CROSS-COUNTRY EFFICIENCY COMPARISON BETWEEN ITALIAN AND SPANISH PUBLIC UNIVERSITIES IN THE PERIOD 2000-2005

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Cross-Country Efficiency Comparison between Italian and Spanish Public Universities in the period 2000-2005[1]

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Abstract

The growing internationalization of European Higher Education requires more emphasis on cross-country comparisons. In this paper, an efficiency analysis of Italian and Spanish universities is conducted; as well as from a comparative perspective. The efficiency scores are obtained using Data Envelopment Analysis. The results demonstrate a good average efficiency in both countries relative to each "country-specific" frontier; but when compared together, Italian universities seem relatively more efficient. Malmquist indexes show, in both cases, efficiency improvements in the period considered. In the Italian case, this improvement is due to major "technological changes"; that is, the introduction of some structural reforms in the sector (e.g. Bachelor/Master curricula). In the Spanish case, there is an improvement in "pure" efficiency, which is due to new funding models. Further stages of the study underline the role of "regional effects", probably due to different socio-economic conditions in Italy, and to the decentralization process in Spain.

***JEL classification*:** C14, H52, I21, I22

***Keywords*:** Efficiency analyses, Universities, Data Envelopment Analysis, Malmquist indexes, Decentralization.

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1. Introduction and objectives

Higher Education, in Europe, is not a homogenous sector (OECD, 2006a). Some countries spend elevated amounts of public resources in tertiary education (e.g., Scandinavian countries), and others much less (mainly countries of Continental Europe such as Italy, Spain, France). Some countries have a well-developed HE system, and high participation rates (e.g., Belgium, Netherlands, etc.) while others, especially in Eastern Europe, are now in their developing process, linked to the more general development of socio-economic context.

However, some European countries have similar HE systems. Among them are those of Spain and Italy. In these countries, HE systems were characterized by reforming processes which started in the 1980s and 1990s, and which are still influencing the organization of the sector. Moreover, the number of students and institutions is very alike, and the most important characteristics of HE structure are almost the same. Among them, in both countries, the emphasis on efficiency and performances of universities is a recent key issue. Actually, this a common characteristic in the European Area (EU, 2006): since public finances are experiencing strong stringencies in many European countries, the problem of providing HE to a massive population of students without increasing public financing is becoming crucial. From a policy perspective, the efficiency of universities' activities have become a priority, and governors are very interested in knowing if these activities are conducted maximizing the results (given the inputs available, e.g. staff and financial resources).

The aim of this study is to provide an efficiency analysis, both for Spanish and Italian universities, as well as a cross-country comparison perspective, to identify the main similarities and differences.

The present paper is innovative in many respects. While there are many studies on efficiency analysis of HE institutions in a single country (e.g. Abbott & Doucouliagos, 2003 and Carrington, *et al*., 2005 – Australia; Athanassopoulos & Shale, 1997, and J.Johnes, 2006 – UK; Agasisti & Dal Bianco, 2006 – Italy; Warning, 2004 –

Germany; McMillan & Datta, 1998 – Canada, Martínez Cabrera, 2000 – Spain), the literature on comparative analysis across different countries is still very limited. To the best of the authors' knowledge, there are only three streams of contributions on this specific issue. The first is by Joumady & Ris (2005) and it is focused on a comparison among universities in different countries, using a sample of young graduates' responses to a survey; they analyze 209 HE institutions in 8 European countries.

The second is by Agasisti & Johnes (forthcoming) who used Data Envelopment Analysis for comparing the technical efficiency of English and Italian universities. The present paper stems from this second approach, based on institutional data about universities' activities (e.g. provided by Ministries, statistical Agencies, etc.), and not on students' responses. Cross-country comparison is a recent field of interest in the literature on the efficiency of universities, due to the increasing internationalization of European HE institutions and growing competition in the European Area. So, the cross-country approach for studying efficiency in HE is increasingly adopted, and it is of crucial importance for many reasons. First, European countries decided within the Bologna Declaration framework to pursue similar objectives using similar policies. Second, the Lisbon Agenda also set similar targets with reference to development in research and education, also including universities' strategies and actions. Finally, experiences and analyses conducted in other countries could be useful for informing national policies – so that the cross-country comparisons can facilitate a cross-fertilization of the best practices.

Moreover, in this era of internalization, the desire to have a "benchmark" for comparing performances inevitably implies a cross-country approach. In this context, the third stream of research is recently being carried out by Bonaccorsi & Daraio (2007). Their studies are based on the Aquameth project[2] whose aim is to collect data about universities (on the institutional level) in several countries. Then these authors also use data on single universities and their objective is to provide evidence of institutions' strategies as well as efficiency.

[2] See Bonaccorsi & Darario 2007 for further information on the project.

Comparative analyses across countries are, however, quite diffuse recently even when using a more qualitative approach or single performance indicators (PIs). The most famous example is the ranking published by the JiaoTong University of Shangaj[3]. The classical weakness of these types of rankings is that they are based on indicators weighted according to a predefined method – and it is usually common for all universities, independently of their specific characteristics, strategies, etc. As we specify later, in this paper we use a methodology (called DEA) which is able to overcome these problems, allowing each university to assign different weights on different dimensions of their activities with the aim to maximize their result. Moreover, rankings usually tend to measure the "quality" of universities (and, as usual, the concept of "quality" is much questionable) while DEA measures the technical efficiency; that is, the ratio of combined outputs on combined inputs – and this indicator is much less subjective.

The paper is organized as follows. In section 2, there is a background for analysis. Section 3 illustrates data and methodology, while section 4 shows the main findings. In Section 5 there is a discussion of results, further analyzing the presence of regional differences within each country, and Section 6 presents concluding remarks.

2. Background

There are several common characteristics in Spanish and Italian HE, which suggest an interesting comparison between them. First, these are two of the biggest HE systems in the European Union. For example, looking at the data on the number of students, it is evident that, among the European countries, only 5 HE systems have comparable dimensions (Germany, UK, France, Italy and Spain) – see Figure 1[4].

Second, an important common feature of Spanish and Italian HE is that they are constituted almost exclusively of universities – there are no vocationally-oriented

[3] See http://www.arwu.org/ranking.htm

[4] The comparison was made referring exclusively to EU-15 States; we decided to not to include the accession states.

institutions[5]. This situation permits the avoidance of some typical problems in making international comparisons, due to different structures of HE systems (typically, related to the existence of a "binary system" in which institutions with different vocations operate). Moreover, the number of universities (in absolute terms) is very similar, further facilitating such a comparison (see Table 1).

