

Global and national prominent universities: internationalization, competitiveness and the role of the State

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Abstracts This article provides a characterization of the internationalization of “global” European universities and discusses the role of the State in promoting greater internationalization and competitiveness levels of prominent national universities. The analysis supports previous arguments stating that global ranking of universities is strongly based on research, but reveals that the internationalization of research universities’ student population is also arranged to enhance research capacity. This finding is further reinforced by a positive association between the internationalization of the academic staff and the internationalization of the student population in one of those universities, being this association particularly strong with the doctoral student population. Finally, based on the analysis of two prominent national universities with different global competitiveness levels, we discuss the role of the State as a central supporter of these universities internationalization and global competitiveness arguing that public funding and support is critical if countries want to have national prominent universities competing at global level.

Keywords World class universities · Prominent national universities · Internationalization academic staff · Internationalization student population · Role of the State · Resources

Introduction

In the last decades of the twentieth century, the theme of internationalization in higher education has gained increasing relevance and attention by researchers and policy makers alike. For higher education institutions, and more concretely, prominent national

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universities oriented to research activities, the changing environment has meant a new challenge: having activities increasingly performed cooperatively and competitively at global level (either in dynamics of internationalization or globalization; see Teichler 2004). For most of these institutions, this has entailed managing conflicting interests derived from increasingly performing activities at local, regional, national and global levels (Marginson and Rhoades 2002). It has also entailed that, in the global competitive environment, their often undisputed dominant national positioning meant less, sometimes much less than before (Marginson 2006). This is bluntly shown by the somewhat polemic, but generally accepted, university global ranking systems (Jobbins 2005). In the current knowledge economy and globalization mix, these rankings have added pressure on university leaders to compete and cooperate internationally. Internationalization of higher education and higher education institutions, thus, is high on the strategic agendas.

Notwithstanding the political and policy discourses on the need to foster international connections and competition, the internationalization strategy in research oriented universities in several countries is still marred by blurriness and lack of resources (Marginson and Sawir 2006). In this article, we discuss critical aspects related to the internationalization of research oriented national universities. Firstly, we acknowledge the argument forwarded by Marginson that “global competition is vectored by research capacity” (2006, p. 1) and that research capability represents the core of the positional goods that rank universities globally.

Thereafter, based on the analysis of several major European research universities, we provide evidence that the universities placed in the top international university ranking positions in Europe share a common student structure. This structure relies heavily on graduate student population and on its strong internationalization. We further find that the internationalization of the student population at graduate level is associated to the internationalization of the academic staff. Finally, two prominent European national technical universities are analyzed—one ‘ranked’ as a global research university and other as a national research university struggling to internationalize its activities and campus—to highlight the role of the State as an enabler of these universities’ internationalization dynamics.

Globalization, internationalization, rankings and world class universities: research capability is the key

The evolution of globalization and of the knowledge society has led to systemic and institutional changes in higher education systems, and has required universities to adapt their character and functions to meet complex societal demands and expectations (Mok and Welch 2003). Supra-national institutions, such as the OECD, have guided national policies towards higher education leading to major systemic and structural changes in higher education systems and institutions (Vaira 2004). These include changes in managerial attitudes and cultures (Deem and Brehony 2005), the changing role of the State, from a position of almost full control to one of steering at a distance (Amaral and Magalhães 2001) which has resulted in increased institutional autonomy, but also in the increment of accountability exercises (Horta and Vaccaro 2008), and the promotion of schemes of performance based-funding and institutional competition (Jongbloed 2006).

Most universities worldwide have needed to change and become more entrepreneurial (e.g., Slaughter and Leslie 1997), and this entrepreneurial attitude has led universities to extend the scope of their activities outside the national borders. As the activities of higher education institutions become more developed in international (in terms of cooperation)

and global (in terms of competition) frameworks (see Teichler 2004), the more these institutions face new challenges. Universities that dominate in their national education systems now see themselves struggling to improve the quality of their academic activities when compared with their international peers.

If an analogy can be made to the world of football, these universities are no longer playing exclusively with peer institutions in national higher education leagues, where they enjoy a certain degree of supremacy based on their reputation, history, teaching quality or national research relevance. Instead, although they continue to play there, they have also started playing in the “Champion’s League”, in the “World higher education Champions League”. There, they may also develop activities in cooperation, but are in effective competition with other universities that have far greater resources, positional goods, and are equally or better integrated in international research and teaching networks of excellence. The universities that have established themselves earlier in global higher education have the competitive advantage. This is so because they belong to countries with dominant scientific systems, have more resources or acquired international reputation and experience by developing activities at the international level earlier. They have created a brand, and these are the universities that tend to be regarded as the *per excellence* “world class universities” (Shattock 2003).

Harvard, MIT, Yale or Cambridge tend to represent the image of the “world class universities” that most universities in the world aspire to be. (These are for higher education, the Real Madrid’s, Liverpool’s, Inter Milan’s and other major teams of the football champion’s league.) The position of these “world class universities” in the international arena is legitimized by worldwide university league tables that assess mainly performance characteristics associated to research activities, but which nonetheless, fuel the competitive enthusiasm among universities at global level (e.g., Dill and Soo 2005). Also, as in football, all countries want to have a top team competing internationally, or in the case of higher education, a “world class university”. In this regard, Altbach states “Everyone wants a world class university. No country feels it can do without one”. The same author adds “The problem is that no one knows what a world-class university is...”¹ It may be true that there is no agreement on a definitive concept of “world Class University”, but the research university model is in everyone’s mind when the idea of “world class universities” is mentioned. The struggle that most European and Asian universities undergo to improve their positions in the research focused international rankings (Deem et al. 2008), and the willingness of most of these universities to have their name or academic activities associated with a better ranked university (Marginson and Sawir 2006), also supports this assumption.

