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Universities' attractiveness to students: The Darwinism effect

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Abstract

Due to significant government cuts to Higher Education funding in Southern European systems, their already underfunded universities were forced to increasingly compete for students as sources of additional revenue. Concurrently, families and students that continued to afford participation in Higher Education became more selective when choosing a university, realising the riskier investment that Higher Education participation had become. Through a competing destinations model and relying on all Italian private and public universities, this study finds that the competition forces characterising universities' attractiveness over the last decade have changed since the financial crisis of 2008. In a context of lower demand for Higher Education, the competition for students grew and universities in close proximity were better prepared to face the new challenges, leading to the growth of Higher Education clusters.

1 | INTRODUCTION

The extant literature suggests that over the last decade universities have increasingly competed for students in Southern Europe (e.g., Ciriaci & Muscio, 2014; Teixeira, Rocha, Biscaia, & Cardoso, 2014). This mounting competition has one underlying objective: to obtain further income from tuition fees. The financial crisis of 2008 has had dramatic effects on Southern European societies, including their Higher Education systems, stimulating

a competition drive for increasingly scarcer public funding and other revenue sources (Cruz-Castro & Sanz-Menéndez, 2015). Austerity measures to control public debt and increase effectiveness of public accounts led governments in the region to reduce Higher Education funding, which, vis-à-vis other European countries, was already considered as low (Zmas, 2015). This decrease in public funding increased university competition for students, at the same time that the socioeconomic situation of these countries hampered the capability of many families to provide the opportunity for their children to participate in tertiary education because of income reduction, job insecurity and growing levels of unemployment, including qualified and youth unemployment (Cairns, Growiec, & Alves, 2014; Giousmpasoglou, Marinakou, & Paliktzoglou, 2016).

In this uncertain and therefore riskier societal scenario, and consistent with human capital (Becker, 1964; Schultz, 1961) and screening (Spence, 1973) theories, students (often with the support of their families) deciding to participate in tertiary education, try to be as certain as possible that they will receive an education of the highest quality, allowing them to better signal themselves on the job market and thus enhance prospects of social mobility and private returns to education (Baker & Brown, 2007). This represented a major challenge for many universities in Southern Europe. In the age of the student-consumer, globalisation and internationalisation, uncertain career prospects and labour challenges, these universities were required to pay more attention to the educational services that they offer and basing—at least part of—their competitiveness on them to survive (although not always with positive effects for the universities going through similar processes elsewhere; see Bunce, Baird, & Jones, 2017; Wong & Chiu, 2017).

It is known that the attractiveness of students became key for Southern European universities' ability to survive, endure and eventually thrive, entangling them in—new and unusual for some of these universities—competitive dynamics (e.g., Teixeira, Rocha, Biscaia, & Cardoso, 2013). Less known are the effects that the financial crisis of 2008 had on this competition drive and whether or not this competition led to the development of agglomeration forces and thus, the creation of clusters[1] of Higher Education. This study answers these two questions based on an analysis of the Italian Higher Education system, a good case study reference for Southern Europe because the characteristics and impact from the financial crisis on its Higher Education sector resonate with those of Portugal, Spain and Greece (Skrbinjek, SanLesjak, & Sustersie, 2018).

University competition for students in Italian Higher Education became exacerbated in the last decade. University funding, which has been historically dependent on public funding for Higher Education (Fondo di Finanziamento Ordinario), started to significantly decrease after the 2008 financial crisis (–17%, €5.5 billion). Concurrently, average tuition fees started to significantly increase (+25%) alongside a decline of almost nine per cent in the student population (2009–2015; European University Association [EUA], 2016). In this context, students have been increasingly regarded as primary resources for university funding: directly through tuition fees and indirectly by attracting government transfers, which have been increasingly made proportional to the universities' actual expenditures per student enrolled (Agasisti, 2009). Recent governmental funding formulas have placed the students at the centre of the distribution of government financial resources to universities, such as the 'standard cost per student' (ministerial decree 815/2014; inter-ministerial 893/2014). The competition for students has consequently become a crucial activity for the financial sustainability of Italian universities. Furthermore, the Higher Education market competition has also changed; the traditional competition for students among local universities is now supplemented by competition from other universities at the national level. Universities face a new pool of potential students that have become geographically dispersed as the share of students enrolled originating from different provinces has constantly increased over time. Specifically, the concentration of students' provinces of residence decreased by nearly 10 per cent at the national level during the period 2002–2012.