Lastly, Spain and Italy have introduced formula-based funding models and/or contract funding encompassing more competitive power in recent years. The difference is that Spain has developed these models in a decentralized situation, where regional authorities have HE responsibility: so each region has adopted its own formula-funding. Instead, Italy has introduced these models in a situation in which the central State Administration still plays a major role, so there is a unique formula valid for allocating resources to all Italian HE institutions. For this reason, the analysis of Spanish and Italian models and their effects on technical efficiency would constitute a preliminary contribution of this paper for future development in policy models in the HE sector.

Nevertheless, two main differences between the two HE systems must be pointed out. First, the Italian university system is under-funded with respect to the EU-15 average (0.9% of GDP), while the Spanish system's financing (1, 2% of GDP) is in line with this European mean (1.3% of GDP) – data refer to year 2004, and are extracted by OECD (2007). Affirming that the Italian HE is under-funded could seem too biased: in fact, it may just as well be the case that the Spanish HE is over-funded – or also the case that the Italian HE is very efficient. Nevertheless, we refer to international data (OECD, 2006b) just to underline that the judgment on the under/over-funding is based on international comparison; that is, assuming that the OECD average is the "standard" level of funding for HE activities[6]. Second, the student: teacher ratio is lower in the Spanish case than in the Italian case. As pointed out later, this is due to a unique characteristic of one part of the academic staff in Spain. However, both differences do

[5] Indeed, for these two countries the proper definition is "University System" for referring to tertiary-level education, although in Spain from the year 2000 the vocational education grew very quick.

[6] The authors are aware that this interpretation is misleading, because differences are due mainly to differences in types and levels of activities provided by HE institutions – but the aim of this comparison is to have a look at differences in general levels of funding.

not affect the possibility of realizing a cross-country comparison. Indeed, since the comparison is conducted at institution-level, it is important that institutions' activities are similar in both countries. This is the case as demonstrated above: a high number of students, university-type education, and similar means of receiving public funds.

To make an efficiency analysis, which is the aim of this paper, it is necessary to define inputs and outputs in the productive process. In the case of HE, the literature points out that universities jointly employ many inputs and many outputs together; see, for instance, the study of universities as multi-product organizations by Cohn et *al.*, (1989). As in this paper a non-parametric approach is adopted (see section 3), the choice of input and output variables assumes crucial importance, because it is not possible to statistically check the robustness of results *ex post*. In this respect, the ability in correctly designing the productive process is decisive. In this study, the prior necessity is to simplify the characteristics of the productive process to allow a better cross-country comparison. In fact, in a country-specific efficiency analysis, several characteristics of universities could be described in detail within the model; but, given the cross-country perspective of the present analysis, it is important to assume, as reference points, the "common features" of all institutions. Because of these reasons, here universities are considered as organizations using financial and human resources as inputs to produce human capital and research products as outputs (Figure 2). This simple model allows a great degree of comparison between Spanish and Italian institutions, because the process[7] in which they are involved is very similar (see above: massive education, university-type education, financial constraints, etc.).

Following previous studies, some proxies for inputs and outputs of the universities' production process were chosen. We are aware that this choice is the most critical one with respect to both the validity and the reliability of the derived results. For this reason, we spend some time here to explain our assumptions in detail. While the literature generally agrees with a simplified description of the productive process,

[7] As stated above, the "production process" in which universities are involved is actually too complicated to be described, as it is a "multi-function" process. However, a graphical illustration of the simplified production process assumed in this paper is provided in Figure 2.

similar to the model adopted here, the choice of adequate proxies for inputs and outputs is still very debated, and no unique solutions were definitively suggested (Johnes, 2004). As inputs, we consider number of students, number of Ph.D. students, number of professors (academic staff) and financial resources available (which also proxy the amount of facilities, laboratories, etc.). As outputs, we use number of graduates as a proxy for teaching performance (production of human capital), and the amount of external resources[8] attracted to research activities (grants, consultancies, etc.) as a proxy for research performances. Both the choice of not using qualitative indicators, as well as the choice of considering resources for research as an output instead of an input is very questionable (Johnes, Johnes, 1995). However, since there are no more reliable nor more robust indicators, most of studies in this field widely accept these simplifications. Nevertheless, a challenge for future research is to better address these shortcomings. Moreover, the differences in subject-mix are not considered here. It is well-known that some disciplines require more resources both for teaching and research activities (e.g., Engineering, Medicine, etc. require laboratories, costly facilities, etc.). However, in a simplified model, these differences could be assumed as incorporated in the resources' differentials, and they are not explicitly considered here. Certainly, future research will try to address this matter, refining the quality of data.

A related shortcoming of this kind of analysis is the consideration of mere quantitative data. The literature on the production processes of education is already pointing out that actually the quality of inputs and outputs matter for determining efficiency and effectiveness in this field (Johnes, G., 2006). However, at the same time, the identification of adequate indicators for describing HE processes is a very hard task. For instance, even if the accumulation of knowledge by students could be considered as a proxy for HE quality (and it is questionable), with respect to the case of secondary education, there are no comparative studies in this field conducted by international organizations periodically (such as the PISA study by OECD). Certainly, in the next few years, the Economics of Education must try to solve, at least partially, these problems both with (1) advancements in the estimation of HE production processes, and (2) with the collection of qualitative indicators.

[8] In both countries, these data are collected on a cash-basis, so the accounting standards are quite similar and the financial indicators adopted here are comparable.

Other problems arise in terms of the choice of variables. We know that simplifications described above in terms of variables used are quite severe; nevertheless, it is the pooling and the cross-country comparison that require making compromises. More specifically, with reference to previous choices, the most important points to be discussed here follow. In Italy, we consider as professors only academic staff members who are also civil servants. This implies a smaller number of teachers for Italian universities compared to the Spanish case, where there are also tenured professors without the civil servant status. This difference is realistic as it describes the situation: in Italian universities there are not (at least in the period of the present analysis) tenured professors without the civil servant status, so this heterogeneity in academic body does not distort the comparative analysis. Then, a difference in efficiency scores is expected due to these differences in the structure of inputs (composition and dimension of academic body).

An analogous discourse is on the number of graduates. Certainly the introduction of BA/MA structure in Italy has modified the structure of outputs for teaching activities. At the same time, it was exactly one of the reasons for this change; that is, increasing the efficiency of Italian universities in producing more graduates (it is an intervention for improving technical efficiency!). So we decided not to "standardize" the number of graduates across Italian and Spanish universities in order to eliminate these differences – we want to analyze precisely how these differences influence technical efficiency.

A critical point is the proxy for research outputs. We decided not to use publication counts, because there is no comparable source of data – the only one is the ISI database, but it does not provide information for all disciplines/areas. The alternative measurement that we decided to adopt is the amount of external funds attracted for research – it is assumed to be a proxy for the market value of a university's reputation/quality in the research field. The most serious problem here is the discipline mix. Indeed, in some areas of research the possibility of attracting resources for applied research is much higher than in others (think of differences between

Engineering/Economics and Linguistics/History/Philosophy). Here we make a strong (but not unreasonable) assumption; that is, these differentials are reflected, at the same time, in resource differentials. Indeed, if it is true that Engineering schools are more able to attract funds from companies, etc., it is also true that their activities (both teaching and research) are more costly as well – so, as in our DEA analysis we consider human and financial resources, this problem should be – at least partially – alleviated.