When looking at the top 100 or 500 worldwide university ranking table’s one feature is obvious: all universities are recognized worldwide as “research universities”. Research capacity, output and quality define global competition in higher education (Marginson 2006). Their research capability itself is fueled by student selectivity processes that ensure that these universities recruit the most promising students. These universities, unlike others, do not have difficulties in attracting students, as these are driven by the positional goods that the courses taken at those universities are able to offer them in the labor and academic markets. The fact that these universities are based in countries with strong economies further enhances these countries’ role as international student attraction

¹ Altbach “The Costs and Benefits of World-Class Universities”, International Higher Education, Autumn 2003 http://www.bc.edu/bc_org/avp/soc/cihe/newsletter/News33/text003.htm [Accessed on the 30th of July of 2008].

magnets, thus, contributing to one-way flows of international students between developing and developed countries (Marginson 2006).

But what type of international students are these top research universities attracting? Table 1 shows relevant characteristics of the top ten European universities in the academic world rankings. Although these rankings have severe methodological flaws recognized by others (e.g., van Raan 2005) and the authors themselves (Liu and Cheng 2005), they present a good outline of what the “university world hierarchy” is (Jobbins 2005). The table focuses on European universities instead of the world universities in order to decrease the overwhelming domination of the native English language speaking universities in the table, especially the doctoral universities in the US that dominate the international competition for students (Marginson 2006).

Previous analyses have shown that the student structure of these universities is organized according to their primary mission: research (e.g., Horta 2008). Therefore, the concern of these universities is to guarantee their research capability by focusing their teaching activities at graduate level, and particularly emphasizing doctoral programs and research. As shown on Table 1, these universities tend to do the same regarding the enrollment of international students and recruitment of academic staff. On average, the universities in the table have 24% of their student population composed of international students, ranging from a maximum of 40% in the Imperial College in the United Kingdom to a minimum of 13% in the University of Copenhagen in Denmark.

However, when the student population is disaggregated by level of education, a more revealing picture is shown. At these universities, only 16% of the undergraduate student population consists of international students while at graduate level this percentage increases to 41%. This indicates that the internationalization of the student population at the top European research universities is focused on graduate education. The average ratio between international graduate and undergraduate students also indicates that these universities have 36% more international students at graduate level than international students at undergraduate level. The number of international graduate students is more than twofold when compared with the number of undergraduate international students at least in three universities (Oxford, ETH Zurich and Paris 11), more than 50% in the University of Cambridge, and only in two universities there were more international undergraduate students than international graduate students (Imperial College and University College London).

This in turn implies that the internationalization strategies of these universities follows the same rationale as that of the student structure. That is, the international population is mostly concentrated at educational levels that support the research activities of these universities, thus fostering their scientific performance and institutional reputation both nationally and internationally (as suggested by Marginson 2006). Also, because the current analysis is set in the European context, it is likely that the rationales for the internationalization of the student population at these universities are deemed to be different according to the educational levels. For example, student exchange programs, such as the SOCRATES program or similar ones, tend to be focused on undergraduate education under the scope of an Europeanisation process, which is characterized by the rationale that cooperation and mobility aim to reinforce cultural and social ties in the European space (Teichler 2004). The rationale of broadening cultural and social horizons of the students at a campus is—like the SOCRATES/ERASMUS programs—more related to the internationalization of students at undergraduate level than supporting research activities which is more associated with the internationalization of the graduate student population.

Table 1 Characteristics of the 10 top European universities in the academic world rankings, 2007

European rank position	World rank position	University	Country	(%) International faculty	(%) International undergraduate students (vs. total undergraduate students)	(%) International graduate students (vs. total graduate students)	(%) International Students (vs. total students)	Ratio international graduate students/ international undergraduate students
1	4	University Cambridge	UK	39	14	51	27	1.82
2	10	University Oxford	UK	36	11	57	27	2.66
3	23	Imperial College	UK	39	34	49	40	0.77
4	25	University College London	UK	29	23	42	29	0.92
5	27	ETH Zurich	Switzerland	53	13	35	23	2.38
6	39	University Paris 06	France	3	17	66	27	1.00
7	42	University Utrecht	Netherlands	NA	NA	NA	NA	NA
8	46	University Copenhagen	Denmark	17	11	16	13	1.2
9	48	University Manchester	UK	30	15	47	23	1.01
10	52	University Paris 11	France	10	10	27	17	2.12

Notes: Calculations based on information placed in Top Universities site (<http://www.topuniversities.com/schools/>) [accessed on 30th June 2008]. All data refers to full time equivalent, except all data for Univ. Paris 6 and Univ Paris 11 which data refers to headcount; No data was found for the Univ of Utrecht. NA not available; Definition: The ratio international graduate students to international undergraduate students refer to the distribution of international students by levels of education. If the ratio is above 1, then most of the international students are enrolled at graduate level. If the ration is below 1, then most of the international students are enrolled at undergraduate level. If the ratio is 1, then the population of international students enrolled at a given university is perfectly distributed between graduate and undergraduate educational levels
Source: Academic ranking of world universities, Institute of Higher Education, Shanghai Jiao University (<http://ed.sjtu.edu.cn/rank/2004/Top%20100%20European%20Universities.htm>); Top Universities site [both sites were accessed on 30th June 2008]

Another characteristic of the universities shown in Table 1 is the high rate of internationalization of the academic staff. On average 27% of the academic staff at the top European research universities consists of international faculty members. This not only suggests that these universities are deeply integrated in international teaching and research networks, but also that English is widely used as the lingua franca. It is in English that these universities are mostly offering graduate level courses, articles are presented and discussed at conferences, knowledge is read in the international major journals; it is also in English that colleagues communicate either by means of ICT technologies or in person (Dedoussis 2007). This is quite an important aspect of a research university. The importance of English is particularly stressed in the scientific world where the prestige (and impact) of publishing a scholarly article in the English language in an international or national journal or book surpasses the scholarly publication in non-English journals or books (Marginson and Rhoades 2002).

