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The efficiency of European universities and the role of exogenous factors

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Abstract

The evaluation of Higher Education represents a worldwide interesting topic of discussion. Many quantitative studies regard efficiency and inefficiency measures of universities' performance in terms of traditional Data Envelopment Analysis (DEA) or of their variants: the efficiency of a specific university is given by a relation between supplied inputs such as costs, students and faculty, and produced outputs such as graduates and profit, while external influences are taken for granted. The purpose of this analysis is to measure the efficiency of public European Higher Education Institutions (HEIs) through non-parametric approaches and to consider the Conditional Frontier treatment of Daraio and Simar (2005) to test how the introduction of some potential exogenous efficiency determinants might affect the university's productivity, namely, the proportion of women as faculty staff members, the Gross Domestic Product and the institution foundation year. We analyze a sample of 457 HEIs from 15 countries by measuring their performance during 2013. Our results suggest the proportion of women as a substitutive input that has a positive effect on the production process.

Keywords

higher education; Data Envelopment Analysis; European higher education institutions; Conditional Frontier Analysis.

1. Introduction

Defining the most efficient universities in Europe is certainly not an easy subject, due to the main dissimilarities observed along the regions. Some countries spend high amounts of public resources in tertiary education (such as the Scandinavian countries), and others much less (mainly countries of Continental Europe such as Italy, Spain, France). Some countries have a well-developed Higher Education (HE) system and high participation rates (such as Belgium,

Netherlands, etc.) while others, especially in Eastern Europe, are now in a developing process linked to the more general development of the socio-economic context. Nevertheless, in the current era of internationalization, the desire to have a "benchmark" to compare performances inevitably implies a cross-country approach. In this context, the research recently carried out by Bonaccorsi and Daraio (2007) is based on the Aquameth project and aimed to collect data about universities (on the institutional level) in several countries. The authors use data on universities with the objective of providing evidence of institutions' strategies as well as of efficiency. The main purpose of this project is to reach a different overview of Europe's universities, beyond the comparison among similar socio-economic European countries. Besides suggesting the most efficient universities in some relevant countries, our analysis also provides, under some specific hypothesis, robust measures on the assessment of exogenous factors as potential drivers of productivity changes.

The central point of this paper is the application of Data Envelopment Analysis (Charnes et al., 1978; Farrell, 1957) and Free Disposal Hull (Deprins, Simar and Tulkens, 1984) to estimate efficiency scores of DMUs with the support of R program. To make an efficiency analysis, it is necessary to define inputs and outputs of the productive process and understand the reason behind their choice (see 4 Data Collection). Because of policy reasons (the problem of efficiency is fundamental for public organizations, since they must be accountable for the use of public money) as well as data limitations (datasets on private universities have missing information), the paper focuses only on public universities. Notwithstanding this the interest in comparing public and private universities (even if the proportion of students in public ones is very much higher) is still strong and leads to a question: is there a difference between them in terms of efficiency? Answering it is left to future research. In this paper, DEA and FDH are used as non-parametric tools for an empirical cross-sectional efficiency analysis related to 2013; that means that Malmquist indexes used to measure the change of productivity over time are not taken into consideration.

It is important to state that a nonparametric approach for analyzing technical efficiency is preferable in the case of public (or not-for-profit) organizations since it does not require a specification of the production function ex-ante. In the case of multiple-input/multiple-output processes (i.e. universities as multi-product organizations producing both teaching and research) the parametric approach requires the estimate of a system of equations, while DEA and FDH models can manage many inputs and outputs simultaneously. There are two different versions of these models: input-oriented and output-oriented. In the former, DMUs minimize inputs while maintaining the same level of outputs and in the latter, DMUs maximize outputs while keeping inputs constant. It is evident that the difference between the two consists of the ability of each DMU to control inputs or outputs. After a first estimation, the Bootstrap method of Simar and Wilson (1998) is used to evaluate the consistency of the estimates, calculate the bias corrected efficiency scores, the standard deviation of the stochastic term, the bias and estimate confidence intervals in which scores might range within. Once the final projection of efficient and inefficient units is clear and bias corrected, some environmental factors are introduced as potential determinants of productivity, in order to evaluate by means of Nonparametric Conditional Frontier Analysis (Daraio and Simar, 2005) their impact on the estimated distance function and on the variation of inefficient units.

2. Literature Review

Efficiency analysis in higher education has been increasingly discussed in literature over time due to the rising interest on universities' activities: research, funding, the profit they make, and

their expenditure are all aspects that the Public Administration has to keep an eye on.
As Daghbashyan (2011) wrote in "The Economic Efficiency of Swedish Higher Education Institutions", the relevant questions about the Swedish Universities are: "How efficiently does the Swedish higher education sector operate?", "Do Higher Education Institutions operate at the same level of efficiency or do they exhibit different economic behavior?", and "What drives the economic efficiency of a Higher Education Institution?"
As the topics she deals with are common to many countries, there can be a reasonable extension of those questions to HEI in the EU. This gives birth to a wide analysis in terms of geographical regions taken into consideration, very different from many other studies we took inspiration from that focus on a more restricted field (in fact, they treated only the efficiency analysis among universities belonging to the same country or to no more than two countries; only some recent studies have started to make comparisons among many countries in the same area thanks to the leveling of differences among them). Specifically, it can be considered an expansion of the work "Comparing Efficiency in a Cross-country Perspective: The case of Italian and Spanish State Universities" written by Agasisti and Peréz-Esparrells (2010): as a matter of fact, this work uses three of their four inputs (number of students enrolled, number of the academic staff and available financial resources) and one of their outputs (the number of graduated students). Some of the most relevant difficulties of this approach are data collection and data mining (described in sections 4 and 5). Issues about the definition and availability of data and existence of outliers well described by Klumpp (2012) in his paper on "European Universities Efficiency Benchamarking" will be stated during the analysis together with measures taken to solve them (there will be an evaluation deeper than Klumpp's).
On one hand a general overview of literature gave a help to define the framework of the analysis, but on the other hand it also revealed that there is not an unambiguous method to evaluate the efficiency of Higher Education institutions.
The final part of the work is composed by an implementation inspired by Wolszczak-Derlacz and Parteka (2011) paper "Efficiency of European public higher education institutions: a two-stage multicountry approach" (that considers only seven countries) with an estimation of the influence of some external factors (number of women, GDP and foundation year) on the previously defined efficiency scores.

3. Data Collection

The first step of the analysis was to find a useful trustworthy dataset. After consulting many European and international web pages which provide data concerning high level education, Eter's site (eter-project.com/search/filtered) was chosen as the main source.
As 2013 was the most recent period of time for which data were provided, it was chosen as the reference year. The research was made by inserting input and output variables.
The list below provides some of them firstly taken into consideration, but then left aside for different reasons:

- Publications (and researches): this output was excluded because the values were binary and that was not useful for the analysis; researches on Internet shed light on the lack of information about the number of publications (and researches) of universities and of a specific database about them
- Rational indices such as Academic staff/total staff, Full professors/academic staff, Core budget/total budget: they were excluded because their use would have led to misleading results since using fractions influences negatively the implementation of the R

program; notwithstanding this after the conditional analysis, the work concentrates on an efficiency analysis with a rational input under some assumptions.
- Capital Expenditure (CAPEX): it was replaced by Total Current Expenditure because the latter is referred to 2013 only while the former to a more extended period.
- Total Number of Full Professors: it was replaced by Total Academic Staff because this one is more general and includes people filling different posts (professional and non-professionals) inside a university.

After elaborating many remarks and evaluations, the final variables taken as inputs, outputs and external factors are the following:

Inputs

1. *Students enrolled at ISCED*[1] *6-7-8*: undergraduate (ISCED 6) and graduate (ISCED 7) students and students in Ph.D. programs (ISCED 8) which are enrolled in each university.
2. *Total current expenditure*: the money universities spend for all activities (core and non-core ones).
3. *Total academic staff*: number of all people working in each university; this input is crucial to underline the importance of spending money on staff organization to increase universities' efficiency in terms of students' education.

Outputs

4. *Graduated students at ISCED 6-7-8*: undergraduate and graduate students who received a graduation and Ph.D. students who succeeded in finishing the Ph.D. program.
5. *Total current revenues*: money each university uses to finance its activities.

External (Environmental) Factors

6. *Foundation year*: it gives information about how much experience universities have been getting through time.
7. *Academic staff women*: number of female people in the academic staff.

In addition to the listed ones, the following variable was taken from Eurostat's site (www.ec.europa.eu/eurostat):

8. *GDP*: Gross Domestic Product at level NUTS[2]; the codes that identify each region let the combination between GDP values and universities.

Even if the actual efficiency of a University is generally determined by the number of researches, of full professors with certificates recognized by the nation to which they belong

[1] *ISCED* (International Standard Classification of Education): classification created by UNESCO to facilitate comparisons of education statistics and indicators across countries on the basis of uniform and internationally agreed definitions. In 2011, a revision to ISCED was formally adopted by UNESCO Member States. The product of extensive international and regional consultations among education and statistical experts, ISCED 2011 takes into account significant changes in education systems worldwide since the last ISCED revision in 1997 (glossary.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx).

[2] The NUTS classification (Nomenclature of Territorial Units for Statistics) is a hierarchical system for dividing up the economic territory of the EU to collect, develop and harmonize European regional statistics, elaborate socio-economic analyses of the regions and frame regional policies; NUTS2 classification refers to basic regions for the application of regional policies (ec.europa.eu/eurostat/web/nuts/overview).

and of students winners of national and international competitions and contests, the forementioned inputs and outputs were chosen to underline not only the economic but also the human aspect of HEIs: as matter of fact, it is important to remember that a University is not a firm maximizing its profit, but a wide organization focusing on teaching and research and working to forge experts that can add value to society.
We provide below, in Figure 1, the final variables chosen as inputs and outputs of the process.

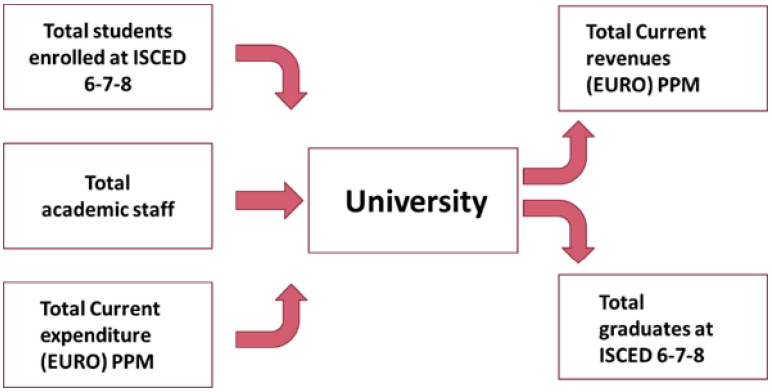

Figure 1. Final input and output variables of the process.