Italian universities have recently been taking measures to increase their attractiveness to students despite declining student enrolment at the national level. In this process, the already substantial competitive pressure to attract students for universities located in close proximity, such as in the areas of Milan, Naples and Rome, has been expectedly augmented. However, due to being used to higher levels of competition, universities in close

proximity are expected to be better prepared to face increasing levels of competition in the Higher Education system when compared with universities in remote areas, unused to such competition dynamics (see Gu, 2012; Sà, Florax, & Rietveld, 2004). The issue of being better prepared to deal with increased rivalry (due to traditional location-driven competition), but also be responsive to it, is thus central to the analysis of this paper. It is so because the close proximity (which lead these universities to be better prepared to compete) acts as a natural selection mechanism giving them an advantage to adapt faster than others to a fast-evolving Higher Education environment based on competition (as in Darwinism; see Wallace, 2007).

This study relies on a spatial interaction approach in the form of a competing destinations model developed by Fotheringham (1983, 1985) and Fotheringham, Nakaya, Yano, Openshaw, and Ishikawa (2001) to identify competition and agglomeration, that is, to what extent student flows become concentrated or not in well-defined regions. This technique, developed by Fotheringham and colleagues, allows the flows of each student to be modelled from the origin to the destination, allowing the analysis of all flows of students from each Italian province to each Italian university in our sample over the period 2003–2012.

Our findings highlight that, on average, Italian universities have operated under growing competition forces in the period 2003–2012. However, by isolating the effects of such forces during the period following the financial crisis (2009–2012) and holding all other factors determining attractiveness equal, universities that are in close proximity have become more attractive to students. Evaluating competition forces over time asserts the claim that the recent developments have led students and their families to be more selective when choosing a university. Our results are robust after considering the overlap in the programmatic offer among competing universities and the segmentation of the Higher Education system in three subsegments of the market defined considering the distance between the province of origin and the university of destination (day; week; term commute).

The paper is organised as follows. Section 2 presents the literature review; Section 3 focuses on the sample of data, explains the competing destinations model and presents preliminary statistics. Section 4 reports the results, while Section 5 corroborates them presenting the robustness checks. Section 6 concludes.

2 | LITERATURE REVIEW

The financial crisis of 2008 influenced both the students' goals concerning enrolment and the strategies and preparation of universities regarding the recruitment of students (Cattaneo, Malighetti, Meoli, & Paleari, 2017). On the demand side, families' reduced income—some experienced significant financial difficulties—decreased households' ability to provide their children with Higher Education, primarily because of the impossibility of supporting the costs of education (Long, 2013). Several of those who still could afford Higher Education expectedly became more selective when choosing a university. In periods of economic difficulty, the benefits derived from positional goods (Hirsch, 1976) reaped from graduating from prestigious universities with regards to potentially obtaining better social status and livelihood, are heightened. Specifically, the choice of a university is driven not only by a human capital dimensi on, where the value of graduating is a function of the intrinsic quality of students, teachers and the services provided by the university, but also by a relative dimension. It implies that students' choice highly depends on the recognition of a university throughout the entire system or, in other words, its prestige (Marginson, 2006).

This means that for the students (and families), the substantial tensions and risks associated with the perceived lesser benefits from Higher Education degrees, in labour markets and societies in high-income countries (the condition of Italy)—designated as survivalism by Wright and Horta (2018)—are compounded by an even riskier context, derived from the financial crisis (Menon, Markadjis, Theodoropoulos, & Socratous, 2017). Their selectivity still relates to the expectation for better opportunities in the labour market and the potential to increase social status in the future, or at least to maintain the same lifestyle in the future if already belonging to middle- and upper-class families (Wright & Horta, 2018). Families, nowadays, have concrete tools to

enable more selective choices due to a faster and easier access to information (e.g., Internet but also university rankings; see Hazelkorn, 2015) facilitating information searching and decision making (Simões & Soares, 2010). However, these may not be sufficient to avoid students and families having overly optimistic expectations concerning the expected returns to investment in Higher Education (Abbiati & Barone, 2017). This investment nowadays (for students and their families) is one that remits to the idea of Darwinism, in the sense that attending Higher Education is not enough as it became a quasi-necessity (Marginson, 2016). Attending prestigious universities is what matters to improve the chances of success after graduation and thus ensure survivability (Wright & Horta, 2018).

On the supply side, universities have been increasingly financially constrained and forced to find new sources of external funding to pursue their daily activities (e.g., Cheslock & Gianneschi, 2008). Consequently, in addition to the intensification of their interactions with the business sector, the scarcity of resources makes increasing student enrolment a priority for academic institutions (Gu, 2012; Rossi, 2010; Teixeira et al., 2014). To remain competitive, the behaviour of competing universities leads them to develop and increase valuable services and facilities for their stakeholders (Porter & Kramer, 2002). The competitors continuously present a moving target for the other universities belonging to the same competitive environment, promoting a Red Queen effect—that is, a university must keep on running to simply maintain its position (Barnett, 1997).