University Paris 6 and University Paris 11 represent special cases mirroring particularities that can be more associated to the French higher education system than to the universities themselves. Unlike their international peers, both universities have a reduced percentage of international faculty; in contrast, they have a substantial percentage of international students which is similar to their international peers. The reduced percentage of international faculty in these two universities, when compared with their counterparts in Table 1, is explained by two factors that led to urges for reform of academic careers at French universities (see Musselin 2005). Firstly, the recruitment of faculty and upward career mobility in French universities involve extremely bureaucratic and complex processes, making them unattractive for international faculty, even if tenured positions are offered from the start (Musselin 2006). Secondly, the French academic labor market still favors “local” careers, while at the same time it is observed a decreasing number of vacancies offered by French universities (Musselin 2006), a declining number of international students being granted doctorates in France (Mogu  rou 2002) and a diminishing number of international candidates applying to vacancies at French universities (Cytermann et al. 2004).² These problems have been acknowledged as it has been increasingly perceived in French academia that there is a need for increased mobility and inclusion of international staff at French universities because “the presence of foreigners among university and research staff is becoming an indicator of dynamism and success” (Musselin 2006 p. 125).

In this context, the strong internationalization of the student population of University Paris 6 and University Paris 11 can be explained by one critical factor besides the recognized academic and scholarly prestige of these universities. France has long had the power to attract international students through its globally recognized scientific prominence (such as Germany; Verbik and Lasanowski 2007). This makes France, and its prominent universities, the main destinations for potential students of French speaking countries worldwide that want to enroll in tertiary education. Indeed, the great majority of the international students coming to France are from French speaking countries with which strong cultural and historical ties exist, such as Algeria or Senegal.³ The challenge is to

² As a matter of fact, It has been suggested that some elements of the French elites have been leaving the French system looking for more attractive academic positions abroad (see Postel-Vinay 2002).

³ Minist  re   ducation Nationale Enseignement Sup  rieur    Recherche, “Les dossiers Enseignement Sup  rieur Recherche et Technologie-Les   tudiants   trangers en France”, report 153, June 2004: <http://media.education.gouv.fr/file/56/5/2565.pdf> [Accessed on the 7th January 2009].

widen the country of origin of the international students and explore new global markets, and there, French universities have faced difficulties (see Verbik and Lasanowski 2007).

The discussion so far underlines that the internationalization of the student population in the top European research universities is mostly focused at graduate level, and that the internationalization of the academic staff is significant. In this context, it is possible that a relationship between the internationalization of the academic staff and the student population exists.

Internationalization at a top research university in Europe: the ETH Zurich case

In order to explore the relationship between the internationalization of the academic staff and the internationalization of the student population, we analyze the *Eidgenössische Technische Hochschule Zürich (ETH Zurich)*, or as it is internationally known, the Swiss Federal Institute of Technology. The choice for the ETH Zurich is based on various factors. It is a top European Research University based in a non English native speaking country; although Switzerland has a very advanced scientific system, it is not a ‘heavy weight’ like France or the UK (see Horta and Veloso 2007); it is a country with a medium-small sized population, therefore having a rather limited national student population. Its universities face a declining demand of national students that most European countries are now increasingly facing after the late twentieth century student boom in higher education (Amaral and Magalhães 2008). But there is another reason for choosing ETH Zurich to explore the relationship between the internationalization of the academic staff and the internationalization of its student population: it is a relatively young higher education institution compared to most other European research universities. It provides, therefore, an interesting case study from which other ‘growing’ and ‘developing’ universities may learn.

ETHZ was founded in 1855 as a federal polytechnic institute, becoming a university in 1909. This transformation led to the growing importance of the research function, which is underlined by the fact that doctoral degrees were granted at the very early stages (Krull 2008). The internationalization of ETH Zurich at this time was based on the curricula, which combined national oriented specifications and interests with international curricular models and the recruitment of several international faculty members.⁴

Since its origins, the ETH Zurich has represented the pinnacle of academic research in Switzerland. In the 1960s and in the 1970s, the awareness that the research performed at the institute was lagging behind internationally lead to reforms, and the need for internationalizing the university was perceived as a priority. In the late decades of the twentieth century, academic freedom became further related to entrepreneurial activities as funding started to be gradually allocated on the basis of achievement which enhanced the academic staff resourcefulness, proactivity and work quality standards. Furthermore, an awareness that international linkages and human resource attraction are critical in supporting the quality of the scholarly activities of the institute was reinforced. This is clearly perceived by the ETH Zurich mission statement: “the ETH Zurich can only compete with the world’s best by establishing international links, by recruiting its academic and research staff worldwide, and by remaining attractive to students from abroad” (as quoted by Dudler and Korosec 2005). This statement is clearly an indication of an international policy that

⁴ Information taken from: www.ethistory.ethz.ch [accessed several times between the 10th of July and the 1st of August].

combines the internationalization of the academic staff and the student population. Table 2 shows the numbers and percentage of professors that were recruited by all departments of ETH Zurich between 1990 and 2002 on what concerns their nationality and country of recruitment.