4. Data Mining

At the beginning the intention was to compile an analysis based on the distinction between public and private sector in higher education, but since the number of private universities (662 among completely and partially private) was much lower than that of public ones (1131), there was evidence that the study was not going to be reliable. This became the reason to move towards something different and focus on comparing efficiencies of public universities belonging to the EU. Given that the initial dataset was composed by data from 1793 DMUs belonging to 36 countries (Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom) in the European continent, the first step was removing data about HEIs in states not members of the EU in 2013. Then, in order to homogenize currencies, the non-Euro ones were converted to Euro and Total Current Expenditure and Total Current Revenues adjusted to PPM terms (Part Per Million=1/1000000).
Even if, according to the starting idea, the aim of the analysis was to make a comparison among all public universities belonging to countries in the EU, a careful consultation of Eter's site highlighted an issue common to many DMUs, namely the lack of values for some inputs or outputs or, even worse, input values equal to zero. As there was no other possible solution, the decision was to eliminate those DMUs from the analysis also because otherwise we would have violated the first economic axiom:

- NO FREE LUNCH: $(\boldsymbol{x}, \boldsymbol{y}) \notin \boldsymbol{\Psi}$ **if** $\boldsymbol{x} = \boldsymbol{0}, \boldsymbol{y} \geq \boldsymbol{0}, \boldsymbol{y} \neq \boldsymbol{0}$
  it states that inactivity is always possible (for example, zero output can be produced by any input vector $\boldsymbol{x} \in \mathbb{R}_+^{\boldsymbol{p}}$), but also that it is impossible to produce an output without any inputs.

Focusing the attention on the figure shown below shed light on the matter of outliers: generated through the R program, it provides a classification of DMUs in 12 groups in which there can be one or more outliers depending on the threshold value fixed as a discriminant. Fixing the value at 0.1 leaves out two outliers.

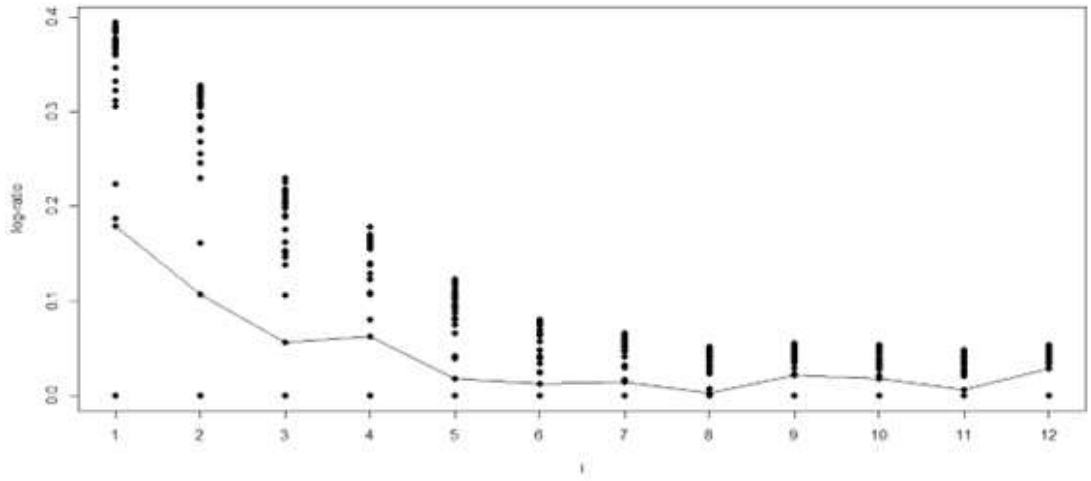

Figure 2. Classification of outliers.

The following matrix helps to define which DMUs they represent:

	[,1]	[,2]	[,3]	[,4]	[,5]	[,6]	[,7]	[,8]	[,9]	[,10]	[,11]	[,12]
[1,]	407	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[2,]	125	407	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
[3,]	125	172	407	NA	NA	NA	NA	NA	NA	NA	NA	NA
[4,]	374	125	172	407	NA	NA	NA	NA	NA	NA	NA	NA
[5,]	254	374	125	172	407	NA	NA	NA	NA	NA	NA	NA
[6,]	53	254	374	125	172	407	NA	NA	NA	NA	NA	NA
[7,]	214	53	254	374	125	172	407	NA	NA	NA	NA	NA
[8,]	214	69	53	254	374	125	172	407	NA	NA	NA	NA
[9,]	214	69	171	53	254	374	125	172	407	NA	NA	NA
[10,]	214	11	69	171	53	254	374	125	172	407	NA	NA
[11,]	214	163	11	69	171	53	254	374	125	172	407	NA
[12,]	214	157	163	11	69	171	53	254	374	125	172	407

Each row is referred to a group and is composed by its outlier plus the ones in the previous group (obviously, the first row/group is composed only by its outlier). A consultation of data revealed that DMUs 407 and 125 were the “The Open University” (UK) and “Fernuniversität in Hagen” (DE).

Then, a quick view at the boxplot regarding the number of students enrolled revealed that one point was very far from the others and was surely going to strongly influence the results. After checking up that it was “The Open University” (UK) (already detected thanks to the previous observation), the decision was to eliminate it due to the mentioned reasons and to the fact that it is an on-line HEI; this last point would have also led to incomparability with other DMUs.

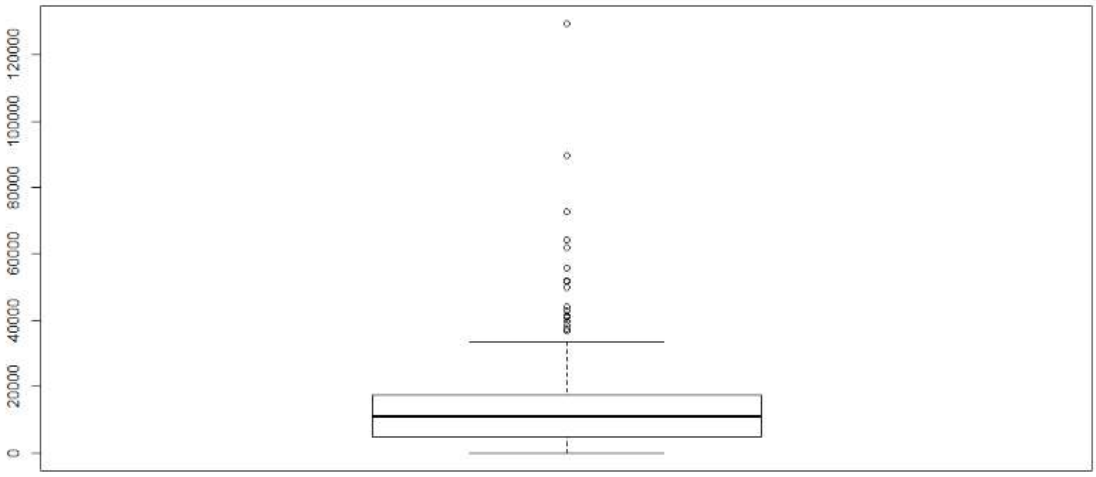

Figure 3. The boxplot regarding the number of enrolled students.

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As for the second outlier ("Fernuniversität in Hagen" (DE)), given that it didn't significantly influence the analysis, the decision was not to remove it. The final version of the dataset includes data belonging to 457 universities coming from 15 countries: Belgium (BE), Cyprus (CY), Czech Republic (CZ), Germany (DE), Denmark (DK), Croatia (HR), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Malta (MT), Portugal (PT), Sweden (SE), Slovakia (SK), United Kingdom (UK) (see Figure 4).

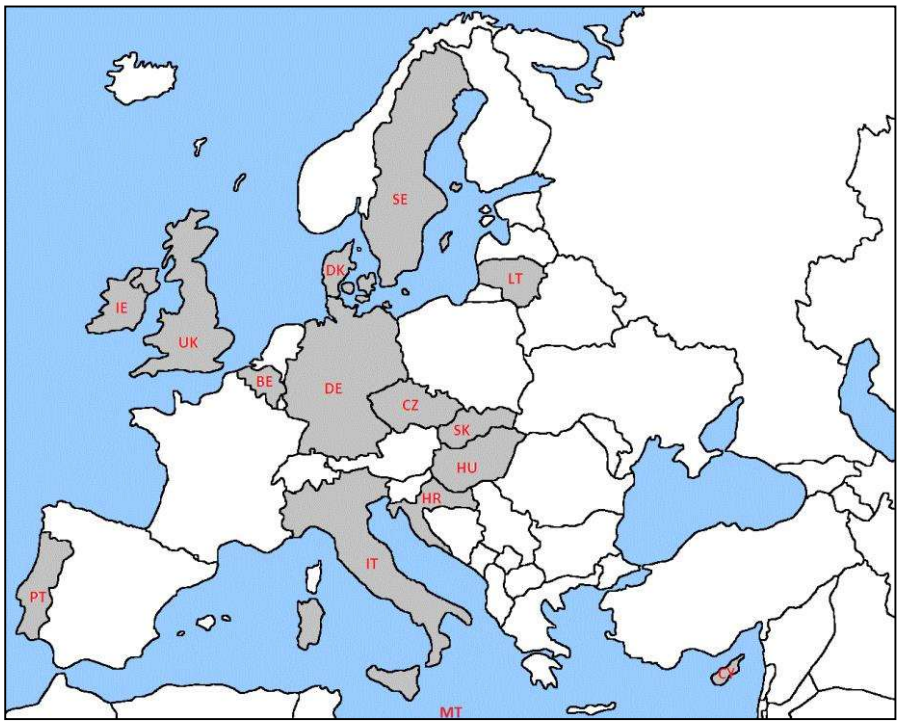


Figure 4. European Countries with Higher Education Institutions considered in the analysis.

5. Analysis

The efficiency analysis branches out following a non-parametric deterministic approach and evaluates DEA, FDH, order-m (25, 50, 100) and order-α (α=95%) frontiers to highlight the differences among the results. Since the only variables that can be managed are the input ones, the framework is input oriented.
Then follows a bootstrap simulation that opens the path to an assessment of the quality of DEA and FDH efficiency scores.

5.1. Non-Parametric Deterministic Models

In both DEA and FDH analyses, non-parametric deterministic models will be used. Here follows an explanation of reasons behind this choice.
An initial study on the data revealed that they follow an unknown distribution: as this didn't let turning to a parametric procedure, the decision was basing the analysis on a non-parametric model. On one hand this kind of approach ensures robustness and allows working in a multiple-inputs, multiple-outputs context, but on the other hand its biggest limitation is "the curse of dimensionality"; in order to avoid this disadvantage, there has been a careful choice of parameters.
The models are deterministic, because all the observations are inside the production set Ψ. The main disadvantage of such an approach is that it includes outliers which can significantly influence the analysis and generate misleading results; as described in the previous section, the most evident outlying DMU was taken out.
Given that the real frontier Ψ can't be defined, DEA and FDH approaches try to estimate it and, as DEA assumes convexity, the relation linking the three is the following:

$$\hat{\Psi}_{FDH} \subseteq \hat{\Psi}_{DEA} \subseteq \Psi$$

Taking as inputs all the data about DMUs, the R program generated the estimations of DEA and FDH efficiency frontiers shown in the plots presented in Figure 5. The x-axis is defined by the combination of inputs, giving each a weight equal to $1/3$, while the y-axis is defined by the combination of outputs, giving each a weight equal to $1/2$.