The discipline mix is a critical topic also with regard to the number of graduates. In fact, it could be the case for weighting differently graduates in different areas; indeed, it is quite common that, in some fields, the number of graduates is much higher than in others (e.g., graduates in Social Sciences versus graduates in Medicine). However, these characteristics are quite homogenous between Italy and Spain, so a related correction of graduate numbers is useless in this study.

3. Methodology and data

In this paper, Data Envelopment Analysis (DEA) is used as a non-parametric technique for efficiency analysis. DEA is well-known as an instrument for these empirical analyses, and the explanation of its details is needless here. Complete treatments of this subject are in Zhu (2003) and Cooper *et al.*, (2006), and a useful description of main uses in HE context could be found in Johnes (2006). Here, only some notes on this methodology are reported, so as to facilitate the interpretation of the main results presented in the next section. First, it is important to state that a non-parametric approach for analysing technical efficiency is preferable in the case of public (or not-for-profit) organizations. Indeed, DEA does not require a functional specification of the production function *ex ante* – this is a valuable characteristic, as in HE many elements intervene in determining the quality and quantity outputs. Then, in the case of multi-inputs/multi-outputs processes (as universities are multi-product organizations, they produce teaching and research) the parametric approach requires the estimate of a system of equations; given the problems described above, it could be very difficult – instead DEA can manage multi-inputs and multi-outputs simultaneously.

In a DEA model, technical efficiency is defined as the relative ability of each Decision Making Unit (DMU) – in our case, universities – in producing outputs given a certain set of inputs - "relative" means that each organization is compared with any other homogeneous unit. The choice of a set of weights which combines several outputs and several inputs is the most important point of DEA analysis. This choice is not left to the discretion of the analyst, but DEA through a linear programming technique chooses the best set of weights for each DMU to maximize the efficiency ratio (outputs/inputs).

DEA mathematical formulation can deal with both constant returns to scale (CRS) and variable returns (VRS). In a constant return to scale (CRS) model, the single DMU's dimension has no importance in defining efficiency performance - that is, DMUs face the same efficiency frontier, independently of their relative size. Obviously, there are many doubts about the comparability of "small" and "large" units in this respect: larger units exploit common inputs to produce different outputs, whereas smaller ones benefit from substantial advantages in organizing activities. The VRS results can be derived by introducing the dimension factor in DEA modelling: each unit is analysed with respect to another of the same "relative" size. Both CRS and VRS efficiency can be calculated for each unit, so it is also possible to compute the "scale" efficiency, defined as ratio CRS/VRS efficiencies. Scale efficiency must be interpreted as the ability of each institution to benefit (in terms of productivity) from its "relative" size.

There are two different specifications of a DEA model: input-oriented and output-oriented. In the input-oriented model, DMUs minimize inputs while maintaining the same level of output. On the contrary, in output-oriented models, DMUs maximize their level of outputs while keeping inputs constant. It is evident that the difference between the two specifications consists of the ability of each DMU to control input or output quantity. CCR results are invariant to the choice of input or output orientation, whereas it is not the case for VRS results[9].

Lastly, in this paper, we also compute Malmquist indexes, which measure the change of productivity over time (for a mathematical formulation of these indexes, see

[9] However, this problem is mitigated by the fact that only efficiency scores vary, while rankings generated in VRS elaborations are not affected by the choice of input/output orientation.

Malmquist, 1953; Caves *et al*., 1982; Johnes, 2004). These indexes analyze the "change in efficiency scores" between two periods, and separate two different components of this change: one related to the *real* change in productivity ("pure" efficiency), and one related to the shifts of production frontier (technology improvement or worsening). The Malmquist index is computed as a combination of the two components. The value of the index must be interpreted as follows: it will be equal to 1 if there is no net effect of changes in technical efficiency and frontier changes; it will be greater than 1 if there is an increase in productivity, and less than 1 if there is a decrease in productivity.

Some brief explanations are required as to the source of data and their characteristics. First, the sources of all data are:

- In the Italian case, the annual collection of data provided by the Italian National Evaluation Committee (CNVSU – *Comitato Nazionale per la Valutazione del Sistema Universitario*), which is a technical organism supporting Ministry activities;
- In the Spanish case, the biannual collection of data realized by the Conference of Spanish Rectors (CRUE – *Conferencia de Rectores de las Universidades Españolas*).

Second, the main reference year of the study is the academic year 2004/05. However, we have built two datasets: one for Italian and Spanish universities referring to the academic year 2004/05, and one referring to the academic year 2000/01. The Italian as well as Spanish data which refer to the financial year covers the time period from January to December – that is, there is no coincidence between financial year and academic year. Our dataset follows the criteria of the academic year. Financial data for year 200X are then matched with student numbers for the year 200X-200X+1[10]. A similar problem for Italy occurs with the number of professors, data for which are collected each calendar year. In this case, we consider these numbers together with the number of students of the prior academic year (e.g. we use the number of students in

[10] The only exception to this rule is for Italian data of academic year 2000/01, which are matched with financial year 2001, since there are no comparable data for the financial year 2000 – however, looking at the main dimensions of these data, there are no substantive differences which can affect the main results.

2002/03 together with number of academic staff in 2003). These rules are coherent with the procedures adopted by CNVSU and CRUE for collecting data.

Third, the focus of the paper is only on public universities, for both policy reasons (the problem of efficiency is most important for public organizations, which must be accountable for the use of public money) as well as data limitations (datasets on private universities have some missing information). As in both countries there are public and private universities (even if the proportion of students in public ones is very much higher, more than 90%) an interesting question is whether there is an efficiency differential between the two different types. This theme is left to future research.

For both countries, we do not separate students and graduates into Bachelors and Masters, because the BA/MA structure was introduced recently in Italy (1999) and in Spain (2006). Therefore, the distinction in the academic year 2004/05 is not informative. However, the introduction of this new BA/MA structure in Italy led, in the years considered, to a significant increase in the number of graduates, since many students enrolled in "old type" courses decided to enrol in new (shorter) courses, concluding their studies in a short time.

The variable "external grants for research" also includes revenues from consultancies, according to the definitions provided by CNVSU and CRUE.

The first attempt was to include all the public universities of the two countries in the sample. Finally, the dataset[11] is constituted by 57 Italian public institutions and 46 Spanish ones. Descriptive statistics for the sample (academic year 2004/05) are reported in Table 2.