Although it is not surprising that the larger proportion of the recruited professors is Swiss nationals compared to other nationalities, it is rather unusual that the proportion of recruited Swiss professors (nationals) is lower than the recruitment proportion of international professors. This certainly accounts for the fact that ETH Zurich has 53% of its academic staff composed by international professors in 2007 (see Table 1). The range of the nationality of the recruited international faculty is rather broad. The substantial recruitment of German nationals is explained not only by the sharing of the same language of the canton where ETH Zurich is located, but also by existing linkages between ETH Zurich and German universities that have a solid tradition in the hard and applied sciences of similar interest to the ETH Zurich (Krull 2008). The latter reason seems to be far more important, since the percentage of Austrian professors hired (also German speaking natives) is much smaller than that of the German professors hired (4.5% Austrians to 25% Germans) with only about 2% of all faculty staff recruited in Austria and 16% of all faculty staff recruited in Germany.

The recruitment of scholars from many nationalities suggests that academic and scholarly quality and potential are critical in the recruitment process, whereas cultural and linguistic similarities are less so. Perhaps, the best indication of this is that ETH Zurich is recruiting scholars from scientific leading countries. ETH Zurich recruits about 42% of their staff in major scientific “superpowers” such as the United States, Germany, Great-Britain and France (Horta and Veloso 2007). This shows that ETH Zurich, as a European Research University, is able to be competitive in the world academic market in attracting the faculty members with promising and established academic and scientific potential and capability, something that is critical to maintaining research proficiency and positional goods at global level (Marginson 2006).

Table 2 Professors taking office at ETH Zurich from 1990 to 2002, by nationality and country of recruitment

Nationality		(%)	Country of recruitment		(%)
Switzerland	155	43.8	Switzerland	170	48
Germany	90	25.4	USA	65	18.4
USA	22	6.2	Germany	57	16.1
Austria	16	4.5	Great Britain	15	4.2
Italy	12	3.4	France	10	2.8
France	11	3.1	Belgium	10	2.8
Great Britain	10	2.8	Austria	6	1.7
Belgium	10	2.8	Italy	5	1.4
Canada	5	1.4	Canada	5	1.4
Other European countries	13	3.7	Other European countries	5	1.4
Asian countries	7	2	Asian countries	3	0.8
African	2	0.6	Oceania	2	0.6
Central and South American	1	0.3	Central and South American	1	0.3
Total	354	100	Total	354	100

Source: ETH Zurich, annual report

However, the internationalization of the ETH Zurich is also reflected in the student population. ETH Zurich is a highly internationalized university in terms of its student population, which is focused at graduate level (35% of its graduate students are international students while only 13% of its undergraduate students are international students) in a similar fashion to its institutional peers in Table 1. One question, then, relates to whether internationalization of the academic staff is interrelated with the internationalization of the student population? In fact, the analysis shows that a higher internationalization of the faculty staff is indeed correlated to a growing internationalization of the student population (Fig. 1a). However, it is when the relation between the internationalization of the faculty staff is done in relation to the student population disaggregated by educational levels that one can perceive where this relationship is strongest.

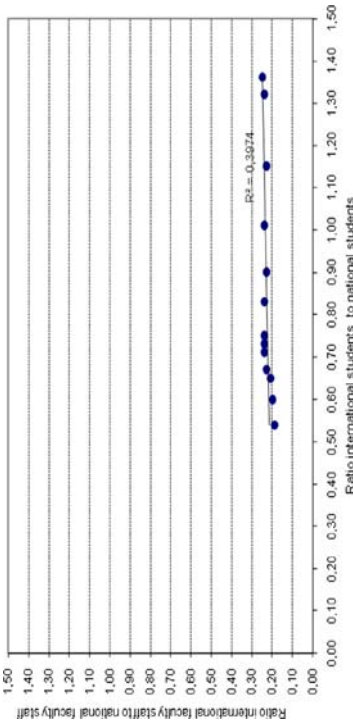
From the analysis of Fig. 1b (undergraduate student population), Fig. 1c (master student population) and Fig. 1d (doctoral student population), one can perceive that the internationalization of the academic staff at a research university is correlated with the internationalization of the student strata that produce scientific outputs and maintain the research capability of the university: the doctoral stratum. This is perceived by the very strong linear relationship between the internationalization of the faculty staff and the doctoral student population ($R^2 = 0.86$), as well as by the strong positive correlation among them (Pearson's correlation coefficient: 0.926; $P < 0.01$). But an equally important result that sustains this argument is that the correlation between the internationalization of the academic staff and the undergraduate population is significant but negative (Pearson's correlation coefficient: -0.617 ; $P < 0.05$).

This is not a surprising result for several reasons. At undergraduate level the overwhelming majority of the students are still by far national (see Teichler 2004). In the case of ETH Zurich, the German language still dominates as the teaching language at undergraduate level, while English is considered the lingua franca at graduate level.⁵ Also, despite the greater internationalization of higher education and student flows, the great majority of undergraduates that conclude their studies still find work in their native national economy (Teichler and Jahr 2001). In this context, hiring international faculty to teach extensively at undergraduate level seems unnecessary particularly when universities are also under pressure to respond to local and national demands that are better understood by nationals (Ahola 2005).

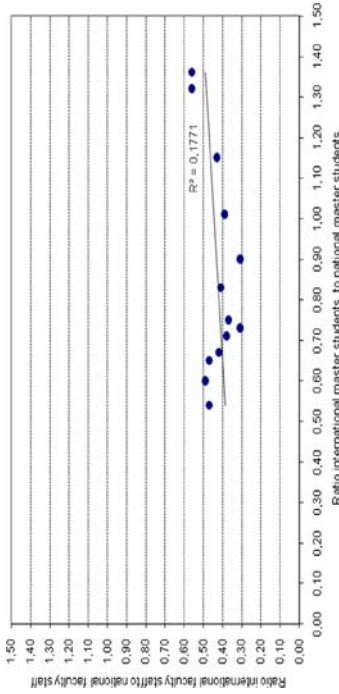
Finally, as at any research university, the focus of the strategic investment on human resources is mainly laid on the graduate school and on the research effort of the university as a way to sustain and improve the current research capability and the student selectivity that supports the reputational base that these universities hold worldwide (Marginson 2006). In this sense, the selectivity of academic staff to be hired is also critical. Hiring promising or established academic staff from universities from developed scientific countries brings alongside with them reputation, know-how, new perspectives, connections, and possible avenues to bring in international research funding (Lacetera et al. 2004). But the competition for bright minds is fierce (see Rosovsky 1990).