Universities that were and are subjected to higher levels of competition are also expected to become more attractive during periods of economic/financial crisis, as students consider them to be more valuable and less risky options in the long run. Universities operating under competition frameworks improve their teaching performance (Agasisti, 2009) and increase their technical efficiency (Abbott & Doucouliagos, 2009). They are stimulated to diversify their programmatic offer in fields far from their traditional expertise (Teixeira, Rocha, Biscaia, & Cardoso, 2012), mainly focusing on new courses having greater regional relevance (e.g., University of Aveiro; da Rosa Pires & de Castro, 1997). What this means is that these universities that have been dealing with higher degrees of competition when compared to others that have not, are able to adapt faster and better to an environment that is becoming increasingly competitive. Adaptation to changing environments is the key element of Darwinism to ensure survival and to thrive (survival of the fittest; Brandon, 1990), and particularly relevant when the changes to the environment are shocking and quick (which leads to the extinction of species and organisations), such as it was the impact of the financial crisis of 2008. In an age of neoliberalism, the universities that adapt and evolve are also the ones that can, through the process of survival, influence the environment by setting their usual competitive frameworks as the competitive frameworks of the entire system (Olssen & Peters, 2005).

3 | RESEARCH DESIGN

3.1 | Methodology

In order to investigate whether or not the negative effect of university competition for students has increased since the financial crisis, the analysis relies on a spatial interaction model. This is achieved by modelling flows of students from the province of origin to the university of destination, using a competing destination model, namely a gravity model assessing the competition/agglomeration forces at the destination level. This model has been implemented in various themes to distinguish the presence of agglomeration or competition forces among alternative destinations.[2] Using this methodology, Lippi Bruni, Nobilio, and Ugolini's (2008) analysis of hospital choice by patients undergoing percutaneous transluminal coronary angioplasty in Emilia Romagna (Italy), found that information on destinations is processed hierarchically and that agglomeration (instead of competition) forces are dominant. In another framework, Bernasco's (2010) analysis of crimes committed by location found that an area located in close proximity of many other residential units is less likely to be targeted than an area that is relatively isolated, thus suggesting the presence of competition forces. In the Higher Education sector, Sà et al. (2004)

showed how the proximity between universities is a key factor in modelling the demand for Higher Education, while Cattaneo et al. (2017), through an analysis of university attractiveness to students in the Italian Higher Education system, showed how Italian universities operate under competition forces, but neglect the longitudinal perspective.

Consistent with the literature (Cattaneo et al., 2017; Cattaneo, Malighetti, Paleari, & Redondi, 2016; Sà et al., 2004), the current analysis relies on a gravity model (Equation 1) where $F_{i,j,t}$ represents the flow of students from each province i of origin to each university j of destination in year t; $O_{(Prov_{i,t})}$ considers the socioeconomic characteristics of province i and its size (mass) able to affect students' mobility to the destination; $D_{j,t}$ represents the mass of university j, depending on both the destination province's features ($Prov_{j,t}$) and the university's attractiveness to students ($Univ_{j,t}$) in year t; and $f(d_{i,j})$ is a decay function between province i and university j:

$$F_{i,j,t} = O_{(Prov_{i,t})} D_{(Univ_{j,t};Prov_{j,t})} f(d_{i,j}). \tag{1}$$

For each of the elements included in Equation 1, Table 1 details the specific variables considered in our spatial interaction model.

To capture whether or not universities at the destination operate under competition or agglomeration forces, a competitors' proximity index (*ComPI*) is included, which is consistent with the literature on competing destination models (Fotheringham, 1983, 1985; Fotheringham et al., 2001). The index is defined as follows:

$$ComPI_{j,t} = \sum_{\substack{m=1 \\ m \neq j}}^{N} (Univ_{m,t}) f(d_{j,m}) \tag{2}$$

where N stands for all other universities m in the Higher Education system except for university j; $Univ_{m,t}$ reflects the characteristics of attractiveness of university destination m; and $f(d_{j,m})$ is a decay function between university j and university m. If the coefficient of *ComPI* is equal to zero, it means that the information is not being processed hierarchically, a negative sign stands for the presence of competition forces, while a positive coefficient indicates that agglomeration forces are present at the destination (Fotheringham et al., 2001). The sign is empirically determined by the model and is the result of the two forces: in the presence of agglomeration forces, an increase of the distance costs is related to a drop in the number of trips between areas, while, on the contrary, competition forces are associated to the premise that the greater the distance a student is willing to travel the more destination alternatives can be found (de Grange, Fernández, & de Cea, 2010).

Having the purpose to understand the evolution of the Higher Education system over time, the analysis also evaluates whether or not the competition forces between universities have remained unchanged throughout the time period under analysis. To do this, the stability of the competition indices' coefficients is assessed by adapting the structural break test described in Andrews (1993) to the competing destinations model.