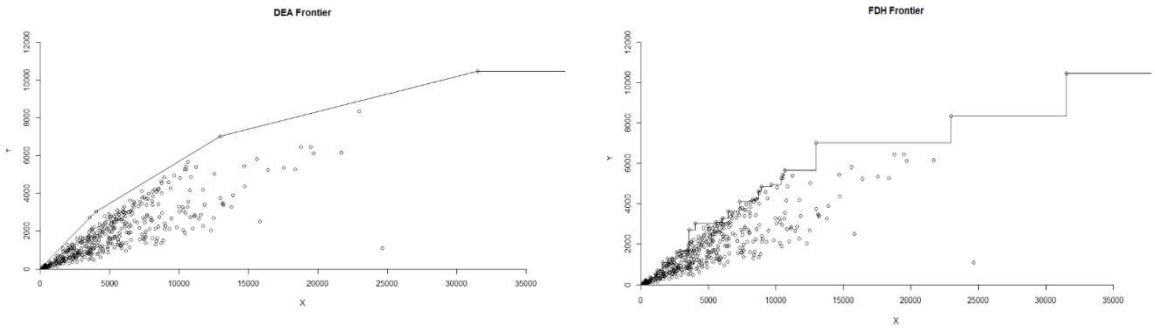


Figure 5. DEA (left) and FDH (right) efficiency frontiers.

According to the FDH analysis there are more than 200 efficient DMUs, but only the ones efficient for both DEA and FDH will be mentioned below. As a matter of fact, if one DMU is

efficient for the DEA approach, it means that it is also efficient for FDH, but the contrary of this statement is not always true:

$$\mathbf{DMU} \in \widehat{\boldsymbol{\Psi}}_{\boldsymbol{DEA}} \Rightarrow \mathbf{DMU} \in \widehat{\boldsymbol{\Psi}}_{\boldsymbol{FDH}}$$

$$\mathbf{DMU} \in \widehat{\boldsymbol{\Psi}}_{\boldsymbol{FDH}} \not\Rightarrow \mathbf{DMU} \in \widehat{\boldsymbol{\Psi}}_{\boldsymbol{DEA}}$$

Thus the final result is a group of 26 DMUs with DEA and FDH scores equal to 1, as presented in Table 1.

Table 1. DMUs with DEA and FDH equals 1.

ETER ID	Institution Name
DE	Staatliche Hochschule für Gestaltung Karlsruhe
DE	Ludwig-Maximilians-Universität München
DE	Hochschule für Politik München
DE	Hochschule für Fernsehen und Film München
DE	Charité - Universitätsmedizin Berlin
DE	Medizinische Hochschule Hannover
HR	Sveucilište u Zagrebu
HU	Budapesti Corvinus Egyetem (BCE)
HU	Liszt Ferenc Zeneművészeti Egyetem (LFZE)
HU	Nemzeti Közszolgálati Egyetem (NKE)
IE	University College Dublin
IE	University College Cork
IT	Università degli Studi di ROMA "La Sapienza"
LT	Šiauliu universitetas
PT	Universidade do Porto
SK	Univerzita J. Selyeho V Komárne
SK	Univerzita Konštantína Filozofa V Nitre
UK	The University of Manchester
UK	Sheffield Hallam University
UK	The University of Warwick
UK	The University of Cambridge
UK	Courtauld Institute of Art
UK	Imperial College of Science, Technology and Medicine
UK	London School of Economics and Political Science
UK	University College London
UK	University of the Highlands and Islands

Besides the mentioned frontier analyses there are also some partial assesses, characterized by more robustness because they are less influenced by outliers or by extremes.
One of them is the order-m frontier: given a DMU (*x, y*), it is benchmarked against the average maximal output reached by *m* peers randomly drawn from the population of units using less input than the level *x*; if $m \rightarrow \infty$ then *m* = *full frontier*.

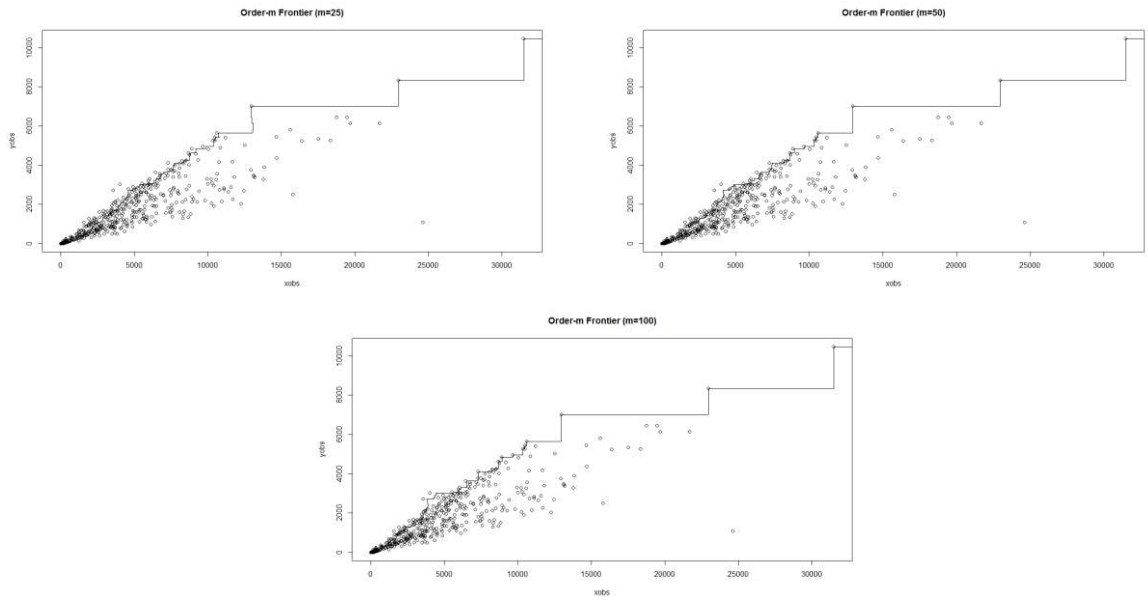


Figure 6. Plots of the Order-m frontiers.

Another partial assess is the order-α frontier; α is the percentage of points taken out from the analysis; in the current analysis α is equal to 0.95: this means that the benchmarking of the performance of a DMU is set against the level of output not exceeded by the 5% of units which are producing with a level of inputs lower (or equal) to the DMU's one; the extreme case of $\alpha = 1$ is the full FDH case. $1 - \alpha$ represents the probability of being dominated on the input side by other DMUs that produce at least the same level of output.
A list of the DEA and FDH efficiency scores *à la* Farrell (1957) and *à la* Shephard (1970) together with estimates of scores according to order-m and order-α as well as graphics to better understand DEA and FDH analyses are provided in Appendix A.

5.2. Bootstrap Simulation

This DGP (Data Generating Process) simulation approach is used to make inference and an assessment of quality of the efficiency estimates. Since the analysis of the main features of non-parametric estimators led to conclude that DEA efficiency measures are affected by errors, the aim of using bootstrap is comparing efficiency scores obtained with the considered sample with others coming from other samples to see if they just belong to the considered sample or if they are an estimation of the real efficiency scores. For every university (DMU), the R program ran the simulation 2000 times by making a combination of values of inputs and outputs.
The bootstrap works on DEA Shephard (1970) efficiency scores, but an additional portion of code let their transformation into Farrell (1957) scores. Its implementation finally generated bias corrected DEA Farrell (1957) scores, biases, calculated as the difference between DEA *à la* Farrell (1957) efficiency scores and the bias corrected ones, standard deviation and upper and lower bounds which define a 95% confidence interval.

The first step was calculating the distance (difference) between bias corrected scores and their lower and upper bounds to see if they were inside their confidence intervals: the result was that 19 of them were lower than their lower bounds and so out-lying from their confidence interval. It can be generally supposed regular as the distribution of variables didn't not follow a Gaussian distribution; further observations led to some other conclusions.

First of all, it has to be mentioned that each of these 19 DMUs had DEA and FDH *à la* Farrell (1957) and *à la* Shephard (1970) equal to 1 and that the equally efficient remaining 7 DMUs (with bias corrected scores inside the confidence interval) had a very short distance between bias corrected score and lower bound. Results are reported in Appendix B.

As the amplitude of a confidence interval reflects the uncertainty about the real value of an efficiency score and, since the probability of having a score outside a thin confidence interval can be considered higher than the one of having a score outside a large confidence interval, in order to have an idea of the condition of data in the current case the width of each interval was calculated by making the difference between upper and lower bound. Then, after defining the average of widths only for the 19 DMUs with out-lying bias corrected scores, it was used as a raw measure to judge if their confidence intervals were large or not: 12 intervals showed to have width bigger than the average.

A reasonable observation that comes from the bootstrap implementation is that even if those 19 DMUs are efficient according to both DEA and FDH models, the fact that they have bias corrected scores outside the confidence interval demonstrates that there is not statistical evidence to say that they are actually efficient.

The consistency is a property according to which an estimator $\theta'_{(x,y)}$ will converge in probability to its real (unknown) parameter measure $\theta_{(x,y)}$, as the sample size increases (or along the time when panel data are regarded). The way to demonstrate the convergence is by proving that the expected value of the squared stochastic bias goes to zero as the sample size (n) tends to infinity ($E(\theta'_{(x,y)} - \theta_{(x,y)},)^2 \approx 0 \mid n \to \infty$). When the bootstrap routine is applied to an increasing subdivision sets of DMUs, the expected squared bias decreases and this supports the arguments of efficiency consist estimators.

As a conclusion, something to remark is that the bootstrap works on an automatic procedure that considers the information available for the estimation of every efficiency score. The length of the confidence interval and so the uncertainty depends on how many sample points determine the DEA frontier above an analyzed DMU: if they are in a big number the precision can be good (thin confidence interval) while if they are very few there is a lack of precision (large confidence interval) caused by not knowing the real position of the refence frontier.

An analysis of the DEA frontier figure led us to practically verify the trueness of this statement. In fact, all the DMUs very close to or lying on the frontier (*Università degli Studi di ROMA "La Sapienza"* (IT), The University of Manchester (UK), London School of Economics and Political Science (UK), *Nemzeti Közszolgálati Egyetem* (NKE) (HU), Sheffield Hallam University (UK), *Università degli Studi di BOLOGNA* (IT)) demonstrate to have large confidence intervals (when ordering DMUs for decreasing confidence interval width, they appear among the first 32) while the ones having many other DMUs around have thin confidence intervals.

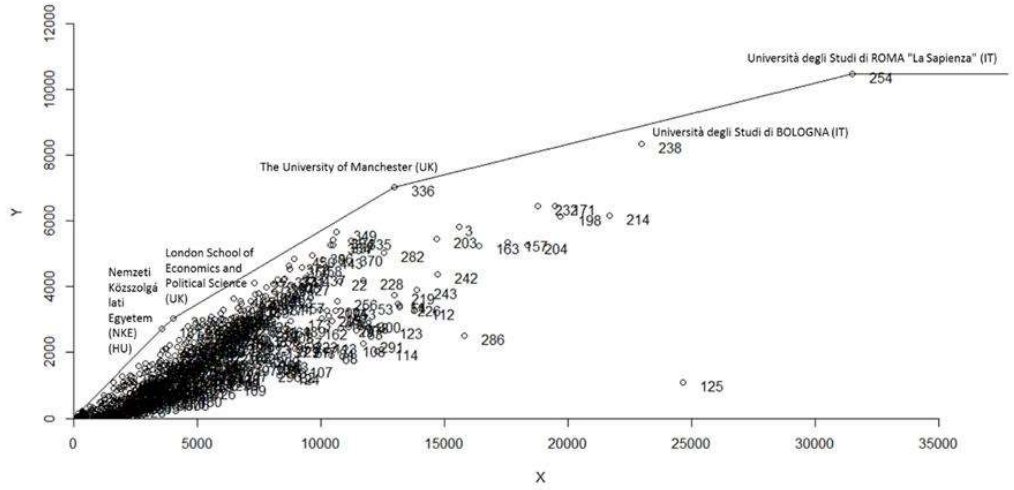


Figure 7. DEA efficiency frontier.