The competition for academic staff requires positional goods and financial resources, which are not available to the overwhelming majority of national research universities that are struggling to internationalize their campuses and activities, reform their structures, and compete globally with peer universities. The question then is how these universities can further internationalize their activities, and increasingly collaborate and compete with their

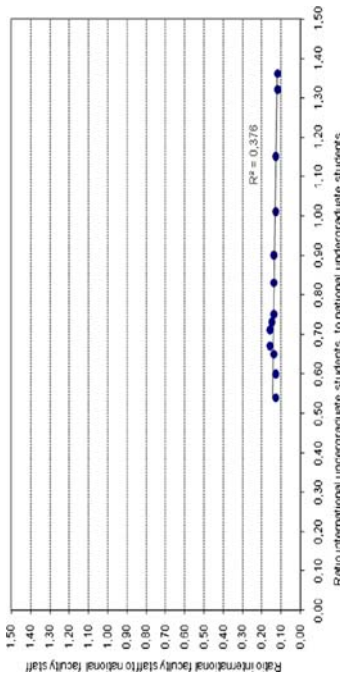
⁵ ETH Zurich information at Wikipedia http://en.wikipedia.org/wiki/ETH_Zurich [accessed several times between the 15th of July and the 30th of July].



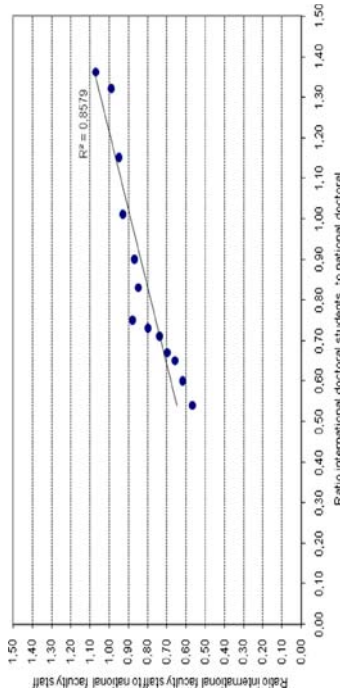
Note: Pearson's correlation (coef: 0.667; sig 0.05); Source: ETHZ Admin. Services
(a) Relationship between international to national faculty ratio and international to national student ratio, 1991–2003



Note: Pearson's correlation (coef: 0.410; not sig); Source: ETHZ Admin. Services
(c) Relationship between international to national faculty ratio and international to national master student ratio, 1991–2003



Note: Pearson's correlation (coef: -0.617; sig 0.05); Source: ETHZ Admin. Services
(b) Relationship between international to national faculty ratio and international to national undergraduate student ratio, 1991–2003



Note: Pearson's correlation (coef: 0.926; sig 0.01); Source: ETHZ Admin. Services
(d) Relationship between international to national faculty ratio and international to national graduate doctoral student ratio, 1991–2003

Fig. 1 Relationship between the proportion of international staff and the international student population at ETH Zurich, 1991–2003

international peers. Perhaps more to the point, it is important to consider whether these universities can do it ‘on their own’ or if the role of the State still matters.

The State as a “university internationalization engine”: two different perspectives

In a global world of higher education, most national governments want to have at least one university considered as an international research university competing and cooperating with other peer research universities globally. Governments promote competitive frameworks in higher education based mostly on research funding competition (e.g., Jongbloed 2006) in order to prepare universities to compete both in the national and global level. The tendency to organize higher education systems according to mechanisms of government-induced managed competition known as quasi-markets have been occurring more frequently and across many countries (see Agasisti and Catalano 2006). In some cases these quasi-markets have not had an effective implementation (see Teixeira et al. 2004). Yet even if the implementation of these quasi-markets has been effective, the problem seems to be that preparing national universities to adopt more flexible organizational structures, entrepreneurial and managerial attitudes and be more proactive through the creation of these State driven quasi-markets does not seem to be enough. Even in the latter cases, national prominent universities continue to lack resources to compete globally, particularly with the doctoral university sector in the US (Litjens 2005). In this context, we argue that the role of the State in the effort to internationalize and enhance the global competitiveness of some national universities should go beyond the creation of national quasi-markets.

In order to make our argument, the case of the *Instituto Superior Técnico* (IST) in Portugal is portrayed. IST is the school of engineering of the Technical University of Lisbon, but due to historical roots related with its institutional development, has a very high level of autonomy and can be perceived, for the sake of the analysis, as an independent higher education institution. The choice for this school is based on the similarities that this school has in terms of national prominence, longevity, and scientific and disciplinary focus with the ETH Zurich which will be used as a reference when relevant. However, IST is also chosen for its dissimilarities with ETH Zurich. The latter is a world research university while the former is a national research intensive higher education institution that is struggling to enhance its international activities and student population.

IST was founded in 1911 and was intended to be a prime technical knowledge base of innovation for the Portuguese economic system. Its original academic staff included German, Swiss and French nationals (Heitor et al. 2004). IST was integrated into the Technical University of Lisbon in 1930, and for most of the twentieth century, had its activities constrained for most of the century by a dictatorial political regime, as well as by constant underfunding and erratic scientific and educational policies (Ruivo 1995). As in most universities in Portugal, IST is very dependent on State policies for science and higher education, and as such, efforts to internationalize its activities and campus are associated with the internationalization driven by the State (Heitor and Horta 2004). The most significant efforts to internationalize IST activities started when Portugal joined the European Union in 1986. Only then did Portugal begin to integrate and participate in international research organizations, such as the CERN, and start to become actively involved in the European Framework programs (Heitor and Horta 2004).