[11] However, some problems arose with the completeness and reliability of data, and then the final decision was to drop 3 universities in Italy and 4 universities in Spain. The Italian universities not included in the sample are *Napoli Parthenope* because it has some missing data and *Perugia per stranieri* and *Siena per stranieri*, as they are focused only on education for foreign students (and they are very small universities indeed). The Spanish universities not included in the sample are: Universidad Politécnica de Cartagena, since it was established only few years ago (it is "too" recent), UNED (Universidad Nacional de Educación a Distancia), which provides only distance learning, UIMP (Universidad Internacional Menéndez Pelayo) and Universidad Internacional de Andalucia because they only provide summer schools (no traditional courses).

Italian universities are, in general terms, bigger than Spanish Universities – about 29,000 students versus 26,000 in average. There are some differences in size between institutions within each country: for example, in Spain the highest number of students is in the *Universidad Complutense de Madrid* (84,010 students) and in the *Universidad de Barcelona* (54.577 students) and in while, on the contrary, *Roma La Sapienza* in Italy has more than 100,000 students. In Spain there are no universities with less than 6,000 students. On the other hand, institutions in Spain and Italy are not very similar in terms of staff numbers. The average number of academic staff is about 1,900 in Spain and only about 950 in Italy. As a consequence, there are many differences among Universities with respect to students: staff ratios, with more students per teacher in Italian institutions – this is due to the strong presence of lay academic staff in Spain; that is, staff tenured by the university but not with the status of civil servants. However, in the two countries it seems that the numbers of students and academic staff, in each university, are very highly correlated. A major difference between the two countries is evident in financial matters. On the surface, this difference may not be apparent. Looking at total average income, we note a great similarity (an average of €170m in the two countries). But (1) the size of universities and (2) the proportion of total expenditure that is provided by the State or the regional authorities vary considerably from one country to another and from one institution to another. For example, in Spanish universities the average expenditure per student is about 7,000€, but there are some institutions with more than 12,000€ per student in Spain (detailed data about public financing are available on request from the authors). The average number of graduates is similar across the two countries – even if the number of students is very different, indeed, it is due to higher drop-out rates in Italy.

4. Results

In the first step, a DEA analysis was run separately for Italian and Spanish universities. The statistics of the results[12] are contained in Table 3.

[12] These results are derived without considering the number of Ph.D. students as an input. This choice is due to the desire of "parsimony" in the use of variables. Alternative specifications, using Ph.D. students also, lead to similar results, so the main findings presented here are not affected by this choice. All the elaborations are made using the software DEAExcelSolver© provided by Zhu (2003).

The picture that emerges is quite difficult to interpret. In general terms, it seems that Spanish HE has a higher average level of efficiency. However, the proportion of efficient universities is very similar: 6 universities are CRS and Scale efficient in Spain (13%), 9 in Italy (15%). Standard deviation is higher in Italy, suggesting a higher differentiation across universities in terms of efficiency. Scale efficiency is very high in both cases (>0.9), which would imply that universities have reached a good size of operations with respect to their own dimension (and with respect to the country-specific frontier). In both cases, as expected, VRS scores are higher because VRS analysis permits the differentiation of universities in terms of size[13].

The situation depicted above is not informative with respect to part of the research question: in fact, it is not possible to judge the relative efficiency of Italian and Spanish universities. The efficiency scores reported in Table 3 are calculated with respect to each country-specific frontier, and they are not useful for a cross-country comparison. The next step was to run a DEA analysis considering Italian and Spanish universities together. We demonstrated above that these universities are very similar as to several characteristics, so comparison is possible without the risk of considering overly heterogeneous units. The results of this second DEA analysis are illustrated in Table 4.

The picture is now very different from that presented in Table 3. Here, the average level of efficiency is about 0.7 and, above all, there are more Italian efficient universities than Spanish ones. This means that comparing all the institutions together, the "efficiency frontier" for Spanish universities has now shifted, and the number of

[13] The results obtained for Italy are coherent with previous studies on the efficiency of Italian universities. More specifically, the correlation with the results reported by Agasisti & Dal Bianco (2006) is about 0.5; since the variables utilized and the reference years are different, it is a good correlation. Instead, the correlations are very low between the results provided in this paper and those by Agasisti & Johnes (2006). However, the incoherence in results is reasonably attributable to two reasons. First, they computed efficiency estimating a cost function, using a different approach in the selection of variables. Moreover, they adopted a different methodology, the Random Parameter Model, which is a parametric technique; the difficulty in comparing results deriving from different sources is well-known (e.g., McMillan & Chan, 2006), and future research will address this point specifically. For the same reasons, the results obtained for Spanish universities presented here differ considerably from those of Johnes & Salas-Velasco (2007). Moreover, they also used a restricted sample of Spanish universities, implying a further difficulty in comparing these results.

universities able to reach that level is lower. There are only 3 "efficient" Spanish universities (VRS efficiency), namely *Autonoma de Barcelona (UAB)*, *Cantabria (UC)* and *Extremadura (UEX)*. These three universities represent the typical university for each different "segment" of HE[14]: *UAB* is a big university with a high reputation, *Cantabria* is a medium university with no competitors within the region, and *Extremadura* is a very small university which, even if the inputs available are quite modest, is able to obtain good performances. All the other Spanish universities have systematically reduced their efficiency score, as evident in a graphical illustration of previous scores against the new ones (Figure 3). Instead, in the Italian case, out of the 14 VRS efficient universities resulting from separate analysis, 12 are still efficient in the overall sample (the analogous graphical comparison of efficiency scores is not reported here because of space constraints; it is available on request from the authors).

First evidence of the changing positioning of Spanish universities is due to the amount of inputs available. As discussed in the previous section, the average performance levels are similar across the two countries, while the average number of academic staff is much higher in Spanish universities. This is also a key difference in the international comparison: the student-teacher ratio in Spanish universities was 11.7 in 2004, versus 21.6 in Italian institutions (the EU-15 mean was 15.9) (OECD, 2006b).

A further explanation for this radical change of Spanish universities' positioning with respect to the overall efficiency frontier is possible through the analysis of Returns to Scale (RTS). In Table 5, the shares of universities which are experiencing Increasing, Decreasing and Constant RTS, respectively, are reported. It should be noted that most Spanish universities can still benefit from an expansion of their operations, while more Italian universities have already reached their optimal scale (and there are many universities experiencing even decreasing returns to scale).

[14] These universities are part of different regional university systems within Spain, and their features and degree of consolidation also differ. Moreover, they belong to different regions in terms of wealth: e.g. UAB is in Catalonia (a very rich Spanish region), while UEX is in Extremadura (which very poor).

Other useful information derives from the analysis of Malmquist indexes. Indeed, the results presented above refer to a single year, and they do not provide information on the dynamics of universities' efficiency. To address this issue, we computed the efficiency change between academic year 2000/01 and 2004/05, by using Malmquist indexes. The results are reported in Table 6.