6. Conditional Analysis

Environmental factors that are beyond the control of universities' management might present a significant impact on the performance of students and faculty of some units in relation to others, which case decreases the contribution that an efficiency analysis has on social prospects. If top-ranked universities are considered as benchmarks of productivity due external variables instead of the institutions' internal capacity to optimize the production of knowledge, then the assessment does not imply a fair judgment on inefficient units, able to reduce input usage or expand positive results and on the efficient units under influence of exogenous factors that project the technology frontier beyond what should measure the overall efficiency; furthermore a comparison among those different universities' is far from an accurate representation of reality. For this reason, after the first analysis, some potential determinants of the productivity of European higher education institutions are taken into account.

The methodology to evaluate the influence of (potential) exogenous determinants of higher education productivity on units' efficiency conducted in this work follows Daraio and Simar (2007a) Conditional Nonparametric Frontier analysis, which does not use neither parametric assumptions nor separability conditions (Nepomuceno et al. 2022). The routine of their methodology was implemented in R-package with the support of the libraries FEAR, Benchmarking and Frontiles. The procedure of conditional frontier measures in the input-oriented case is to decompose nonparametric joint distribution $H_{X,Y}(x,y) = \text{Prob}(X \leq x, Y \geq y)$, read as the probability for a specific DMU operating at the level of resources (x, y) to be weakly dominated, into a cumulative distribution of the operating input x in terms of y and z, and a survivor

function of y related to the environmental factor z; this means that the joint distribution conditional to Z external factors can be rewritten as:

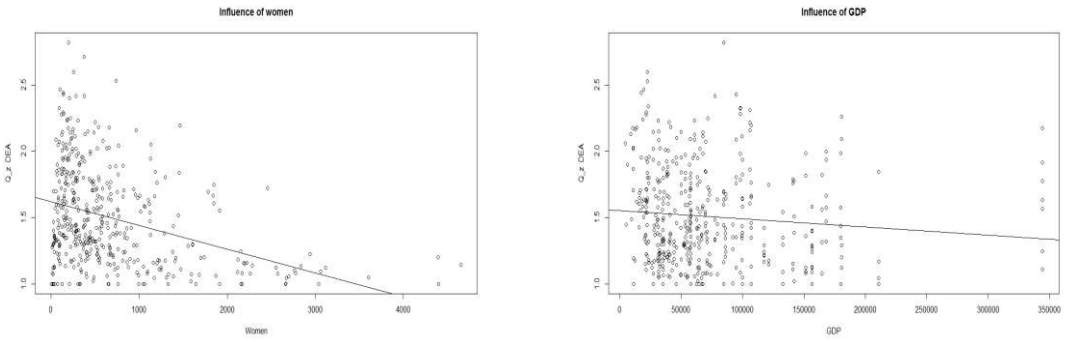
$$H_{X,Y|Z}(x,y) = F_{X|Y,Z}(x|y,z)\, S_{Y|Z}(y|z)$$

Where:

$F_{X|Y,Z}(x|y,z) = Prob(X \leq x, Y \geq y, Z = z)$ is the conditional distribution of x in terms of y and z;

$S_{Y|Z}(y|z) = Prob(X \leq x, Y \geq y, Z = z)$ is the survivor function of y conditioned to external factor z, for all y such that $S_{Y|Z}(y|z) > 0$ (strictly positive).

The equality $Z = z$ in the pairwise comparison of university units demands smoothing techniques and Kernel estimations based on appropriate bandwidth sizes. The choice of the bandwidth parameter is the most crucial issue to project nonparametric kernel estimations due its sensitiveness propensity to under or over smooth the shape of the probability density function. The applied method of bandwidth selection required a very long computational time[3]. To overcome this problem, we turned to a less accurate method.
We considered the Women Proportion in the Academic Staff (WP), the Foundation Year (FY) and GDP at level NUTS 2 for each country, as potential exogenous factors that might impact the production frontier of knowledge and efficiency scores of universities in the higher education assessment. The plots in figure 8 Represent scatter plots of the ratio $Q_z = \frac{\widehat{\theta_n}(x,y|z)}{\widehat{\theta_n}(x,y)}$ decomposed on Z environmental (potential) determinants of HEIs' productivity. A decreasing regression line means that the considered external factor is favourable to efficiency improvement and can be allocated as a potential substitute that might spare production resources, while an increasing regression line means that the considered exogenous factor is unfavourable to efficiency.



[3] It led the package to more than 30 hours of exhaustive computation with no results at sign

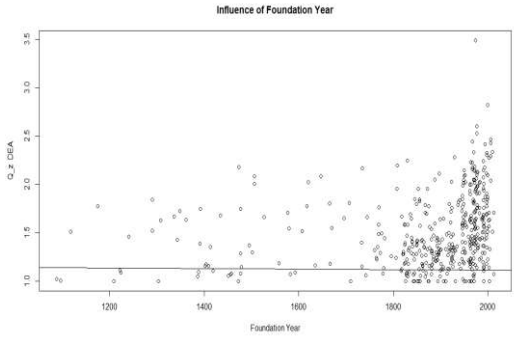


Figure 8. Efficiency measure plot conditioned to WP (left plot); Efficiency measure plot conditioned to GDP (right plot); Efficiency measure plots conditioned to FY (lower plot).

The results suggest that the number of women in the total academic staff and the GDP have a positive impact on the computation of efficiency measures and in the projection of the technology frontier, while the foundation year (a proxy for the economies of scale a university might present along the years) does not present a significant influence on the efficiency of European HEIs. The next section approaches the methodology to consider the ratio of women, which is the most significant determinant in the first efficiency analysis as a resource and remarks the changes and prospects that outcome from this inclusion.

6.1. Bootstrap Simulation

Data Envelopment Models fails to propose a consistent efficiency evaluation when one or more managerial resources are directly accessed as ratio data because if the violation of the convexity assumption on the projection of the technology frontier. In conventional CRS and VRS productivity models, ratio measures generate an incoherent production aggregation function as they have different denominators on different decision units.

The conditional frontier evaluation suggests the inclusion of the external factor "number of women in total academic staff" as a potential resource favourable to a positive impact on efficiency measure, since it is prone to save inputs as substitute or increase outputs as complementary in the production process (Daraio and Simar, 2007b). This exogenous factor in the current dataset assumes the ratio of $x_{,j} = \frac{N_{,j}}{D_{,j}}$, where $N_{,j}$ refers to the volume of women as faculty members of university j, and $D_{,j}$ regards the total number of faculty members and professors. To include this exogenous variable as an input to project the production frontier of higher education in Europe, we applied a procedure in which the optimal solution is reachable by placing both the numerator and denominator of the ratio resource as additional constraints. For this reason, women are considered as a substantive input of the total academic staff in order to evaluate how their contribution impact the efficiency of universities in terms of spared resources or produced knowledge.

67 universities are regarded as efficient units after this inclusion, an addition of 41 institutions compared to 26 in the first assessment: 11 in United Kingdom, 4 in Italy, 4 in Slovakia, 2 in Croatia, 2 in Czech Republic, 1 in Denmark, 27 in Germany, 7 in Hungary, 5 in Lithuania, 1

in Malta, 1 in Portugal, 1 in Sweden and 1 in Belgium. Figures 9 and 10 represent new frontier projections of the technologies assessed with the inclusion of the women proportion in academic staff as an additional resource.

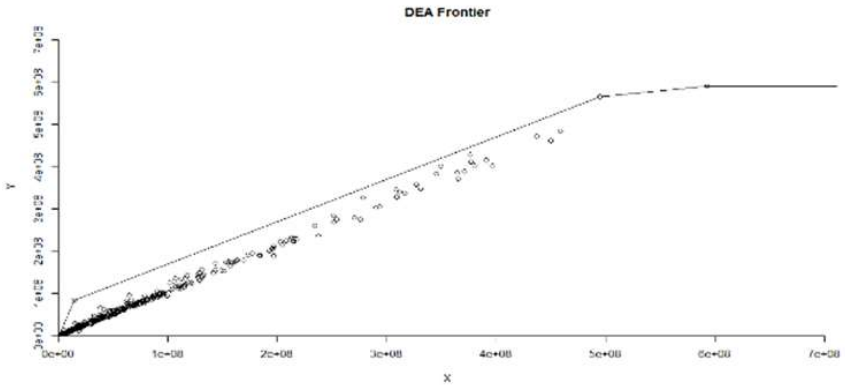


Figure 9. DEA women-inputted frontier projection.

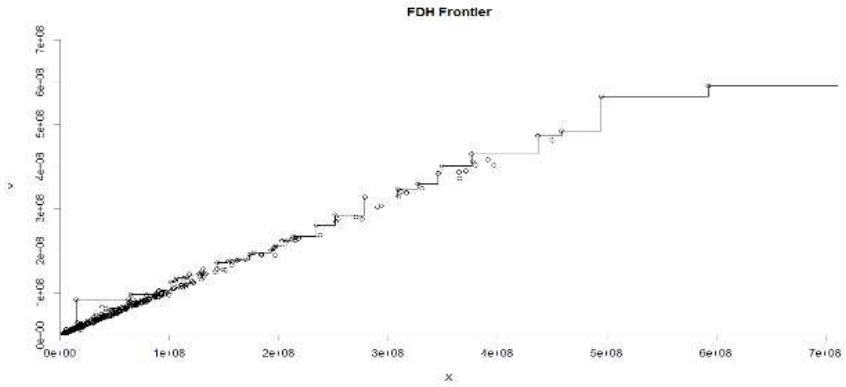


Figure 10. FDH women-inputted frontier projection.

7. Conclusions

The aim of this paper is to analyze the efficiency of the universities that belong to the European Union. In order to so, the starting point has been studying Performance and Efficiency Analysis course syllabus and notes written during lessons; in addition to this the consultation of paper, essays and articles on Internet helped defining the main framework in which the analysis has been set in terms of choice of inputs, outputs and external variables.

The work concerns an evaluation of efficiency scores of HEIs at European level: the underlying idea is considering crucial to have a European benchmark in this era of globalization also to understand if, for example, there is a relation between a good efficiency score and the richness or greatness of the country to which the correspondent university belongs.

In many situations, there is evidence of the importance of human aspect: universities differ from firms because they are more than an economic organization. In fact, their main resources are students, both enrolled and graduated, that together with the staff (professionals and non-professionals) contribute to generate the actual efficiency.

The analysis branches out starting from the collection of data and their skimming procedure, based on properties and assumptions (explained in chapter 4 and 5) related to a deep understanding of the available tools, and then coming to the consideration of the final data belonging to 457 DMUs in 15 countries members of the EU. A simple analysis implemented by the R program shed light on the issue of their unknown distribution: this led to work in a non-parametric framework.

The efficiency evaluation let the identification of 26 universities efficient according to both DEA and FDH models: 6 in Germany, 1 in Croatia, 1 in Italy, 1 in Portugal, 1 in Lithuania, 2 in Ireland, 2 in Slovakia, 3 in Hungary and 9 in United Kingdom. When making observations about these results, another important fact has to be remembered: due to the lack of data, universities belonging to countries traditionally considered as having good educational policies (such as France and Finland) were taken out. It can be reasonable to suppose that their existence in the dataset would have influenced the definition of the efficiency frontier.