The internationalization effort of the Portuguese universities led by the State had another impulse. The evaluation assessment of university based research units implemented in the 1990s strongly emphasized in its evaluation process the importance to publish in international journals. This led to a change in the organizational behaviors and working attitudes at IST, particularly in the perception that there was a need to internationalize the academic activities and increase research collaboration (Horta 2008). In addition, as in other countries, associated policies increased the autonomy of universities, promoted managerial practices and entrepreneurial attitudes that fostered both inter-institutional cooperation and competition at national level (see Magalhães and Amaral 2007).

The entry of Portugal in international scientific institutions and the implementation of the national assessment of the university research units impacted the publication dynamics in international journals (Fig. 2). Before these State led efforts, and taking the year of 1983 as a reference point, the number of IST authored scientific publications in international journals in mathematics, physics, electrical, mechanical and chemical engineering was less than 50. Moreover, only 9% of these were done in collaboration with colleagues based in international universities. In 1993, 7 years after Portugal joined the European Union, the number of publications tripled, and 27% of these were published in collaboration with colleagues based at international universities. During both of these periods, single authored articles predominated (79% in 1983 and 56% in 1993). In 2003, not only did the production of articles more than triple compared to 1993 figures, but more articles were produced in collaboration with academics based in international universities (35%) than were single authored (34%). Also, the percentage of articles produced in collaboration with colleagues from other national universities increased from the 12% in previous decades to 25%, suggesting that not only was collaboration in research becoming more important, but also that IST academics had become more integrated into national and international networks.

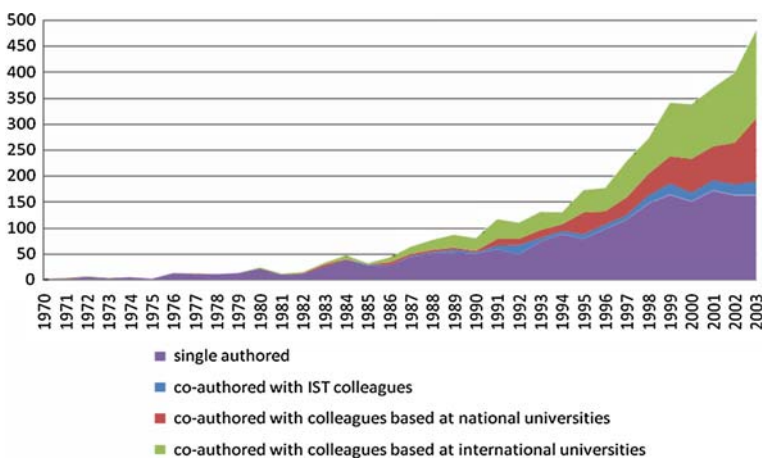


Fig. 2 Evolution of collaboration patterns in the publication of scientific international articles by IST faculty in the areas of Mathematics, Physics, electric engineering, mechanical engineering and chemical engineering, 1970–2003. *Source:* Data gathered from Thomson ISI, web of science

That said, and in spite of the fast development of Portuguese universities in the last decades of the twentieth century (Heitor and Horta 2004), the competitiveness of IST and of the majority of the Portuguese universities in the global market to bring in promising academic staff is difficult. A reason that could be a hampering factor in the attraction of international faculty is the low level of salaries practiced in Portugal. Departing from the exploratory work of Rumbley et al. (2008) we compared the salaries of German, French and Portuguese academics at entry-level and found insignificant salary differentials. In fact, if purchasing power parity is used in the calculations, the salary of Portuguese academics at entry-level when compared with their German and French counterparts can be considerably higher.⁶ Therefore, salaries are not a factor in lessening the attractiveness of Portuguese universities. Instead, the difficulties in attracting promising academic staff in the global market seem to be much more associated with overly bureaucratic recruitment processes, underlined by the low attractiveness of the Portuguese universities in terms of reputation and constrained by the scarcity of available resources to develop scholarly work (Horta 2008). The result is that unlike the global research universities, which tend to have at least one-fourth of their academic staff composed by international academic staff, at IST only 2% of its academic staff is not Portuguese. At IST, not only is the majority of the recruited academic staff national, but the great majority also completed their doctoral degrees in Portugal (Table 3).

The characterization of the hiring process seen on Table 3, and the overwhelming recruitment of Professors that held their doctoral degree from Portuguese universities, results to a great extent from State led policies aimed to increase the qualifications of the academic staff that is still rather low in Portugal (GPEARI 2006). It is also the result of the expansion of doctoral programs in Portuguese universities, which has entailed that a substantial share of this hired academic staff are ‘inbreeds’ (the inbreeding rate at IST is very high; see Horta 2008). This may be an obstacle for the internationalization process at IST since inbreeds tend not to be so connected and collaborate less with peers outside the university when compared with their non-inbred academic peers (Horta 2007). Nonetheless, the hiring of 22% of all hired academic staff who did their doctoral degrees in universities from countries with developed scientific systems is important because this academic staff is deemed to bring with them contacts and the ability to integrate themselves and others in international scientific and teaching networks (Holtermann 1996). This allows IST to respond to globalization by assuming an internationalization strategy as many European universities do where cooperation is favored to competition (van der Wende 2001), but it also reflects the institutional inability to compete globally.