The findings are differentiated between Spain and Italy, and they contribute to another part of the explanation. First, in the period considered, the improvement of Italian universities' efficiency is much higher than Spanish counterparts (the Malmquist index is 1.48 versus 1.06). This differential does not reflect the real improvement of "pure" efficiency, which is much higher in Spain, but the "technological change" which is more favourable for Italian universities. Interpreted in the light of the "production process" of universities, the information on "technological change" reflects two main recent changes in the Italian system:

- The introduction of the BA/MA structure has had the positive effect of improving the number of graduates (which is one of the output indicators considered in this study);
- The inclusion in the funding formula of the indicator "resources attracted for research", as a performance indicator, stimulates universities to maximize the income from this type of funds.

Even if these changes were fully implemented in a subsequent period with respect to those analysed here, the effects of announcing them and of organizing coherent policies (with adequate experiments as well) seem to have impacted the efficiency of universities. A further confirmation of this interpretation stems from the analysis of efficiency scores in 2000/01[15]. The situation at the beginning of the period was the opposite: Italian universities had lower performances in the overall sample with respect to the "country-specific" frontier, and they have experienced a significant improvement in the period considered (on the contrary, the improvements experienced

[15] For reasons of space, the detailed results about the efficiency analyses in 2000/01 are not reported here, but they are available on request from the authors.

by the Spanish universities are modest, and their relative position with respect to the Italian institutions has been worsening).

5. Discussion of main results: the presence and role of regional effects

A further analysis of data shows interesting differences at the regional level. This is a key point of the study, since it is worth noting that a major difference between Spanish and Italian HE is related to the role of regional and central governments. As mentioned in Section 2, the financial responsibility for funding Italian universities is still attributed to the State (central government), while in the Spanish case this is the regional governments' task. This difference could lead to different incentives for universities with respect to their location, because each region has adopted its own formula. Consequently, in the discussion of results it is important to detect the eventual existence of such "regional effects".

In the Italian case, the regional effects could be due to the different socio-economic conditions of the territories; as the incentives are the same for all universities, then their efficiency should be related to the initial situation (e.g., the socio-economic conditions in which they are immersed). The differentials in terms of economic development in Italy are well-known, with the Northern part of Italy being much more developed and richer than other regions.

In the Spanish case, where the incentives are different across regions (each region has its own model for financing universities); the differences in terms of efficiency could be related to the types of decentralization. More specifically, in analysing the HE characteristics in different regions, Pérez Esparells (2004) suggests dividing the regions into two groups for analyzing the HE systems: (1) "fast lane" regions, which have been managing their autonomy for many years, and with a strong commitment to obtaining "independence" from the Central State, and (2) "slow lane" regions, which are characterized by a less pronounced process of decentralization (it has been effectively operating only in the last few years). The crucial distinction between the two groups of regions is that the former received their autonomous competences for

HE before 1990[16], and, some of them, have a more "nationalistic" identity. The consequences of this "dual system" in developing decentralization are also important in HE. Indeed, the "fast lane" regions have been experimenting with alternative models for financing universities for many years, and they are all adopting types of performance-based funding models; "slow lane" regions, instead, have been facing these issues only in recent times – so the positive effects of decentralization could be potentially lower.

Tables 7 and 8 report an analysis of efficiency scores in 2004/05, divided by regions, to observe whether the preliminary hypotheses of regional effects are actually verified. It is important to note that the efficiency scores reported here are those obtained separately for Italian and Spanish universities; indeed, to detect the regional effects this choice seems more coherent. This remark is important, because in the separate analysis, average Spanish performance is higher than the Italian (and this is not the case in the real comparison, as demonstrated above). The results show that there are important differences across regions, which can contribute to explaining (in) efficiency differentials.

In the Italian case, some patterns are clear: the universities located in the southern part of Italy obtain lower efficiency scores, while those located in the northern part have the best performances (on average). Also the universities located in central Italy show good efficiency scores, but standard deviation is consistently higher, suggesting that this group contains both efficient and very inefficient universities. The difference between efficiency scores of universities located in Northern and Southern Italy is statistically relevant (at 10% of significance; t = -1.898, p-value = 0.065; also the Mann-Whitney test confirms this result, p-value = 0.089). In the Spanish case, there is not distinction between "fast lane" and "slow lane" regions.

[16] The seven regions that could have "faster" competencies (in education, health, etc.) at that time were defined by the Spanish Constitution in 1978, and they are: *Andalucía, Canarias, Catalonia, Comunidad Valenciana, Galicia, Navarra, and País Vasco.* The other ten Spanish regions accessed the same level of autonomy, according to those competencies, later in time.

Last evidence is provided by the decomposition of the efficiency change by regions. The average change in the period considered (from 2000/01 to 2004/05) is reported in Tables 9 and 10 – information refers to VRS efficiency scores.

There are some different patterns between the Italian and Spanish cases which suggest possible effects of decentralization. In the Italian university system, there is a clear "convergence" dynamic: while universities located in the northern part of Italy are experiencing a decrease in their average score (mainly due to a high starting level), universities in southern and central Italy are improving their performance in the period very rapidly (about + 9% and +8% respectively). On the contrary, in Spain, universities located in both types of Regions are experiencing high rates of growth, and an even more accentuated process of convergence among regions is identifiable in this case also. The trend in efficiency scores, both in Spain and Italy, is in a positive direction, with institutions becoming more efficient. In the Spanish case, the increases in universities' efficiencies (regarding "slow lane" regions) has permitted them to reach, in the four years analyzed, the efficiency level of the "fast lane" regions – while the efficiency differential was an average of 0.3 in 2000/01, (there is no statistical difference in 2004/05). In Italy, the efficiency gain experienced by universities located in the Central and Southern part of the country is much stronger (+ 10%) but at the end of the four-year period analyzed here, the difference in efficiency scores is still great and statistically evident (see above); however, it is due to an initial situation in which efficiency differentials across regions were, on average, enormous (about 20%, see Table 9).

The delicate and controversial issue of decentralization effects deserves more attention and more empirical analyses in future research. Nevertheless, this paper makes a first attempt to derive some hypotheses suggesting that decentralization can also influence the efficiency of universities. This is an important point in the reflection on policy implications: in fact, if the process of decentralization actually affects universities' performances, it is important to study in which directions these processes operate. More specifically, even if economic theory suggests that decentralization

implies more differences across regions, the results presented here do not support this view – at least, if universities' efficiency is concerned. Nevertheless, longer periods of analysis should help researchers and policy-makers to better identify the expected effects of decentralization itself.