A Chow breakpoint test over a range of dates (from 2003 to 2012) is used to calculate the F-statistic. The most likely date for a breakpoint is one that produces the highest F-statistic. The test reveals that by using each of the three indices, a structural break occurred in 2009, leading to the creation of a step dummy variable coded 1 for the years after 2008 (Structural break). Additionally, to isolate the marginal effects of university competition after the structural change, each competition index is interacted with the Structural break dummy (*ComPI Structural break*).

To linearise our competing destinations model (Equation 1), a Poisson pseudo maximum likelihood model (PPML) is used as a technique able to overcome the known shortcomings of the ordinary least squares (OLS) log transformation (see Silva & Tenreyro, 2006). For this reason, all variables are log-transformed except for the dependent variable (the flows of province–university students).

TABLE 1 Description of variables

Variables	Description
Dependent variables	
Flow of students	Flows of first-year enrolled students for the bachelor's and five-year degree (Ciclo Unico) level from all Italian provinces to each university
Explanatory variables	
$f(d_{i,j})$	Distance in kilometres between the university of origin and province of destination
Province-level variables─$\left[O_{(Prov_{i,t})};D_{(Prov_{j,t})}\right]$	
Quality of life ranking (destination/origin)	The annual position of the province of destination (origin) in the quality of life ranking produced by the Italian financial newspaper *Il Sole 24 Ore* as in Ciriaci (2014). Each province has been scored as (Quality of life ranking) − 1
Student population	The total number of first-year, first-time enrolled students from each province of origin
Value added per capita (destination/origin)	Ratio between the value added per capita of the province of destination (origin)
Scholarships per student (destination/origin)	The number of student scholarships provided at a provincial level divided by the student population in that specific province
Presence of universities at the origin	Dummy variable equal to 1 if at least one university is located at the province of origin
Universities' attractiveness index	The average of a factor of attractiveness of the universities at the province of origin. All universities' characteristics (population, teaching resources, legitimacy, prestige, internationalisation, legal status) are reduced through a principal component analysis resulting in one factor explaining 60 per cent of the variance
University-level variables─$\left[Univ_{(Prov_{j,t})}\right]$	
University population	The total number of registered students in each university
University students–faculty ratio	Ratio between the total number of registered students and the number of faculty members at the same university
University legitimacy	The number of articles on national, regional and local newspapers pertaining to each university for each year is collected using the Factiva news media database
University students' fees	The ratio of the total contribution of bachelor's and master's students to the total number of students attending a specific university, scaled by the value added per capita of the student's province of origin
University prestige	Dummy variable equal to 1 if the university destination is included in the ARWU ranking
University internationalisation	Percentage of international students on the total number of registered students of a university
Private university	Dummy variable equal to 1 for private universities, 0 otherwise
$ComPI_{j,t}$	An index of university competition accounting for the extent to which a university is distant, both in physical (km) and operative terms, from its competitors (e.g., Cattaneo et al., 2017, 2016 ; Sà et al., 2004)
Financial crisis	Dummy variable equal to 1 for flows of students enrolling in the period 2009–2012

3.2 | Sample and data

Our analysis considers all 75 traditional public and private universities in the Italian Higher Education system in the period 2003–2012, after having excluded all 11 distance learning institutions, six doctoral universities (Scuola Normale of Pisa, Institute for Advanced Study of Pavia, Italian Institute of Human Sciences in Florence, IMT Institute for Advanced Studies in Lucca, Sant' Anna School of Advanced Studies in Pisa, International School for Advanced Studies in Trieste) and three universities for foreigners (University of Foreigners of Perugia, of Reggio Calabria and of Siena) as these universities operate in a largely different student competitive framework. The Rome Link Campus University is also not included in the sample because it was only accredited as a traditional university in the second half of 2011 (decree no. 374 of 21 September 2011) and no data are available for it.

All data were collected relying on two main sources: (a) the web dataset created by the Ministry of Education, Universities and Research (MIUR) for university-level data; and (b) the dataset of the Italian National Institute of Statistics (ISTAT) and the publications of the *Sole 24Ore* (the most important financial newspaper in Italy) for province-level data.

Table 2 shows the percentage of first-year first-time students across different distance ranges and considers the location of universities (Centre, North, South). The total number of students enrolling in the system significantly decreased in the period 2003–2012 (–19%), where minus seven per cent is the decrease since the financial crisis (2009). In a country historically characterised by an important North–South socioeconomic divide where the South is less economically developed than the North (Ciriaci, 2014), Southern universities are those facing the highest reduction in the number of enrolling students over the sampled decade (–27%). Northern universities also faced an overall reduction in enrolments over the decade, but this has somewhat reversed with a small increase in the period 2009–2012 (+0.23%).