Notwithstanding this, the results obtained through the analysis described in this paper can be considered reliable: in fact, it is evident how powerful and well-off countries (Germany and United Kingdom) have bigger numbers of efficient DMUs. But in addition to this first judgement, a wider observation paves the way for a reflection on the fact that the 26 DMUs are more or less homogeneously distributed among some European countries: this means that even if Europe is a big continent in which reside various languages, cultures and regions with different wealth conditions, it has the common focus of increasing the educational level in order to provide society with capable and qualified people able to build a better future. This is the demonstration that Europe believes in Education.

The bootstrap analysis made on the previously defined efficiency scores, showed that the 26 efficient DMUs had bias corrected scores out from confidence intervals (19) or very close to lower bounds (7). That means that even if those 19 DMUs are efficient according to both DEA and FDH models, the fact that they have bias corrected scores outside their confidence intervals demonstrates that there is not statistical evidence to say that they are actually efficient.

The last part consists of the conditional analysis, elaborated to go deep into efficiency evaluation and see the influence of external factors on it. Thus, foundation year, the number of women in total academic staff and GDP (at level NUTS2) were added to the analysis and the result was that GDP and the number of women in total academic staff affected efficiency scores.

As mentioned in this work, there is a general lack of information about the role of women in high education institutions: this was the reason for a second implementation of the non-parametric deterministic model considering the number of women as an input and total academic staff as an output, in addition to the existing inputs and outputs. The results showed that 67 DMUs (11 in United Kingdom, 4 in Slovakia, 1 in Belgium, 2 in Croatia, 2 in Czech Republic, 1 in Denmark, 27 in Germany, 7 in Hungary, 4 in Italy, 5 in Lithuania, 1 in Malta, 1 in Portugal and 1 in Sweden), many more than the 26 of the first analysis, were efficient: it is evident how women are a key resource contributing to HEIs' efficiency.

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Appendix A

Tables with the results of the non-parametric deterministic models DEA, FDH, order-m, order-α.

ETER ID	Institution Name	DEA Far	DEA She	FDH Far	FDH She	order_m (m=25)	order_m (m=50)	order_m (m=100)	order_α (α=95%)
BE0058	Universiteit Hasselt	0.64953475	1.53956	1	1	0.623746337	0.698475077	0.762503255	1.213508914
BE0059	Universiteit Antwerpen	0.637368421	1.56895	1	1	0.930288894	0.958341245	0.986733227	0.720073001
BE0060	Universiteit Gent	0.906315404	1.10337	1	1	1	1	1	0.831092058
CY0001	ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ	0.664123269	1.50574	1	1	0.604192673	0.657649271	0.736324247	0.931591439
CY0002	ΑΝΟΙΚΤΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ	0.405535581	2.46587	1	1	0.517707334	0.645996523	0.750442494	1
CY0003	ΤΕΧΝΟΛΟΓΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ	0.611578919	1.63511	1	1	0.555741282	0.623387046	0.733727031	1.36836642
CZ0001	Akademie múzických umění v Praze	0.580479064	1.72272	1	1	0.431713263	0.546655679	0.712615876	2.172786617
CZ0002	Akademie výtvarných umění v Praze	0.783421276	1.27645	1	1	0.157194982	0.237941908	0.391975162	6.837043306
CZ0003	Česká zemědělská univerzita v Praze	0.620551321	1.61147	1	1	0.631956517	0.72017806	0.856611701	0.703211659
CZ0004	České vysoké učení technické v Praze	0.553394061	1.80703	0.991151096	1.00893	0.976701824	1.00037373	1.006698993	0.630978205
CZ0005	Janáčkova akademie múzických umění v Brně	0.62189132	1.60800	0.923208191	1.08318	0.451053057	0.552620568	0.791619598	2.532648394
CZ0006	Jihočeská univerzita v Českých Budějovicích	0.510641576	1.95832	1	1	0.690002175	0.798796084	0.888774171	0.834786034
CZ0007	Masarykova univerzita	0.742634597	1.34656	1	1	0.982667871	0.997323891	0.99984913	0.788779709
CZ0008	Mendelova zemědělská a lesnická univerzita v Brn	0.555741171	1.79940	1	1	0.736317212	0.823265331	0.899645435	0.909208569
CZ0009	Ostravská univerzita v Ostravě	0.544073318	1.83799	1	1	0.675029836	0.792256238	0.901988657	0.965598773
CZ0010	Slezská univerzita v Opavě	0.607901488	1.64500	1	1	0.517932909	0.632195015	0.732243227	1
CZ0011	Technická univerzita v Liberci	0.495044027	2.02002	0.956577242	1.04539	0.805315141	0.921661892	0.982188782	0.854435111
CZ0012	Univerzita Hradec Králové	0.516635182	1.93560	1	1	0.652681048	0.696272045	0.810583802	0.873771957
CZ0013	Univerzita J. E. Purkyně v Ústí nad Labem	0.446636479	2.23896	1	1	0.706477114	0.810083336	0.911388254	0.755136528
CZ0014	Univerzita Karlova v Praze	0.580392463	1.72297	0.997945605	1.00206	0.993511731	1.000403136	1.001786059	0.547382369
CZ0015	Univerzita Palackého v Olomouci	0.584983899	1.70945	0.974782888	1.02587	0.917610376	0.976936627	1.00648242	0.789799918
CZ0016	Univerzita Pardubice	0.465986166	2.14599	1	1	0.712602734	0.801646227	0.866991556	0.817183025
CZ0017	Univerzita Tomáše Bati ve Zlíně	0.618617501	1.61651	0.934019912	1.07064	0.611402627	0.748583483	0.889076609	1.033185968
CZ0018	Veterinární a farmaceutická univerzita Brno	0.667949134	1.49712	1	1	0.320185881	0.449364117	0.562767664	1.835628709
CZ0019	Vysoká škola báňská - Technická univerzita Ostrav	0.555760763	1.79934	1	1	0.832554369	0.915710705	0.959755977	0.740017231
CZ0020	Vysoká škola ekonomická v Praze	0.714036841	1.40049	0.777762221	1.28574	0.693510223	0.897099367	1.065548083	0.843236818
CZ0021	Vysoká škola chemicko-technologická v Praze	0.47781942	2.09284	0.983606519	1.01667	0.812065374	0.894948961	0.953647508	0.966462541
CZ0024	Vysoká škola umělecko-průmyslová v Praze	0.680565539	1.46937	1	1	0.380011251	0.490649781	0.571303205	2.311841041
CZ0025	Vysoké učení technické v Brně	0.608736117	1.64275	1	1	0.892269449	0.958716786	0.991727267	0.728188765
CZ0026	Západočeská univerzita v Plzni	0.555827565	1.79912	0.942218009	1.06133	0.770144356	0.877268057	0.965508137	0.8491853
DE0001	Albert-Ludwigs-Universität Freiburg	0.925791156	1.08016	1	1	0.961548083	0.992459292	1	0.569830078
DE0002	Ruprecht-Karls-Universität Heidelberg	0.953175546	1.04912	1	1	1	1	1	0.548723961
DE0003	Universität Hohenheim	0.600393952	1.66557	1	1	0.819892892	0.889811374	0.938468737	0.865513577
DE0004	ther Institut für Technologie (KIT) - Bereich Hoch	0.631674022	1.58310	1	1	0.884064347	0.930404973	0.979142257	0.459749772
DE0005	Universität Konstanz	0.654715929	1.52738	1	1	0.725661506	0.792590847	0.882387605	0.710963984
DE0006	Universität Mannheim	0.547547008	1.82633	0.977711081	1.02280	0.86660598	0.919704459	0.963349639	0.745468498