Even if the international size and scope of mainly research oriented activities of IST increased strongly driven by State led policies, its student structure is still too focused on undergraduate education to enable IST to become a competitor in the international global

⁶ Departing from the exploratory work and analysis of Rumbley et al. (2008), we compared the academic salaries of German, French and Portuguese assistant professors. The results indicate that a German assistant professor would earn around 180 Euros more than a Portuguese Assistant professor, but a French Assistant professor would earn around 100 Euros less than a Portuguese assistant professor per month at entry-level. If Purchasing Power Parity was used to take into account standards of living then a Portuguese assistant professor would earn more than 800 Euros per month than a French assistant professor and around 550 Euros more per month than a German assistant professor. Data for the Portuguese assistant professor salary was obtained from official sources (DGAEP 2008) and Purchasing Power Parity from the World bank website (as did Rumbley et al. 2008): http://web.worldbank.org/WBSITE/EXTERNAL/DATA_STATISTICS/ICPEXT/0,,menuPK:1973757~pagePK:62002243~piPK:62002387~theSitePK:270065,00.html [Accessed on the 6th January 2009].

Table 3 Professors taking office at IST Lisbon from 1990 to 2003, by the place where they earned their doctoral degree

Country where the doctorate degree was earned		(%)
Portugal	356	74.6
United States	58	12.2
Great Britain	36	7.5
France	10	2.1
Switzerland	4	0.8
Other European countries	10	2.1
Central and South American	3	0.6
Total	477	100

arena (Horta 2008). Fig. 3a shows that the internationalization of IST student structure is as well focused mostly at undergraduate level. In 2004, the internationalization of the student population at IST was three times larger at undergraduate level than at doctoral level. This contrasts with the situation of ETH Zurich, where from 2000 onwards the larger international student population was composed by doctoral students (Fig. 3b). In 2003, there were more international doctoral students enrolled at ETH Zurich than national doctoral students (7% more and the number of international and national master students was basically the same; Fig. 3d). At IST, the proportion of international doctoral students enrolled in comparison with national students was minimal (ratio of 0.16) and even lower at master's level (ratio of 0.08) (Fig. 3c).

However, the internationalization of the student population cannot be perceived only under a structural framework, but requires its size to be taken into account as well. In the context of this article, and the importance that research capability has on defining the “world classness” of a university, the size of the doctoral student population is critical because they represent human resources that most support research activities. Doctoral students not only contribute to the research outputs of academics that they are working with, but are also likely to free the academics' time from teaching towards research by assuming the role of teaching assistants (Austin 2002). They also have the potential to create linkages between academics, facilitate the access to network resources, and bring in new ideas (Melin 2004). In this sense, the realities of IST and ETH Zurich are quite different. In 2004, IST had 83 international doctoral students enrolled in various doctoral programs while ETH Zurich had 1,307 in 2003 (Fig. 3a, b).

Finally, and also unlike ETH Zurich which enrolls international students from all over the world, the internationalization of IST' student population is strongly based on the incoming of students from Portuguese speaking countries. In 2004, of the whole international undergraduate student population at IST, 80% were international students from Portuguese speaking countries such as Brazil, Angola or Mozambique. In fact, the majority of the international students at IST are from these countries as they represent 68% of the whole international student population. The sharing of the same language seems to be critical in the attraction of these students, although its importance as a central factor in attracting international students at graduate level wanes since at IST only 30% of the total graduate international students come from Portuguese speaking countries.

The structure of the student population and particularly the structure of the international student population imply that the research capability of these two universities (at least in

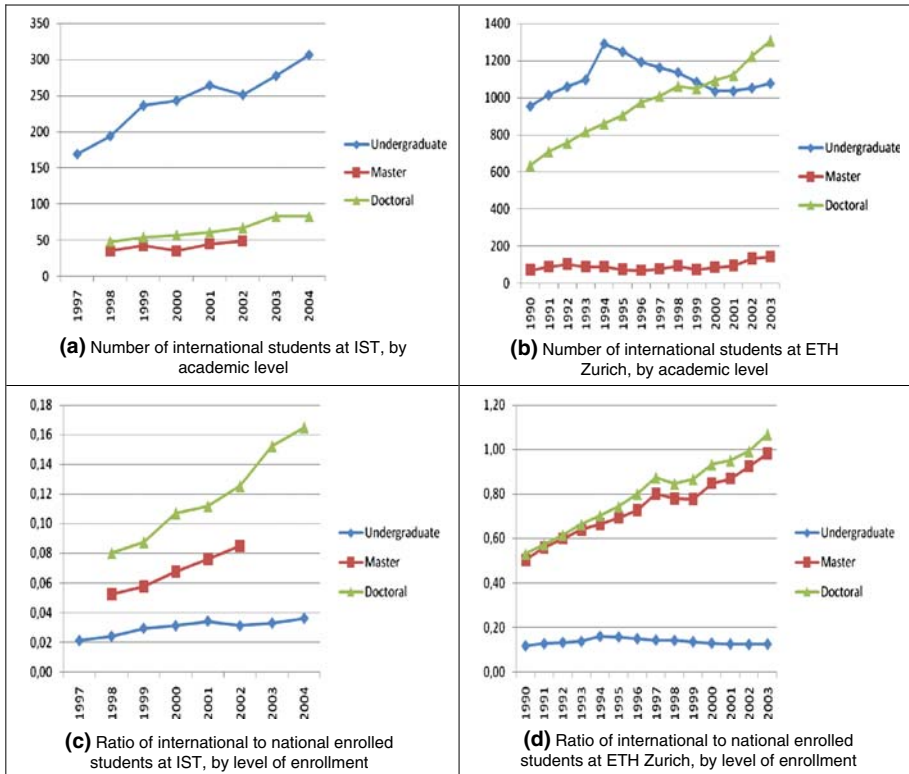


Fig. 3 Comparison between the number of international students and the ratio of international to international students by level of enrollment. *Source:* Administrative Services of IST and ETH Zurich

terms of human resources) is quite different, and in turn, so is their positioning in the global higher education market in terms of their competitiveness (see Marginson 2006). The lower international prestige and inadequate student structure to compete directly with the top world and European research universities of IST is evident. Despite the reinforcement of graduate education in the last decades of the twentieth century, as well as the strong emphasis in further internationalizing master and doctoral programs (UTL 2005) the ability of IST, or the Technical University of Lisbon itself, to do it on its own is discouraging.