When students' enrolments are analysed concerning the distance between the university of destination and the province of origin, universities in the Centre of the country increased their attractiveness to students living in provinces from distances ranging from 51 to 100 km. However, universities located in central Italy witnessed an important decrease in attractiveness for students coming from provinces in the 101–200 and 301–400 km ranges. Despite the overall decrease of almost seven per cent in enrolments in the period 2009–2012, Northern universities increased their attractiveness substantially for those students coming from distant areas. Since the financial

TABLE 2 Students' attractiveness and origin–destination distance

Distance ranges (km)	>0		0–50		51–100	
University location	Δ% (2003–2012)	Δ% (2009–2012)	Δ% (2003–2012)	Δ% (2009–2012)	Δ% (2003–2012)	Δ% (2009–2012)
Centre	–22.71	–5.57	–22.93	–4.39	0.45	0.15
North	–9.93	0.23	–11.69	–2.68	–27.23	–13.55
South	–26.78	–14.81	–28.51	–14.06	–8.19	0.82
Total	–19.21	–6.54	–21.06	–7.59	–27.57	–20.98
Distance ranges (km)	**101–200**		**201–300**		**301–400**	
Centre	–27.50	–12.17	–5.7	3.7	–32.2	–15.2
North	–6.64	2.40	–13.8	16.8	–25.6	22.5
South	–25.54	–20.24	–3.4	–7.4	–10.7	–5.3
Total	–18.58	–9.16	–8.18	4.58	–26.82	–1.56

crisis, they increased the number of students from areas more than 100 km away. These universities registered an increase of 2.4 per cent (between 101 and 200 km), 16.8 per cent (between 201 and 300 km) and 22.5 per cent (between 301 and 400 km).[3] Contrarily, flows of students from distant locations towards Southern universities decreased in all distance ranges, even though the reduction of the more distant provinces was smaller during the latest years of the sample.

The competition levels of universities located in areas characterised by higher levels of competition (Milan, Rome, Naples) have increased their attractiveness over the past four years. For example, the universities within a radius of 50 km from the centre of Milan have, on average, increased their market share of students (e.g., Polytechnic University of Milan +0.5%, University of Milan +0.5%, Catholic University of the Sacred Heart +0.3%, University of Milan Bicocca +0.3%, University of Bergamo +0.1%). Conversely, the greatest decrease in market share occurred among those universities operating under previous dynamics of little competition, which are primarily located in the South (e.g., University of Palermo −1.2%, University of Lecce −0.7%, University of Catania −0.6%).

4 | RESULTS

In order to confirm the preliminary findings coming from the previous descriptive analysis, a competing destination model is performed, aiming to test whether or not agglomeration or competition forces characterise the Italian Higher Education system over time. Model (1) in Table 3 reports the estimate of the competing destination model performed for the total flows of first-time first-year students from each province to each university of destination. It indicates that the *ComPI* is negative and highly significant, suggesting strong competitive forces among universities, which negatively affect the number of students they are consequently able to attract. Model (2) in Table 3 reports the results of the PPML regression that includes the structural break in 2009 to evaluate whether or not the effects of competition have changed since the financial crisis of 2008. The findings indicate that the period after 2009 is negatively related to the overall attractiveness of universities to students throughout the Higher Education system. This result supports the fact that enrolments significantly decreased over the period under analysis. Further, the interaction term (Competition index Structural break) is positive and highly significant, suggesting that agglomeration forces have begun to characterise the Italian Higher Education system since 2009. Although the coefficient of the competition index still suggests that, on average, competition forces are present among universities, a dynamic transformation of the universities' attractiveness to students has occurred.

In the post-2008 financial crisis, the decrease in student enrolments has not affected the Higher Education system homogenously. The change in the market share of enrolled students between 2007 and 2012 suggests that universities in close proximity perform better, holding all other factors determining attractiveness equal. This means that universities used to operating before in competitive environments have been shown to be more resilient and adaptable to the changing environment, and consequently have experienced only small declining enrolment rates.

The change in competition dynamics after 2009 allows an interpretation of the effects of the 2008 crisis. During periods characterised by reduced levels of demand for Higher Education, the overall decline in well-being and economic stability associated with the decreasing incomes and, in some cases, loss of employment, leads families and students to make a more selective choice. As the investment in Higher Education has become more selective, universities located in more competitive environments become more attractive expectedly offering better income and more employment opportunities to students after graduation. Families are likely to make their decisions not only considering the direct cost of Higher Education (e.g., tuition fees), but also indirect costs (opportunity costs) in the medium term relative to expected graduation time (three to five years). Because it is reasonable to assume that the capability of families to bear these costs decreased during the financial crisis (Long, 2013), their propensity to invest in more selective Higher Education services has likely influenced the selection of universities, thus shaping competition between universities at the national level, but also locally.