DE0007	Universität Stuttgart	0.67914669	1.47244	1	1	0.877770553	0.912988469	0.973960899	0.390398702
DE0008	Eberhard Karls Universität Tübingen	0.928644275	1.07684	1	1	0.995717019	1	1	0.572412353
DE0009	Universität Ulm	0.891366945	1.12187	1	1	0.778290765	0.921341899	0.976620389	0.855922649
DE0016	Universität Augsburg	0.489658863	2.04224	1	1	0.867065988	0.914826893	0.945111198	0.537605358
DE0017	Otto-Friedrich-Universität Bamberg	0.479722011	2.08454	1	1	0.825793601	0.861900494	0.922279094	0.644362399
DE0018	Universität Bayreuth	0.607533289	1.64600	1	1	0.749645862	0.803640157	0.873266025	0.637517963
DE0020	iedrich-Alexander-Universität Erlangen-Nürnbe	0.944430179	1.05884	1	1	0.997583268	0.999597211	1	0.446767766
DE0021	Ludwig-Maximilians-Universität München	1	1	1	1	1	1	1	0.572580648
DE0022	Technische Universität München	0.958616785	1.04317	1	1	1	1	1	0.513850477
DE0023	Universität der Bundeswehr München	0.85630921	1.16780	1	1	0.367465872	0.505742599	0.591086701	1.597792213
DE0024	Hochschule für Politik München	1	1	1	1	0.12816215	0.191892706	0.340709202	11.45300239
DE0025	Universität Passau	0.519910897	1.92341	1	1	0.770809112	0.837221949	0.89019097	0.901392302
DE0026	Universität Regensburg	0.836169247	1.19593	1	1	0.891292975	0.968339857	0.992098084	0.676231459
DE0027	Julius-Maximilians-Universität Würzburg	0.862611779	1.15927	1	1	0.92681917	0.972482631	0.996314535	0.550560962
DE0028	Freie Universität Berlin	0.600839679	1.66434	1	1	0.894215405	0.959343732	0.986531185	0.496167611
DE0029	Technische Universität Berlin	0.567165275	1.76315	1	1	0.915096464	0.962694579	0.988598629	0.401184462
DE0030	Charité - Universitätsmedizin Berlin	1	1	1	1	1	1	1	1.103130357
DE0031	Humboldt-Universität zu Berlin	0.455490435	2.19544	0.6677045	1.49767	1.096837873	1.184609406	1.333347429	0.420371353
DE0038	Europa-Universität Viadrina Frankfurt (Oder)	0.498128442	2.00751	1	1	0.737383795	0.817564818	0.869042612	1.050225408
DE0039	Universität Potsdam	0.544321137	1.83715	1	1	0.850645634	0.914874884	0.951350028	0.571790366
DE0040	Universität Bremen	0.583383345	1.71414	1	1	0.940975491	0.976350545	0.990304136	0.578188457
DE0042	Universität Hamburg	0.8909454	1.12240	1	1	0.997670657	1	1	0.476701052
DE0043	Technische Universität Hamburg-Harburg	0.56809461	1.76027	1	1	0.645394526	0.719943878	0.801632352	0.838575691
DE0044	Hafencity Universität Hamburg	0.411978437	2.42731	1	1	0.572288339	0.681797971	0.786072813	1.263871365
DE0047	Technische Universität Darmstadt	0.640687329	1.56082	1	1	0.819335535	0.89538935	0.962847662	0.453348416
DE0048	ann Wolfgang Goethe-Universität Frankfurt am M	0.92693499	1.07882	1	1	0.968954478	0.99747983	1	0.44268051
DE0049	Justus-Liebig-Universität Gießen	0.659421505	1.51648	1	1	0.897215398	0.943608958	0.974440578	0.618427995
DE0051	Universität Kassel	0.487786202	2.05008	0.866748316	1.15374	0.981622823	1.025993619	1.073697522	0.491848245
DE0052	Philipps-Universität Marburg	0.601885928	1.66144	1	1	0.918966141	0.965443996	0.98613208	0.574377754
DE0055	Ernst-Moritz-Arndt-Universität Greifswald	0.938361321	1.06569	1	1	0.69489523	0.796237804	0.906986015	0.848419734
DE0056	Universität Rostock	0.902489938	1.10805	1	1	0.82573187	0.888146502	0.967245573	0.818015838
DE0058	nische Universität Carolo-Wilhelmina zu Braunsch	0.601953651	1.66126	1	1	0.924105154	0.962858346	0.984805662	0.554711914
DE0059	Technische Universität Clausthal	0.669890147	1.49278	1	1	0.523722242	0.636656548	0.723183665	0.869014755
DE0060	Georg-August-Universität Göttingen	0.869305303	1.15034	1	1	0.993466814	0.999918845	1	0.550222286
DE0061	Leibniz Universität Hannover	0.630810316	1.58526	1	1	0.896723354	0.937417449	0.98317747	0.502109313
DE0062	Medizinische Hochschule Hannover	1	1	1	1	0.756852843	0.929837838	0.994720588	1.591536088
DE0063	Tierärztliche Hochschule Hannover	0.928363049	1.07716	1	1	0.244010054	0.349962701	0.45572756	1.964222155
DE0064	Stiftung Universität Hildesheim	0.504193528	1.98337	1	1	0.786586451	0.860042596	0.926617889	0.967229834
DE0065	Leuphana Universität Lüneburg	0.530698078	1.88431	1	1	0.752006916	0.813300795	0.874175799	0.776217492
DE0066	Carl von Ossietzky Universität Oldenburg	0.612087053	1.63375	1	1	0.785485609	0.86980597	0.938398435	0.746028643
DE0067	Universität Osnabrück	0.578899376	1.72742	1	1	0.769869635	0.809966356	0.869010996	0.755615182
DE0068	Universität Vechta	0.444750317	2.24845	1	1	0.685726315	0.76203633	0.839235151	1.175950935
DE0069	RWTH Aachen	0.922869075	1.08358	1	1	1	1	1	0.489896778
DE0070	Universität Bielefeld	0.542124188	1.84460	0.946439318	1.05659	0.938779621	0.987799508	1.023385547	0.575119099
DE0071	Ruhr-Universität Bochum	0.621562423	1.60885	1	1	0.980230203	0.991750508	0.999018228	0.408548398
DE0072	Rheinische Friedrich-Wilhelms-Universität Bonr	0.889443019	1.12430	1	1	0.99444629	1	1	0.471823971
DE0073	Technischen Universität Dortmund	0.463607139	2.15700	0.92079566	1.08602	0.987936934	1.015805568	1.056050534	0.405681003
DE0074	Heinrich-Heine-Universität Düsseldorf	0.832112745	1.20176	1	1	0.930645247	0.982700147	0.995101479	0.406267983
DE0075	Universität Duisburg-Essen	0.877379719	1.13976	0.984000992	1.01626	1.010944193	1.016015251	1.016259138	0.42002605
DE0076	Fernuniversität in Hagen	0.284519248	3.51470	0.737160121	1.35656	0.917457756	0.999587115	1.106291191	0.121699384
DE0077	Universität zu Köln	0.914040829	1.09404	1	1	0.992741953	0.999395424	1	0.364604393
DE0078	Deutsche Sporthochschule Köln	0.503260824	1.98704	1	1	0.655637328	0.770729269	0.849628994	1.11552389
DE0079	Westfälische Wilhelms-Universität Münster	0.881878514	1.13394	1	1	0.997966518	1	1	0.505147882
DE0080	Universität Paderborn	0.495184956	2.01945	0.943412453	1.05998	0.874911195	0.945797505	1.000014592	0.526320852
DE0081	Universität Siegen	0.433019414	2.30937	0.875919409	1.14166	0.956342957	0.99729026	1.03646116	0.478754373
DE0082	Bergische Universität Wuppertal	0.394784241	2.53303	0.825815551	1.21092	0.994514025	1.086326775	1.145350952	0.398266195
DE0085	Technische Universität Kaiserslautern	0.554043741	1.80491	1	1	0.810093371	0.871352574	0.920695351	0.561506467
DE0086	Universität Koblenz-Landau	0.457975625	2.18352	0.835235235	1.19727	0.778969363	0.846946952	0.998735922	0.759772892
DE0087	Johannes Gutenberg-Universität Mainz	0.572531094	1.74663	1	1	0.936236647	0.964171635	0.988137179	0.500702111
DE0089	che Universität für Verwaltungswissenschaften S	0.636590334	1.57087	1	1	0.259935674	0.381637145	0.501410736	3.047773325
DE0090	Universität Trier	0.45896991	2.17879	1	1	0.845505408	0.899296253	0.946267278	0.654300645
DE0092	Universität des Saarlandes Saarbrücken	0.836014788	1.19615	1	1	0.856571495	0.94514113	0.985551533	0.596767333
DE0093	Technische Universität Chemnitz	0.590827986	1.69254	1	1	0.773926227	0.84356412	0.89633222	0.570941349