This is more related to a matter of lack of financial resources than a lack of will and institutional planning (UTL 2005). The total income of IST in 2004 neared the 98 million Euros mark, of which about 52 million Euros were provided by the State. In the same year, the total income of ETH Zurich amounted to more than 704 million Euros, of which about 579 million Euros was provided by the State (i.e., Swiss Confederation Funding). Not only the total income obtained by a top research university such as ETH Zurich is seven times larger than the one of IST, but the contribution of the State is also more substantial (82% in the case of ETH Zurich compared to 52% at IST).⁷ The amount of income that ETH Zurich

⁷ *Source:* IST “Orçamento do IST 2004”, IST administrative services. ETH Zurich “ETH Zurich Annual report for 2004”: http://www.ethz.ch/about/bginfos/annualreports/2004_eth_statistics_en.pdf [accessed on the 30th July 2008].

receives from the Swiss state is also eleven times larger than the amount of income that IST receives from the Portuguese government.

Two main insights can be withdrawn from the analysis of these numbers. The first is that with the current amount of income IST cannot aspire to improve its activities in a way that allow it to compete at the same level with ETH Zurich and other top European and US research universities. Second, and perhaps most important, for both cases the role of the State is or can be decisive.

In the case of ETH Zurich the role of the state is decisive because it provides large public funds that help to ensure the positioning of the university as a top research university in the world. It is not unreasonable to argue that without the support of the State, the quality, internationalization and reputation of the teaching and research work performed at ETH Zurich would suffer.⁸ In the case of IST, although a substantial amount of resources are obtained from other sources than the State, they are clearly not enough to reach decisive levels of investment that allow the change in the student structure and its further internationalization. IST on its own with or without the current funding from the state cannot compete internationally with major European and US universities. The IST case provides a paradigmatic example to sustain the argument that if a country wants to have one or a few more world class universities, then the State has to invest in the “creation” of those universities. While doing this it is required to take into account the characteristics of existing research universities, but the process needs to remain faithful to the context of the higher education, scientific and economic systems of that country and the university requires to be aware of its “glonacal” levels of action (Ahola 2005). This indicates that internationalization processes and policies require more than funding, but that without funding there is hardly even a fair start to competitive ‘races’.

In Portugal, the state is once again acting as a driver of internationalization in the Portuguese higher education and scientific system. It has signed protocols with three US research universities—Carnegie Mellon University, Massachusetts Institute of Technology and University of Texas at Austin—as a means to promote the national scientific and technological capability, but the objective is also to facilitate the internationalization of the Portuguese universities. The aim of the program of international partnerships developed between the Portuguese government and the above mentioned US research universities is to establish advanced tertiary education and research networks that can facilitate the recruitment of academic staff and researchers. The program involves several Portuguese higher education institutions, but includes the participation of State Laboratories, industry and Technological development agencies. The contracts with the US universities have an initial duration of 5 years and an estimated budget of 141 million Euros.⁹ Although it is too soon to perceive the impact of this State driven internationalization plan, its sole implementation and enthusiastic adherence of the Portuguese universities to it underlines the critical role that the state still has in higher education. It also underlines that in spite of the changes in higher education in the last 50 years, the sustainability of a national “world class” university in the global arena cannot be achieved without the strong commitment of the state and public funding.

⁸ For an analysis of the role of the State in the internationalization of Swiss universities and the Swiss academic research see Horváth et al. 2000.

⁹ Source: Resolução do Conselho de Ministros no. 132/2006. *Diário da República*, 1^a Série, no. 198, 13th of October 2006.

Conclusion

In this article, we show that the internationalization of national research oriented universities requires to be focused on graduate education and research activities, if they aim to compete in the global higher education market. The analysis of the major research universities in Europe shows that the internationalization of the campuses is dual: student population and academic staff. On what concerns the student population, one observes that the internationalization of the student population is focused at graduate level, mainly at doctoral level in order to support the universities research activities. Our analysis also shows that there is a relationship between the internationalization of the academic staff and the internationalization of the student population. The internationalization of the academic staff is strongly and positively associated with the internationalization of the doctoral student population. This indicates that the recruited academic staff is hired to perform research and teach at graduate level.

However, two facts are important in terms of accounting for these results

- (1) One cannot assume that the internationalization of the academic staff enhances the internationalization of the student population. There is a relationship between them, but one cannot infer causality from that relationship since the methods of analysis were based on simple correlations. More information would be necessary to perform an analysis that would allow inferring causality and a better understanding of the nuances involved in the relationship between the internationalization of academic staff and student population.
- (2) The case of the ETH Zurich represents a case of a European research university where some lessons can be learned. Its internationalization and research capacity evolution is path dependent and cannot be withdrawn from its national and institutional contexts. Although ETH Zurich and IST share many characteristics, the future internationalization path of universities such as IST should take into account both the critical characteristics of the top research universities in the world, but also the characteristics of the S&T and higher education systems as well as the national and local social and economic context.

Finally, both for a “world class university” such as ETH Zurich and a prominent national research higher education institution such IST, the role of the State, through funding and higher education internationalizing policy initiatives seems to be critical. Although the role of the State in higher education has been changing gradually, it can still be an engine of internationalization of national higher education institutions, and only the State can provide the financial resources for a country to build or maintain a competitive “world class university” in the global arena.

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