TABLE 3 The changing impact of university competition over time

	(1)	(2)
Distance	−1.906*** (−32.015)	−1.906*** (−31.995)
Province level		
Quality of life ranking (O)	−0.032*** (−3.364)	−0.030*** (−3.228)
Value added per capita (O)	−1.022*** (−3.661)	−0.892*** (−3.887)
Student population (O)	0.904*** (12.967)	0.869*** (11.168)
Scholarship per student (O)	0.129 (0.493)	0.209 (0.812)
Presence of universities at the origin (O)	−0.035 (−1.097)	−0.044 (−1.486)
Universities' attractiveness index (O)	−0.189*** (−4.216)	−0.197*** (−4.542)
Quality of life ranking (D)	0.012 (0.201)	0.019 (0.314)
Value added per capita (D)	1.567*** (5.787)	1.555*** (5.698)
Scholarship per student (D)	0.145 (0.468)	0.172 (0.555)
University level		
University population	0.704*** (12.015)	0.707*** (12.042)
University teaching resources	0.013 (0.154)	0.010 (0.119)
University legitimacy	−0.003 (−0.102)	−0.006 (−0.174)
University's average tuition fee	0.647 (0.811)	0.641 (0.796)
University prestige	0.219** (2.244)	0.211** (2.142)
University internationalisation	6.609*** (5.041)	6.555*** (5.037)
Private university	−0.012 (−0.069)	−0.014 (−0.075)
ComPI	−0.186*** (−2.576)	−0.200*** (−2.774)
Financial crisis		−0.600*** (−2.696)
ComPI Financial crisis		0.042** (2.530)
Constant	−6.085* (−1.843)	−6.658** (−2.252)
Observations	77,102	77,102
R^2	0.890	0.901

Note. This table reports the results of the PPML model estimated to examine the evolution of competition and agglomeration forces among Italian universities. The sample consists of 75 universities observed during the period 2003–2012. Model (1) investigates the overall effect of university competition across the entire period. Model (2) replaces the analysis of Model (1) examining the structural break identified by using the Chow breakpoint test. Each regression controls for time and province fixed effects. A set of dummies for the presence of four macrouniversity disciplines (arts and humanities, medical sciences, natural and technical sciences, and social sciences) is also included. *T*-statistics are reported in parentheses. ***, ** and * indicate statistical significance at the 1, 5 and 10 per cent levels, respectively.

The analysis of control variables affecting students' mobility towards specific universities and areas, highlights an important factor, well known in the literature: distance acts as a deterrence factor for mobility (Long, 2004). At a provincial level, the value added per capita is a factor influencing the mobility of students both at the origin and the destination. Students are attracted by richer areas, departing from the poorest ones. This departure is also associated to lower levels of quality of life, indicating for instance the lack of or lesser regional amenities and welfare, at the origin. Further, the average attractiveness of universities at the origin province acts as a disincentive to move towards other areas. Surprisingly, the number of scholarships in the province of origin has no significant effect on student mobility. At a university level, the size, prestige and internationalisation of a university are major elements in attracting larger amounts of students, signalling the representativeness and quality of a university inside the Italian Higher Education system.

TABLE 4 Robustness checks

	(1)	(2)
Distance	−1.517*** (−23.212)	−1.831*** (−29.720)
Province level		
Quality of life ranking (O)	−0.048*** (−4.198)	−0.039*** (−4.488)
Value added per capita (O)	−0.963*** (−4.174)	−1.389*** (−5.184)
Student population (O)	0.507*** (7.483)	0.948*** (12.747)
Scholarship per student (O)	−0.056	−0.063
	(−0.484)	(−0.247)
Presence of universities at the origin (O)	−0.053 (−1.160)	−0.039 (−1.014)
Universities' attractiveness index (O)	−0.352*** (−6.251)	−0.252*** (−4.545)
Quality of life ranking (D)	0.064 (0.950)	0.020 (0.371)
Value added per capita (D)	1.412***	1.366***
	(5.302)	(5.914)
Scholarship per student (D)	0.354 (1.560)	0.382 (1.363)
University level		
University population	0.529*** (10.536)	0.670*** (12.089)
University teaching resources	0.060 (0.998)	0.073 (0.671)
University legitimacy	0.008** (2.115)	0.002 (0.459)
University's average tuition fee	0.066 (0.105)	0.202 (0.249)
University prestige	0.242*** (2.788)	0.197** (1.989)
University internationalisation	11.465*** (4.602)	8.049*** (6.437)
Private university	0.250* (1.833)	−0.032 (−0.193)
ComPI	−0.200*** (−2.836)	−0.211*** (−2.857)
Financial crisis	−0.161*** (−5.608)	−0.218*** (−3.076)
ComPI Financial crisis	1.616*** (3.882)	1.878** (2.537)
Constant	−2.383 (−0.991)	−1.569 (−0.701)
Observations	77,102	77,102
R^2	0.517	0.889

Note. This table reports the results of the PPML model estimated to examine the presence of competitive forces among Italian universities. The sample consists of 75 universities observed during the period 2003–2012. Model (1) replaces the analysis of Model (1) in Table 4 adjusting the index of competition for the overlap in universities' departments. Model (2) substitutes the *ComPI* index with the *ComPI* for day–week–term commute. Each regression controls for time and province fixed effects. A set of dummies for the presence of four macrouniversity disciplines (arts and humanities, medical sciences, natural and technical sciences, and social sciences) is also included. *T*-statistics are reported in parentheses. ***, ** and * indicate statistical significance at the 1, 5 and 10 per cent levels, respectively.