ETER ID	Institution Name	DEA Far	DEA She	FDH Far	FDH She	order_m (m=25)	order_m (m=50)	order_m (m=100)	order_α (α=95%)
DE0094	Technische Universität Dresden	0.944093	1.05922	1	1	0.973392382	0.994682193	1	0.577879011
DE0096	Technische Universität Bergakademie Freiberg	0.8152565	1.22661	1	1	0.508501283	0.597687775	0.690104104	0.997725544
DE0097	Universität Leipzig	0.862900809	1.15888	1	1	0.930171159	0.981702574	0.999121062	0.641441068
DE0102	Martin-Luther-Universität Halle-Wittenberg	0.770410625	1.29801	1	1	0.875597551	0.937381028	0.983005832	0.568194258
DE0103	Otto-von-Guericke-Universität Magdeburg	0.775316894	1.28980	1	1	0.798244975	0.89121763	0.935834045	0.70500335
DE0104	Universität Flensburg	0.413689914	2.41727	1	1	0.640862206	0.726201281	0.813651054	1.091451153
DE0105	Universität Kiel	0.554230696	1.80430	0.931184211	1.07390	0.957731396	1.000905115	1.038400232	0.547601945
DE0106	Universität Lübeck	0.747604036	1.33761	1	1	0.437835093	0.514175245	0.60680238	1.830040004
DE0108	Universität Erfurt	0.57287515	1.74558	1	1	0.777004799	0.86513371	0.928933407	1.108736532
DE0109	Technische Universität Ilmenau	0.592939989	1.68651	1	1	0.686853812	0.753462328	0.832827363	0.820443817
DE0110	Friedrich-Schiller-Universität Jena	0.843985738	1.18485	1	1	0.899271499	0.966919292	1	0.682834348
DE0111	Bauhaus-Universität Weimar	0.542605747	1.84296	1	1	0.734811808	0.832683234	0.897960878	1.0185598
DE0112	Pädagogische Hochschule Freiburg i.Br.	0.473175709	2.11338	0.705882353	1.41667	0.543232177	0.674209451	0.876765246	1.337960702
DE0113	Pädagogische Hochschule Heidelberg	0.609779128	1.63994	1	1	0.335796028	0.474665627	0.644655128	1.062712692
DE0114	Pädagogische Hochschule Karlsruhe	0.516799337	1.93499	1	1	0.501003868	0.63944188	0.772600779	1.216024032
DE0115	Pädagogische Hochschule Ludwigsburg	0.500297628	1.99881	0.738853503	1.35345	0.523656015	0.683349476	0.848292548	1.228264532
DE0116	Pädagogische Hochschule Schwäbisch Gmünd	0.516986351	1.93429	1	1	0.574856334	0.676417347	0.798024802	1.51449759
DE0117	Pädagogische Hochschule Weingarten	0.488595525	2.04668	1	1	0.550614795	0.687443417	0.801021946	1.015542446
DE0133	Staatliche Hochschule für Musik Freiburg i.Br.	0.648425773	1.54220	1	1	0.396680944	0.535783787	0.665955315	1.898980115
DE0135	Staatliche Hochschule für Gestaltung Karlsruhe	1	1	1	1	0.132603027	0.179403695	0.335628339	7.584883738
DE0136	Staatliche Hochschule für Musik Karlsruhe	0.720828827	1.38729	1	1	0.452063716	0.556075415	0.674725864	1.696113764
DE0137	Hochschule für Musik und Darstellende Kunst M	0.548409718	1.82345	1	1	0.527110034	0.635084766	0.761856867	1.664749558
DE0138	aatliche Akademie der Bildenden Künste Stuttga	0.75861342	1.31819	1	1	0.328576161	0.39965641	0.534271976	2.386672417
DE0139	e Hochschule für Musik und Darstellende Kunst S	0.634751895	1.57542	1	1	0.463011113	0.572825725	0.706244518	2.110057636
DE0140	Staatliche Hochschule für Musik Trossingen	0.540273365	1.85091	1	1	0.519525761	0.624005044	0.726802458	1.959170254
DE0142	Hochschule für Fernsehen und Film München	1	1	1	1	0.063299558	0.097330537	0.255163453	10.00486708
DE0143	Hochschule für Musik und Theater München	0.54166256	1.84617	1	1	0.475508229	0.59627472	0.781404609	0.912383195
DE0146	Hochschule für Musik Würzburg	0.519271236	1.92578	1	1	0.605252452	0.738989469	0.847920332	1.375383882
DE0149	Universität der Künste Berlin	0.605103773	1.65261	1	1	0.470337562	0.576327234	0.689107632	1.228059474
DE0153	schule für Film und Fernsehen in Potsdam-Babel	0.588286357	1.69985	1	1	0.495984033	0.595649523	0.735028783	1.840139344
DE0155	Hochschule für Bildende Künste Hamburg	0.73840785	1.35427	1	1	0.420546111	0.517710387	0.666181567	1.573717243
DE0156	Hochschule für Musik und Theater Hamburg	0.478904648	2.08810	1	1	0.490150311	0.650700771	0.768137757	1.377710714
DE0158	chule für Musik und Darstellende Kunst Frankfur	0.548888337	1.82186	1	1	0.435198447	0.59734396	0.74201264	1.06277832
DE0159	Hochschule für Gestaltung Offenbach	0.759085979	1.31737	0.984932111	1.01530	0.169568596	0.327219631	0.512289854	6.971789837
DE0160	Hochschule für Musik und Theater, Rostock	0.534657829	1.87036	1	1	0.463109012	0.614850744	0.709664688	1.618797939
DE0161	Hochschule für Bildende Künste Braunschweig	0.526345104	1.89989	1	1	0.45395424	0.53866786	0.709334476	1.337785194
DE0162	chschule für Musik, Theater und Medien Hannov	0.473522318	2.11183	0.890025575	1.12356	0.537753176	0.718733349	0.888687885	1.292252292
DE0163	Hochschule für Musik Detmold	0.564456453	1.77162	1	1	0.499531327	0.679037835	0.80285538	1.58052314
DE0164	Kunstakademie Düsseldorf	0.775528976	1.28944	0.870191827	1.14917	0.145218154	0.310756272	0.546943433	7.44692431
DE0165	Robert-Schumann-Hochschule Düsseldorf	0.442151278	2.26167	0.904380063	1.10573	0.619112174	0.719982174	0.851265287	1.127943103
DE0166	Folkwang Universität der Künste	0.53704632	1.86204	0.838554217	1.19253	0.475306936	0.637161985	0.803044271	1.07248423
DE0167	Kunsthochschule für Medien Köln	0.734274335	1.36189	1	1	0.084602696	0.149567192	0.209618611	6.421577161
DE0168	Hochschule für Musik Köln	0.549983455	1.81824	0.775381851	1.28969	0.456724056	0.593765056	0.82080173	1.571124807
DE0169	Kunstakademie Münster	0.930218419	1.07502	1	1	0.1891735	0.326133837	0.560130834	8.802809575
DE0171	Hochschule der Bildenden Künste Saarbrücken	0.774309962	1.29147	1	1	0.24914372	0.359660797	0.420948345	5.062898129
DE0173	Hochschule für Bildende Künste Dresden	0.806172944	1.24043	1	1	0.250080098	0.33312092	0.462383254	4.471200216
DE0175	chschule für Musik Carla Maria von Weben Dresc	0.547152123	1.82765	1	1	0.529750717	0.651158976	0.762884349	1.572559632
DE0182	Muthesius Kunsthochschule Kiel	0.751664466	1.33038	1	1	0.358999595	0.451953209	0.530684028	3.088881183
DE0183	Musikhochschule Lübeck	0.750253572	1.33288	1	1	0.393067511	0.46030105	0.587895545	2.708781029
DE0184	Hochschule für Musik Weimar	0.512107735	1.95271	1	1	0.561155644	0.75173385	0.837676819	1.012337091
DE0274	chschule für Angewandte Wissenschaften Hambu	0.399758924	2.50151	0.895936194	1.11615	0.905655881	0.97384124	1.035566774	0.549257807
DE0299	Hochschule Hannover (FH)	0.466750132	2.14247	0.995819235	1.00420	0.825461814	0.915376097	0.96410318	0.690846721
DE0347	Hochschule für Technik und Wirtschaft Dresden	0.498774479	2.00491	1	1	0.722729651	0.801136641	0.847195232	0.982329662
DE0348	chschule für Technik, Wirtschaft und Kultur Leip	0.568739092	1.75828	1	1	0.695729353	0.783317476	0.859459929	1.002184505
DE0350	Hochschule Zittau/Görlitz (FH)	0.624376774	1.60160	1	1	0.6270514	0.722429674	0.779522305	1.423079336
DE0371	Fachhochschule Jena	0.466158772	2.14519	1	1	0.682037699	0.771720764	0.827030931	1.005263697
DE0455	nburgische Technische Universität Cottbus-Senft	0.586049672	1.70634	1	1	0.778689428	0.832434061	0.889128873	0.738907854
DK0001	Københavns Universitet	0.874638556	1.14333	1	1	1	1	1	0.59838034
DK0002	Aarhus Universitet	0.831704744	1.20235	1	1	1	1	1	0.631969697
DK0003	Syddansk Universitet	0.590450768	1.69362	0.952808063	1.04953	0.994106422	1.037582818	1.046029105	0.541268513
DK0004	Roskilde Universitet	0.632060361	1.58213	1	1	0.791723723	0.860955475	0.918780565	1
DK0005	Aalborg Universitet	0.643622084	1.55371	0.970422117	1.03048	0.997599587	1.019185144	1.027516531	0.640753684
DK0006	Danmarks Tekniske Universitet	0.815885139	1.22566	1	1	0.902382127	0.969251882	0.994896468	0.696465277
DK0007	Handelshøjskolen	0.597759797	1.67291	0.985290751	1.01493	0.937357233	0.974240153	1.000227154	0.767756253
DK0008	IT-Universitetet i København	0.585931449	1.70668	1	1	0.539761415	0.662715271	0.753929013	1.692690214
HR0001	Sveučilište u Dubrovniku	0.439016522	2.27782	1	1	0.445037622	0.543907808	0.679603861	1.834730823
HR0002	Sveučilište Jurja Dobrile u Puli	0.43625004	2.29226	1	1	0.517209118	0.616649409	0.70754036	0.893797733
HR0003	Sveučilište Josipa Jurja Strossmayera u Osijeku	0.512218723	1.95229	0.982006311	1.01832	0.749674616	0.859303229	0.958155302	0.752880027
HR0004	Sveučilište u Rijeci	0.583639823	1.71339	1	1	0.594903583	0.690733585	0.786619741	0.838081697
HR0005	Sveučilište u Splitu	0.514720931	1.94280	1	1	0.630240311	0.695707896	0.821161578	0.65770615
HR0006	Sveučilište u Zadru	0.46654245	2.14343	0.760962457	1.31413	0.629903979	0.723354978	0.891147841	1.121714769
HR0007	Sveučilište u Zagrebu	1	1	1	1	0.997195128	1	1	0.66557595
HU0001	Budapesti Corvinus Egyetem (BCE)	1	1	1	1	0.388675181	0.556700676	0.784682325	0.866704214
HU0002	pesti Műszaki és Gazdaságtudományi Egyetem (I	0.692948251	1.44311	1	1	0.722687699	0.80429246	0.900173133	0.678533938
HU0003	Debreceni Egyetem (DE)	0.585854743	1.70691	1	1	0.916013467	0.958440744	0.989701516	0.569403204
HU0004	Eötvös Loránd Tudományegyetem (ELTE)	0.860580759	1.16201	1	1	0.69822734	0.79446925	0.952504981	0.658635029
HU0005	Kaposvári Egyetem (KE)	0.535605274	1.86705	1	1	0.562041477	0.65467836	0.720718379	1.425692379
HU0006	Liszt Ferenc Zeneművészeti Egyetem (LFZE)	1	1	1	1	0.268282239	0.373377617	0.460933959	2.715822299
HU0007	Magyar Képzőművészeti Egyetem (MKE)	0.589643997	1.69594	1	1	0.37797213	0.46953446	0.597328974	1.949209012
HU0008	Miskolci Egyetem (ME)	0.461267245	2.16794	1	1	0.695718599	0.797028679	0.883275357	0.761810426
HU0009	Moholy-Nagy Művészeti Egyetem (MOME)	0.62590917	1.59768	1	1	0.289728443	0.408064242	0.506528679	2.077936286
HU0010	Nyugat-magyarországi Egyetem (NYME)	0.511722874	1.95418	1	1	0.675489067	0.760876147	0.835061532	0.908211254
HU0011	Pannon Egyetem (PE)	0.495907378	2.01651	1	1	0.641633243	0.696017022	0.779108952	0.933727058
HU0012	Pécsi Tudományegyetem (PTE)	0.493021775	2.02831	0.674513915	1.48255	1.033967408	1.136209093	1.296984277	0.513017962
HU0013	Semmelweis Egyetem (SE)	0.581599206	1.71940	1	1	0.883866586	0.932207499	0.970140841	0.659299458
HU0014	Széchenyi István Egyetem (SZE)	0.409562582	2.44163	1	1	0.623677424	0.705289046	0.76997992	0.620118334
HU0015	Szegedi Tudományegyetem (SZTE)	0.622915065	1.60536	0.979556245	1.02087	0.909715833	0.962512222	1.01325844	0.62013084
HU0016	Szent István Egyetem (SZIE)	0.368362309	2.71472	0.621851729	1.60810	0.995408218	1.206234691	1.329988804	0.657057359
HU0027	Óbudai Egyetem (OE)	0.35462896	2.81985	1	1	0.674269182	0.768177176	0.838662587	0.481551541
HU0073	Nemzeti Közszolgálati Egyetem (NKE)	1	1	1	1	0.49525313	0.628175077	0.794698987	1.435699313
IE0001	University College Dublin	1	1	1	1	0.887355998	0.949618979	0.996301972	1
IE0002	University College Cork	1	1	1	1	0.673737957	0.796674863	0.909715195	0.894176431
IE0003	National University of Ireland, Galway	0.730541056	1.36885	1	1	0.90861814	0.9502847	0.975880433	0.868962861
IE0004	Trinity College Dublin	0.918763253	1.08842	1	1	0.788781554	0.892447456	0.972952782	0.932347127
IE0005	Maynooth University	0.772220772	1.29497	1	1	0.523448593	0.60422949	0.764024597	1.150229832
IE0006	Dublin City University	0.741152252	1.34925	1	1	0.643340747	0.75021528	0.790427827	1.024593705
IE0007	University of Limerick	0.648270518	1.54257	1	1	0.816099006	0.869680354	0.926752435	0.900800515
IT0001	Università Politecnica delle MARCHE	0.551442033	1.81343	1	1	0.890146425	0.947237667	0.977934228	0.715264816
IT0003	Università della CALABRIA	0.465027226	2.15041	1	1	0.846808746	0.895805144	0.939690605	0.536562625