6. Conclusions

The results presented in the previous section are useful for policy purposes. Considering each country separately, it is evident that the average efficiency of the sector is quite high (in 2004/05, the mean efficiency scores is about 0.8 in both countries). There is a quite remarkable differentiation across universities within each country, suggesting certain heterogeneity of universities' activities (in both cases, standard deviation of efficiency scores is high). When considered together, the Italian universities seem to be more efficient than Spanish ones in 2004/05. This situation is different with respect to the academic year 2000/01, when the performances of the universities in the two countries were very similar. In the period considered, Malmquist indexes show that Italian universities experienced an important improvement in their efficiency, due to an improvement in "technology": more specifically, this effect is due to important reforms in curricula organization (introduction of BA/MA structure) because, as discussed earlier, many students who were enrolled in "old-type" (longer) courses, decided to pass towards "new" bachelor courses, which are shorter, obtaining their degree in a short time. In the Spanish case, the main innovation was the introduction of "new" funding models[17]. Moreover, this innovation is affecting most of the regions, and it directly affects the "pure" efficiency of universities and not the frontier (that is, not the HE system as a whole).

A further analysis of data (see Section 5) showed that in both countries there is a difference across regions in terms of universities' efficiency. In the Italian case, an influence related to the different economic development of Italian territories seems to exist, which is that the Northern part of Italy is much richer than others – and efficiency scores of universities located in Northern Italy appear to reflect this, in some way. On

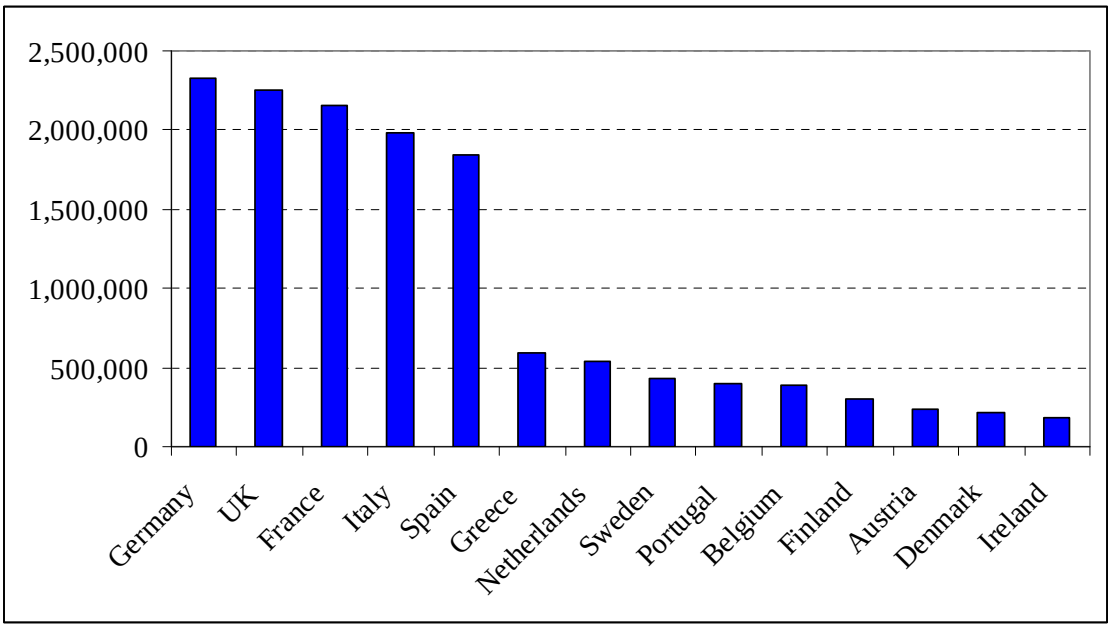
[17] It treats itself more than funding models distribution models of a fixed quantity of funds. The use of this type of models implies, in fact, the establishment of a sum zero game.

the other hand, in Spain, the main differences seem to be related to differences in the decentralization process: regions which started their autonomy in governing HE early have benefited from higher returns in terms of universities' efficiency, but in the last year analyzed (2004/05) these differences seem to be exhausted.

The potential policy implications of our study are numerous. First, the results provide evidence that cross-country comparison permits further benchmarks for the national universities – where an efficiency analysis is conducted only within a country; the benchmark is relative, whereas other (better) targets are possible looking at international competitors. Second, the implementation of BA/MA structure according to the Bologna Declaration has lead to a significant improvement in the graduate number – and, consequently, to an efficiency improvement. Even if considerations of the quality of new Bachelor graduates could be analyzed, nonetheless this method seems valuable for improving outputs – OECD (2006b) underlined that among the main EU countries, Italy experienced the highest improvement in graduation rates. Third, if policies are enacted to differentiate the composition of academic staff, through the introduction of tenured professors without the status of civil servants, these processes must be monitored under the profile of productivity: indeed, if the amount of improvement increases without a corresponding increase in outputs, the overall (technical) efficiency will obviously decrease.

Future research can extend this study. For instance, a wider comparison among universities from different European countries could be useful for policy purposes. A selection of countries in which the level of decentralization is more differentiated (e.g. Germany or Belgium) can also shed more light on this important matter.

Figure 1. The number of students in tertiary education – some EU-15 countries (2004)



Source: Eurostat.
Notes: the number of students includes all tertiary education courses; that is, vocationally-oriented courses and postgraduate courses (not only Masters, but also Ph.D. courses, research oriented postgraduates, etc.).

Table 1. The number of universities in Spain and Italy, a. a. 2005/06

Country	Public universities	Private universities	Total
Italy	60	16	76
Spain	50	24	74

Source: Italian Ministry of University, Spanish Ministry of Education and Science.

