68	12.59	15
VT	11.12	12.94	18

The values of the ORI indexes highlight the meaninglessness of evaluating universitiesô attractiveness using point estimates. Specifically, its distribution for the 50 TETAs takes 19 values, showing that no real differences exist among the location parameters of many TETAs. Specifically, we observe that 11 of the 50 TETAs have a value equal to 0. Further, 8 of the 50 TETAs have a value equal to 3; 4 of the 50 have a value of 15; 5 of the 50 have a value of 19; 5 of the 50 have value 22. Thus, 33 of the 50 TETAs are distributed across the 5 values of the ORI index. Among the top TETAs, only Bologna has an index value equal to 42 (ï 7 with respect to the null model), representing a significant departure from the average, followed by Pisa and Milan, which share a value of 33, and Turin with a value of 32. These empirical findings based on confidence intervals indicate that accounting for relevant covariates divergences in attractiveness become not significant, and about half of the divergences in the performance are explained by factors external to the university institutions. This should warn police makers against planning policies that support institutions solely based on differences in point values.

6. Conclusions

The flow of students across TETAs was analysed using a Bradleyï Terry model. This strategy considers TETAs attractiveness to be parameters that are located on a continuum using multiple pair comparisons. In this framework, the present approach seams to be useful because it assumes that a TETA that has greater attractive power (with respect to the others) will have a higher probability of being preferred by students in the multiple comparisons of pairs of competitor TETAs. Furthermore, the main advantage of the proposed approach is that it allows us to assess the effect of certain characteristics of competitor TETAs that are not directly unrelated to the universityôs institutions actions.

The results of the Bradleyï Terry model, in line with the main empirical findings of recent literature, suggest that TETAs are attractive not only for the quality of their educational supply but also for their socio-economic factors (particularly in terms of labour market assets and leisure activities), reflecting the Italian context of being characterised by two main economic contexts, the less-developed South and the more-developed Centre-North. These economic factors affect the behaviour of individuals and their decisions of mobility: they migrate toward the Northern regions for university studies, most likely to look for better educational and job opportunities. Consequently, our analysis shows that territories are able to attract students when they take advantage of the overall socio-economic conditions.

Further, making comparisons among TETAs using fair indicators (i.e., those that account for the uncertainty in the point estimates), the information on attractiveness has been summarised using an Overall Rating Index (ORI). These data show that most of the non-significant differences in point estimates led to unreliable differences in ranking (in terms of the overlapping confidence intervals of the estimates). Based on the ORI values, it is clear that a straight ranking of the TETAs would not be appropriate, whereas it is more informative to determine groups of TETAs with clustered units and closer values of the index (e.g., ñHighly attractiveò, ñModerateò, ñMiddle attractiveò, and ñUnattractiveò).

Indeed, the first findings of this explorative analysis suggest that assigning financial endowment on the basis of student mobility does not reward the universityφs capability to attract students but instead rewards the area where it is located. Furthermore, the use of league tables, which do not consider the uncertainty in the point estimates and the effect of factors outside the control of the universityφs ruling bodies risks draining students toward the richest territories, which are also those with a higher cost of living; thus, these studentsô increased monetary investment bestows no real advantage in terms of educational opportunities.

Nevertheless, it is worth noting that because we have considered variables on a macro level to propose a modelling approach for the phenomenon of student mobility, the effect of other variables on the micro level has not yet been investigated. To create a more complete picture of the potential of TETAs to drain students from other areas, it would be worthwhile for an analysis to investigate micro and macro factors jointly in their relationship to student mobility by considering the effect of student covariates relative to their socio-economic characteristics (for instance, those referred to as the student background). Such an approach would allow further inferences to be made concerning the capability of universities to attract talented students, shifting the focus of the analysis from a quantitative to a qualitative perspective in terms of the quality of students whom the universities are able to attract.

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