5 | ROBUSTNESS CHECKS

In order to corroborate the validity of the results, the *ComPI* is adjusted considering the overlap in the programmatic offer among universities. Second, it is assumed that the student population is not homogenously distributed across Italy when computing the *ComPI*, but instead segmented in three different markets (day, week, term commute). The Appendix reports the details of these two further analyses.

Model (1) in Table 4 shows that after controlling for the presence of the same departments, competition forces (increased levels of competition between universities) characterised the Higher Education system in the period 2003–2012, while starting from 2009 agglomeration forces emerged to dominance in the Higher Education system. Model (2) in Table 4 documents that our findings are also robust to the segmentation of the Higher Education system. Even when considering the day, week and term commute markets, competition forces are found to have on average influenced universities' attractiveness in the last decade, although the creation of Higher Education clusters (agglomeration forces) have become evident since the recent financial crisis.

6 | CONCLUSIONS

The findings show an increased Darwinism effect driven by a changing environment that is characterised by mounting competition for students and a heightened relevance of university attractiveness to students in a diminishing student market. First, universities that had some experience of competing with one another (since they were in close proximity) were able to capitalise on this experience/knowledge and be more responsive to change by most likely adapting better to student demands and expectations. It is important to note that if these universities had the experience but not made good use of it, this advantage would possibly not be enough to guarantee that they thrive in the changing and evolutionary environment, as evolutionary dynamics underline responsiveness and adaptability rather than initial powerful characteristics as key for survival. The initial powerful characteristics may lose relevance in new environments (the same is true for evolutionary economics; see Galor & Moav, 2002), but one can argue that this is probably not the same since among those universities in close proximity, are the most prestigious universities in Italy and these due to the relevance of positional goods in constrained markets would always have a competitive edge in relation to the others.

Second, as the competition forces took hold of the Higher Education systems and conditioned universities' strategies focused now on attracting more students, the universities changed but not in a homogenous form. This means that although previous studies show that universities under intense competition improve their teaching performance (Agasisti, 2009), technical efficiency (Abbott & Doucouliagos, 2009) and diversify their programmatic offer (Teixeira et al., 2012), it is not clear that all did it the same way, or actually did it. This idea is suggested by the fact that after the financial crisis of 2008, Higher Education clusters were formed as agglomeration forces took over. This means that the system became more vertically diversified between those universities that changed, adapted and thus thrived and those that were not able to fully succeed.

This paper points out important implications for university managers and policymakers. First, it is of interest for university managers, in providing evidence of the changing demand for Higher Education services over time. In particular, the reduced financial capabilities of students' families over the financial crisis have translated into a higher sensitivity to the quality of services. This provides support for diversified policies over time, in accordance to how Higher Education demand showed instability during the period of crisis. Most importantly, our results identify more resilient universities in higher competition areas, showing that institutions better able to leverage on network resources resulted in greater attractiveness. This calls for managerial policies that, rather than defensively reacting to the competitive context, act for promoting an integrated use of resources. On the one hand, universities in central areas can see their context as a source of wealth, rather than as a challenge, and profitably act for increasing the attractiveness of the local context as a whole. On the other hand, managers of Higher Education institutions in remote areas need to be aware that strategies aimed at linking the institutions to the network are of growing importance, while the monopoly strategies over the local area are decreasing in importance.

Further, our study has implications for policymakers, both for the system analysis, as well as for the implementation of actions. Central institutions need to be aware that attractiveness is a dynamic phenomenon, interacting with local context and economic cycle. In particular, periods of decreasing demand are a challenge that needs to be faced with specific attention both to average and to extreme conditions. Addressing issues such as accessibility,

standard quality and excellence promotions, they need to take into account that institutions need to adapt to a changing context, and they can promote resilience by setting goals over the long run, rather than by evaluating short-term dynamics. This is of peculiar importance with respect to funding policies, and the more so in countries, such as Italy, where Higher Education institutions largely rely on public funding as the main budget source. An important note of caution for governments in driving competition dynamics in Higher Education (including that for students) is to make sure that these do not become excessive because the latter is known for its detrimental effects on universities' strategies that start to emulate models that are not sustainable while providing little added value to their activities. Although increasing competition is needed in a global capitalist world, excessive competition can lead to the survival of the fittest in Darwinian rhetoric, meaning it will also lead to several extinctions (closure of universities, most likely in the regions with lesser resources that need them the most) which will have problematic disruptive effects on the environment, that is, the Higher Education system and a more equal and integrated regional socioeconomic development. Governments must assure the stable development of the Higher Education system and this cannot be based on extreme competition alone, otherwise systems promoting universal Higher Education will be back to promote elite Higher Education systems because only the prestigious universities will survive, and this is not desirable in the current global knowledge societies.