Figure 2. The productive process of universities: a simplified model

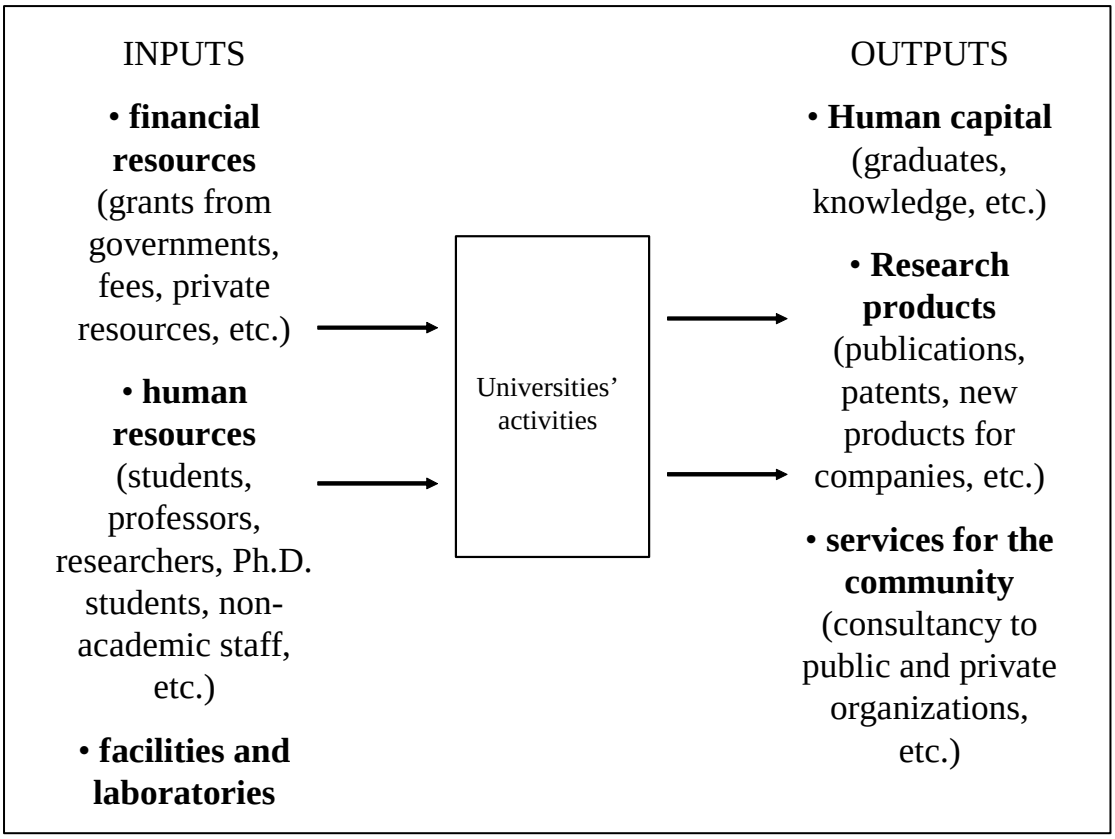


Table 2. Italian and Spanish universities: descriptive statistics (2004/05)

Italy	Students	Academic staff	Total income (.000€)	Graduates	External research (.000€)
Mean	29,632	965	175,995	3,936	15,509
Median	21,083	667	124,448	3,026	8,613
St. dev.	25,747	887	146,715	3,544	18,125
Min.	1,228	33	12,871	139	0
Max	134,812	4,724	727,110	16,365	70,940
# universities	57	57	57	57	57
Spain	Students	Academic staff	Total income (.000€)	Graduates	External research (.000€)
Mean	26,329	1,915	172,897	3,339	17,358
Median	23,090	1,592	131,592	2,693	11,085
St. dev.	18,085	1,181	116,015	2,048	17,466
Min	6,460	477	34,066	773	1,189
Max	87,412	5,896	498,938	9,938	99,262
# universities	46	46	46	46	46

Source: authors' elaborations from CNVSU and CRUE.

Table 3. Efficiency scores, Italian and Spanish universities (separate analysis) 2004/05

Spain	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.814	0.882	0.927
St.Dev.	0.122	0.126	0.080
# Universities	46	46	46
#Efficient units	6	16	6
Italy	**CRS Efficiency**	**VRS Efficiency**	**Scale Efficiency**
Mean	0.760	0.802	0.949
St.Dev.	0.159	0.159	0.078
# universities	57	57	57
# Efficient units	9	14	9

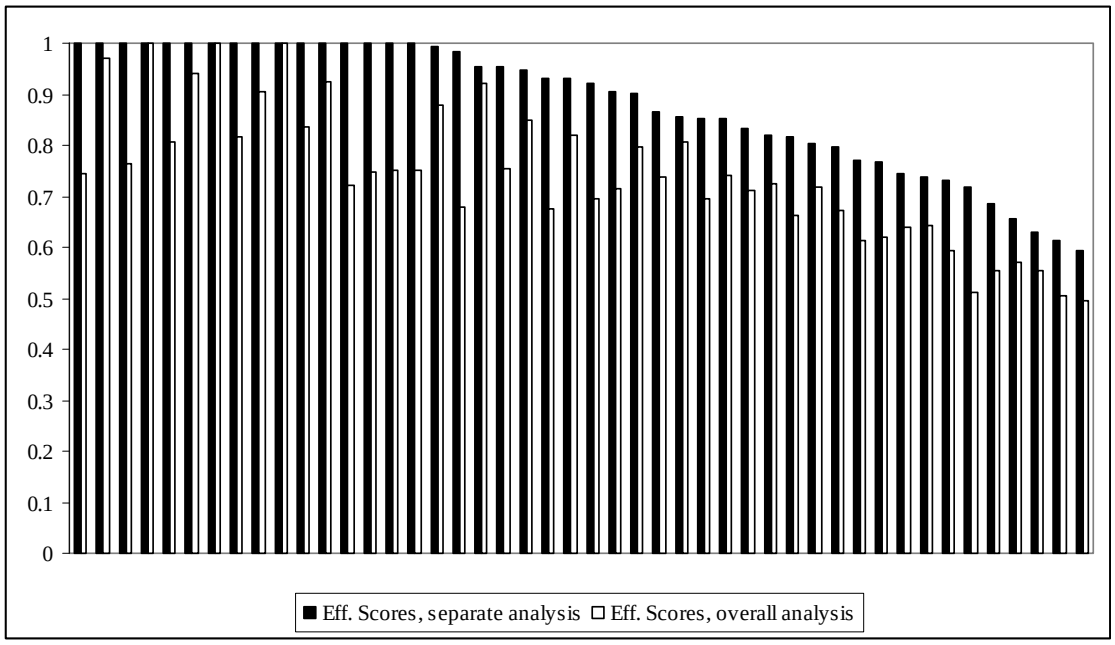
Source: authors' elaborations

Table 4. Efficiency scores, Italian and Spanish universities (overall analysis) 2004/05

Overall sample	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.739	0.774	0.957
St.Dev.	0.149	0.149	0.067
# Observations	103	103	103
# Efficient universities	10	15	10
Spain	**CRS Efficiency**	**VRS Efficiency**	**Scale Efficiency**
Mean	0.718	0.744	0.965
St.Dev.	0.137	0.135	0.046
# Observations	46	46	46
# Efficient universities	2	3	2
Italy	**CRS Efficiency**	**VRS Efficiency**	**Scale Efficiency**
Mean	0.756	0.798	0.950
St.Dev.	0.157	0.157	0.079
# Observations	57	57	57
# Efficient universities	8	12	8

Source: authors' elaborations

Figure 3. Efficiency scores of Spanish universities (separate analysis vs. overall analysis) 2004/05



Source: authors' elaborations

Table 5. An analysis of Returns to Scale (RTS)

	Increasing RTS	Decreasing RTS	Constant RTS
Italy	42.1%	43.9%	14.0%
Spain	65.2%	30.4%	4.3%

Source: authors' elaborations

Table 6. Malmquist indexes, Italian and Spanish universities, period from 2000/01 to 2004/05

	Malmquist index	Efficiency change	Frontier shift
Italy	1.482	1.070	1.388
Spain	1.063	1.230	0.859

Source: authors' elaborations

Table 7. Efficiency scores of Italian universities 2004/05, by regions

Northern Italy	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.823	0.839	0.982
St. Dev.	0.138	0.140	0.026
Central Italy	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.756	0.843	0.908
St.Dev.	0.265	0.283	0.277
Southern Italy	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.698	0.742	0.941
St. Dev.	0.149	0.153	0.047

Source: authors' elaborations

Table 8. Efficiency scores of Spanish universities 2004/05, by regions

"Fast lane" Regions	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.812	0.881	0.925
St.Dev.	0.119	0.127	0.076
"Slow lane" Regions	CRS Efficiency	VRS Efficiency	Scale Efficiency
Mean	0.818	0.882	0.930
St.Dev.	0.131	0.129	0.087

Source: authors' elaborations

Table 9. Efficiency change of Italian universities (from 2000/01 to 2004/05), by regions

Northern Italy	VRS Efficiency 2000/01	VRS Efficiency 2004/05	Variation (%)
Mean	0.870	0.839	-3.56%
Central Italy	VRS Efficiency 2000/01	VRS Efficiency 2004/05	Variation (%)
Mean	0.780	0.843	8.10%
Southern Italy	VRS Efficiency 2000/01	VRS Efficiency 2004/05	Variation (%)
Mean	0.676	0.742	9.84%

Source: authors' elaborations

Table 10. Efficiency change of Spanish universities (from 2000/01 to 2004/05), by regions

"Fast lane" Regions	VRS Efficiency 2000/01	VRS Efficiency 2004/05	Variation (%)
Mean	0.807	0.881	9.26%
"Slow lane" Regions	VRS Efficiency 2000/01	VRS Efficiency 2004/05	Variation (%)
Mean	0.776	0.882	13.66%

Source: authors' elaborations

References

Abbott, M., Doucouliagos, C., (2003), "The Efficiency of Australian Universities: a Data Envelopment Analysis", *Economics of Education Review*, n.22, pp.89-97.

Agasisti, T., Dal Bianco, A., (2006), "Data Envelopment Analysis to the Italian University System: Theoretical Issues and Policy Implications", *International Journal of Business Performance Management*, vol. 8, n 4, pp. 344-367.

Agasisti, T., Johnes, G., (2006), "Heterogeneity and the Evaluation of Efficiency: the Case of Italian Universities", *Lancaster University Management School*, mimeo.

Agasisti, T., Johnes, G., (forthcoming), "Beyond Frontiers: Comparing the Efficiency of Higher Education Decision-Making Units across Countries", *Education Economics*.

Athanassopoulos, A.D., Shale, E., (1997), "Assessing the Comparative Efficiency of Higher Education Institutions in the UK by Means of Data Envelopment Analysis", *Education Economics*, vol.v5, n. 2, pp.117-134.

Bonaccorsi, A., Daraio, C., (2007), *Universities and Strategic Knowledge Creation. Specialization and Performance in Europe*, Edward Elgar, Cheltenham, UK and Northampton, MA, USA.

Carrington, R., Coelli, T., Rao, P., (2005), "Measuring the Performance of Australian Universities: Conceptual Issues and Initial Results", *Economic Papers*, vol. 24, n. 2, pp. 145-163.

Caves, D.W., Christensen, L.R. and Diewert, W.E., (1982), "Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers", *Economic Journal*, vol. 92, n. 365, pp. 73-86.

Cohn, E., Rhine, S., Santos M., (1989), "Institutions of Higher Education as Multi-Product Firms: Economies of Scale and Scope", *The Review of Economics and Statistics*, vol.71, n.2, pp.284-290.

Cooper W.W., Seiford L.M., Tone K., (2006), *Introduction to Data Envelopment Analysis and Its Uses*, Springer, New York.

CRUE (2006), *La Universidad Española en Cifras*, CRUE, Madrid.

EU - European Commission, (2006), *Efficiency and Equity in European Education and Training Systems*, COM (2006) 481 final.

Johnes, G., Johnes, J., (1995), "Research Funding and Performance in U.K. Departments of Economics: A Frontier Analysis", *Economics of Education Review*, vol. 14, n. 3, pp. 301-314.

Johnes, J., (2004), "Efficiency Measurement", in Johnes, G., Johnes, J., (Eds), *International Handbook on the Economics of Education*, Edward Elgar Publishing Ltd, Cheltenham.

Johnes, G., (2006), "Education and Economic Growth", *Lancaster University Management School*, Working paper n. 2006/019.

Johnes, J., (2006), "Data Envelopment Analysis and its Application to the Measurement of Efficiency in Higher Education", *Economics of Education Review*, vol. 25, n.3, pp. 273-288.

Johnes, G., Salas-Velasco, M., (2007), "The Determinants of Costs and Efficiencies Where Producers are Heterogeneous: The Case of Spanish Universities", *Economics Bulletin*, Vol. 4, n. 15, pp. 1-9.

Joumady, O., Ris, C., (2005), "Performance in European Higher Education: A Non-Parametric Production Frontier Approach", *Education Economics*, vol. 13, n. 2, pp. 189-205.

Malmquist, S., (1953), "Index Numbers and Indifference Surfaces", *Trabajos de Esdatistica*, vol. 4, n. 1, pp. 209-242.

Martínez Cabrera, M., (2000), "Análisis de la Eficiencia Productiva de las Instituciones de Educación Superior", *Papeles de Economía Española*, n. 86, pp. 179-191.

McMillan, M.L., Datta, D., (1998), "The Relative Efficiencies of Canadian Universities: A DEA Perspective", *Canadian Public Policy*, vol. 24. n. 4, pp. 485-511.

McMillan, M. L., Chan W.H. (2006), "University Efficiency: A Comparison and Consolidation of Results from Stochastic and Non Stochastic Methods", *Education Economics*, vol. 14, n. 1, pp. 1-30.

OECD, (2006a), *Education Policy Analysis: Focus on Higher Education*, OECD, Paris.

OECD, (2006b), *Education at a Glance 2006*, OECD, Paris.

OECD, (2007), *Education at a Glance 2007*, OECD, Paris.

Pérez Esparrells, C. (2004), "La Educación Universitaria en España: El Vínculo entre Financiación y Calidad", *Revista de Educación* (Ministerio de Educación y Ciencia), n. 335, pp. 305-316.

Warning, S., (2004), "Performance Differences in German Higher Education: Empirical Analysis of Strategic Groups", *Review of Industrial Organization*, n.24, pp.393-408

Zhu, J., (2003), *Quantitative Models for Performance Evaluation and Benchmarking*, Kluwer Academic Publisher, Boston, MA.

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