Indeed, our study does not come without limitations. The generalisability of our results is limited by the boundary conditions of our empirical setting. We analysed the case of Italian universities across the recent financial crisis. In these respects, our sampling was therefore limited with regards to institutions, geography and time period. Future studies might investigate how the competitive dynamics are affected in systems where different types of Higher Education institutions operate (i.e., universities of applied sciences), or where market instruments are far more developed than in a Southern European country or across other types of economic phenomena. We leave this to future research.

ENDNOTES

[1] Meaning the geographical concentration of university-specific regions that have characteristics that differentiate them from others on key elements of their mission (i.e., such as teaching for example). Those university clusters that are competitive are bound to boost their prestige and competitiveness, and ultimately favour the social and economic development of these regions in the long term, while the university clusters that are not, eventually have a less pronounced beneficial effect for themselves and for the regions in which they are located.

[2] As a limit of the model, the index is not able to capture the fact that agglomeration and competition forces can coexist (see Li & Liu, 2012).

[3] Four hundred kilometres is considered as the upper threshold, since almost 92 per cent of the population of students comes from provinces located within this distance from the universities of destination.

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APPENDIX

A.1 Overlapping Offer

The *ComPI* is corrected considering the presence of the same departments between each pair of universities. We first identified the departments' overlap (in common):

$$DEP_{OV_{i-j}} = (DEP_i \cap DEP_j)$$

where DEP_i stands for the departments (weighted by department size) of university *i* and DEP_j those at university *j*. Second, the overlapping index between two universities (*i* and *j*) is computed by multiplying the relative shares of students enrolled in the departments of university *i* also existing at university *j*:

$$IEDP_{OV_{i-j}} = \left(\frac{\sum StuUniv_i \in DEP_{OV_{i-j}}}{\sum StuUniv_i} \right) \times \left(\frac{\sum StuUniv_j \in DEP_{OV_{i-j}}}{\sum StuUniv_j} \right).$$

The *ComPI* is therefore adjusted as follows:

$$ComPI_{j,t} = \sum_{\substack{m=1 \\ m \neq j}}^{N} (Univ_{m,t} DEP_{OV_{m-j,t}}) f(d_{j,m}).$$

A.2 Market Segmentation

We define the three relevant markets as:

- *Day commute*: the distance between the province of origin and the university of destination is less than 50 km;
- *Week commute*: the origin–destination distance is at least 50 km, but less than 300 km;
- *Term commute*: the origin–destination distance is greater than 300 km.

Analytically the definition of the three markets is as follows:

$$Mkt_{Day}^{Prov_i} = \{Univ\} \mid d_{Prov_i}$$

$$Mkt_{Week}^{Prov_i} = \{Univ\} \mid 50\,km \leq d_{Prov_i - Univ_j} < 300\,km$$

$$Mkt_{Term}^{Prov_i} = \{Univ\} \mid d_{Prov_i - Univ_j} \geq 300\,km.$$

The *ComPI* is therefore modified according to the definition of the three different relevant markets:

$$ComPI_{Day}^{Prov_i} = \sum_{j=1}^{N} (Univ_j) f(d_{Prov_i - Univ_j}) \quad \text{if } Univ_j \in Mkt_{Day}^{Prov_i}$$

$$ComPI_{Week}^{Prov_i} = \sum_{j=1}^{N} (Univ_j) f(d_{Prov_i - Univ_j}) \quad \text{if } Univ_j \in Mkt_{Week}^{Prov_i}$$

$$ComPI_{Term}^{Prov_i} = \sum_{j=1}^{N} (Univ_j) f(d_{Prov_i - Univ_j}) \quad \text{if } Univ_j \in Mkt_{Term}^{Prov_i}$$

$$ComPI_{Day/Week/Term}^{Univ_j} = \begin{cases} CPI_{Day}^{Prov_i} & \text{if } Univ_j \in Mkt_{Day} \\ CPI_{Week}^{Prov_i} & \text{if } Univ_j \in Mkt_{Week} \\ CPI_{Term}^{Prov_i} & \text{if } Univ_j \in Mkt_{Term} \end{cases} \cdot$$