ETER ID	Institution Name	DEA Far	DEA She	FDH Far	FDH She	order_m (m=25)	order_m (m=50)	order_m (m=100)	order_α (α=95%)
IT0004	Politecnico di BARI	0.482367873	2.07311	1	1	0.660490937	0.762978017	0.832690566	0.748706052
IT0005	Università degli Studi di BARI ALDO MORO	0.724142625	1.38094	1	1	0.958153334	0.991319513	0.999458739	0.577954954
IT0006	Università degli Studi del SANNIO di BENEVENTO	0.429671936	2.32736	1	1	0.67922852	0.767067349	0.848980663	0.916253814
IT0008	Università degli Studi di BERGAMO	0.460031327	2.17377	1	1	0.694973562	0.780445042	0.864809241	0.71915431
IT0009	Università degli Studi di BOLOGNA	0.980132345	1.02027	1	1	1	1	1	1
IT0012	Università degli Studi di BRESCIA	0.52246765	1.91399	1	1	0.926415031	0.970824493	0.990215119	0.733566919
IT0013	Università degli Studi di CAGLIARI	0.494139274	2.02372	0.960358343	1.04128	0.980842833	1.012736585	1.0237331	0.555560602
IT0014	Università degli Studi di CAMERINO	0.60007312	1.66646	1	1	0.675399957	0.756155108	0.857029707	1.17130379
IT0015	Università degli Studi del MOLISE	0.495449012	2.01837	0.982559436	1.01775	0.808111722	0.903527836	0.961407949	1
IT0017	versita degli studi di Cassino e del Lazio Meridior	0.465622443	2.14766	0.92451413	1.08165	0.810713485	0.88713917	0.967707044	0.821840837
IT0019	Università degli Studi di CATANIA	0.595610858	1.67895	1	1	0.944194844	0.984176354	0.997730678	0.513215854
IT0020	iversità degli Studi "Magna Graecia" di CATANZA	0.52444629	1.90677	0.979319746	1.02112	0.813217183	0.902907	0.968507969	0.946759572
IT0021	versità degli Studi "G. d'Annunzio" CHIETI-PESCA	0.5005178	1.99793	0.883905915	1.13134	0.937024621	1.021177492	1.0835453	0.624727021
IT0023	Università degli Studi di FERRARA	0.72063161	1.38767	1	1	0.716802434	0.780220442	0.85870947	0.837121478
IT0025	Università degli Studi di FIRENZE	0.741862985	1.34796	1	1	0.921406733	0.972063307	0.998716528	0.594293998
IT0027	Università degli Studi di FOGGIA	0.541949567	1.84519	1	1	0.720113263	0.822968273	0.898393459	0.838397484
IT0028	Università degli Studi di GENOVA	0.644104063	1.55254	1	1	0.922465851	0.971821975	0.990886166	0.679521422
IT0029	Università degli Studi de L'AQUILA	0.448376026	2.23027	0.917293233	1.09016	0.929122587	0.987184009	1.028833703	0.555605268
IT0030	Università del SALENTO	0.686018883	1.45769	0.891595615	1.12158	0.753212439	0.82980243	0.996027138	0.747112126
IT0032	Università degli Studi di MACERATA	0.542079703	1.84475	1	1	0.694277019	0.757394176	0.853208179	0.878167965
IT0033	Università degli Studi di MESSINA	0.608048299	1.64461	0.991005724	1.00908	0.957608692	0.991194466	1.004281434	0.668669326
IT0035	Politecnico di MILANO	0.900630709	1.11033	1	1	0.990880728	1	1	0.72255374
IT0038	Università degli Studi di MILANO	0.803874132	1.24398	1	1	0.999597399	1	1	0.564650806
IT0040	Università degli Studi di MILANO-BICOCCA	0.638491817	1.56619	1	1	0.936153755	0.970696932	0.990576451	0.603570426
IT0042	Iniversità degli Studi di MODENA e REGGIO EMILI	0.563177815	1.77564	0.817016855	1.22396	0.952578559	1.036651958	1.110910408	0.683719494
IT0044	Seconda Università degli Studi di NAPOLI	0.559235714	1.78815	0.961343229	1.04021	0.968358366	1.004590803	1.024289891	0.652143629
IT0045	Università degli Studi di NAPOLI "Federico II"	0.919764084	1.08724	1	1	1	1	1	0.598198029
IT0046	Università degli Studi di NAPOLI "L'Orientale"	0.487335136	2.05198	1	1	0.682455502	0.771576552	0.884207076	0.673005898
IT0047	Università degli Studi di NAPOLI "Parthenope"	0.437943316	2.28340	1	1	0.699682117	0.828917481	0.892307555	0.641243744
IT0050	Università degli Studi di PADOVA	0.90152464	1.10923	1	1	1	1	1	0.690699212
IT0051	Università degli Studi di PALERMO	0.805631097	1.24126	1	1	0.914128258	0.972623945	0.998947075	0.726432929
IT0052	Università degli Studi di PARMA	0.662875766	1.50858	1	1	0.892341919	0.943761988	0.974222424	0.714597238
IT0054	Università degli Studi di PAVIA	0.61227426	1.63326	0.942836945	1.06063	0.970964569	1.007069439	1.030059359	0.737327072
IT0055	Università degli Studi di PERUGIA	0.614662944	1.62691	1	1	0.921573746	0.961510761	0.987627856	0.747379959
IT0056	Università per Stranieri di PERUGIA	0.760807745	1.31439	0.999291797	1.00071	0.369514258	0.453372855	0.597907086	2.044018717
IT0059	Università di PISA	0.701980712	1.42454	1	1	0.969507144	0.991703725	0.999040445	0.562310621
IT0060	Università degli Studi della BASILICATA	0.586769707	1.70425	1	1	0.649133136	0.703808888	0.776506394	0.964248164
IT0061	ersità degli Studi "Mediterranea" di REGGIO CALA	0.816931462	1.22409	1	1	0.479686494	0.541034615	0.675264028	1.08074742
IT0063	Università degli Studi ROMA TRE	0.635439852	1.57371	1	1	0.882288749	0.93477655	0.976297784	0.635944082
IT0068	Università degli Studi di ROMA "La Sapienza"	1	1	1	1	1	1	1	1
IT0069	Università degli Studi di ROMA "Foro Italico"	0.740775991	1.34994	1	1	0.394886155	0.483761791	0.647013026	1.548707746
IT0070	Università degli Studi di ROMA "Tor Vergata"	0.696121288	1.43653	1	1	0.924133605	0.964656853	0.991028651	0.674388089
IT0077	Università degli Studi di SALERNO	0.430366695	2.32360	1	1	0.921804493	0.957455854	0.984269917	0.514154983
IT0078	Università degli Studi di SASSARI	0.562930725	1.77642	1	1	0.794049852	0.857925401	0.931052585	0.766940097
IT0079	Università degli Studi di SIENA	0.684394285	1.46115	1	1	0.855215727	0.899355753	0.955663353	0.890300572
IT0080	Università per Stranieri di SIENA	0.884718526	1.13030	1	1	0.403643458	0.520086437	0.622733661	1.645075537
IT0081	Università degli Studi di TERAMO	0.69873674	1.43115	1	1	0.629662964	0.701515388	0.823494347	1.579525832
IT0082	Politecnico di TORINO	0.872486778	1.14615	1	1	0.820726455	0.888417371	0.969266825	0.645791494
IT0083	Università degli Studi di TORINO	0.850390347	1.17593	1	1	0.998757821	1	1	0.658196477
IT0085	Università degli Studi di TRENTO	0.615885787	1.62368	1	1	0.849391118	0.893274107	0.952275239	0.745668494
IT0087	Università degli Studi di TRIESTE	0.633538407	1.57844	1	1	0.825314781	0.892990916	0.953758271	0.75779306
IT0088	Università degli Studi di UDINE	0.557636186	1.79328	1	1	0.919733616	0.951070432	0.980154256	0.737058117
IT0089	Università degli Studi di URBINO "Carlo BO"	0.479575653	2.08518	1	1	0.795158754	0.868619325	0.927908424	0.777755433
IT0090	Università degli Studi INSUBRIA Varese-Como	0.563561768	1.77443	1	1	0.812915884	0.892602135	0.952313941	0.88689486
IT0091	Università "Cà Foscari" VENEZIA	0.559191372	1.78830	1	1	0.835653579	0.898202802	0.942405781	0.720055179
IT0092	Università IUAV di VENEZIA	0.869411996	1.15020	1	1	0.563609889	0.655611435	0.771654494	1.486774671
IT0093	li Studi del PIEMONTE ORIENTALE "Amedeo Avog	0.55161098	1.81287	0.963961684	1.03739	0.755834311	0.840893474	0.926270696	0.829102382
IT0094	Università degli Studi di VERONA	0.568686972	1.75844	1	1	0.927733362	0.958178738	0.983236336	0.670179185
IT0095	Università degli Studi della TUSCIA	0.503321464	1.98680	0.779262019	1.28327	0.85641064	0.968993186	1.072996118	0.868743395
LT0001	Vilniaus universitetas	0.646602191	1.54655	1	1	0.738970363	0.808217818	0.883995509	0.815628877
LT0002	Vilniaus Gedimino technikos universitetas	0.641380467	1.55914	1	1	0.643483038	0.800637308	0.892891515	0.965965831
LT0003	Lietuvos edukologijos universitetas	0.736375831	1.35800	1	1	0.484632969	0.624451802	0.730478775	1.309320311
LT0004	Vilniaus dailes akademija	0.544801898	1.83553	1	1	0.418109447	0.510596539	0.610083242	1.787839707
LT0005	Lietuvos muzikos ir teatro akademija	0.660913565	1.51306	1	1	0.321395924	0.428166535	0.540263047	2.566048949
LT0006	Mykolo Romerio universitetas	0.837866989	1.19351	1	1	0.632295657	0.74107675	0.838328016	0.640801996
LT0007	Generolo Jono Žemaicio Lietuvos karo akademija	0.765608092	1.30615	1	1	0.379840926	0.483087753	0.628086637	2.645464881
LT0008	Kauno technologijos universitetas	0.684270877	1.46141	1	1	0.65893554	0.711937001	0.838071708	0.985821583
LT0009	Vytauto Didžiojo universitetas	0.582170108	1.71771	1	1	0.637532138	0.754970268	0.8413788	0.985135015
LT0012	Aleksandro Stulginskio universitetas	0.568808926	1.75806	1	1	0.416677792	0.503756048	0.588323807	1.127184031
LT0013	Lietuvos sporto universitetas	0.812741012	1.23040	1	1	0.311610419	0.399847326	0.521240698	2.141294525
LT0015	Šiauliu universitetas	1	1	1	1	0.399597384	0.543065532	0.684910602	1.86728954
LT0047	Lietuvos sveikatos mokslu universitetas	0.663051092	1.50818	1	1	0.499961509	0.604562518	0.66035591	1.208507157
MT0001	University of Malta (L'Universita` ta` Malta)	0.672348693	1.48732	1	1	0.753330361	0.83118132	0.903352647	0.975490783
PT0001	Universidade dos Açores	0.48508006	2.06152	1	1	0.520166172	0.59810848	0.693336849	1.434419029
PT0002	Universidade do Algarve	0.46991201	2.12806	0.899243712	1.11205	0.782406918	0.880512361	0.981993282	0.829738837
PT0003	Universidade de Aveiro	0.765851248	1.30574	1	1	0.728618347	0.826537403	0.877745981	1.024747545
PT0004	Universidade da Beira Interior	0.747192414	1.33834	1	1	0.594722097	0.667935166	0.795226635	1.258541154
PT0005	Universidade de Coimbra	0.656944022	1.52220	1	1	0.816213903	0.87355813	0.939904331	0.806953863
PT0006	Universidade de Évora	0.616868273	1.62109	0.97143799	1.02940	0.721834257	0.82247015	0.927730466	1.090538359
PT0008	Universidade Nova de Lisboa	0.726233413	1.37697	1	1	0.809165223	0.86507477	0.92110369	0.949738075
PT0010	Universidade da Madeira	0.691074704	1.44702	1	1	0.408134098	0.483084923	0.585426024	1.753805934
PT0011	Universidade do Minho	0.704481535	1.41948	1	1	0.824818956	0.877010745	0.936278495	0.962835517
PT0012	Universidade do Porto	1	1	1	1	0.865715216	0.950567846	0.994760836	1.130384853
PT0013	Universidade de Trás-os-Montes e Alto Douro	0.673167604	1.48551	1	1	0.611901301	0.674006096	0.761413331	1.251171415
PT0014	ISCTE - Instituto Universitário de Lisboa	0.688575698	1.45227	1	1	0.54644023	0.69864397	0.787668493	1.190502345
PT0015	Universidade Aberta	0.611267616	1.63594	1	1	0.441373027	0.510407627	0.638266044	0.70351873
PT0140	Universidade de Lisboa	0.930620784	1.07455	1	1	0.968328669	0.998354411	1	0.826629356
SE0001	Uppsala universitet	0.776049393	1.28858	0.988389984	1.01175	0.992185937	1.010307375	1.011628928	0.399929548
SE0002	Lunds universitet	0.849453557	1.17723	1	1	0.983505189	0.996583541	1	0.49052329
SE0003	Göteborgs universitet	0.771900393	1.29550	1	1	0.984849414	0.997788488	1	0.484379382
SE0004	Stockholms universitet	0.69763464	1.43342	1	1	0.978889225	0.993867509	0.999098657	0.322710553
SE0005	Umeå universitet	0.607185792	1.64694	1	1	0.897785831	0.948616364	0.977686157	0.49609825
SE0006	Linköpings universitet	0.684384109	1.46117	1	1	0.840564279	0.89970208	0.977380837	0.739540223
SE0007	Karolinska institutet	0.847258375	1.18028	1	1	0.788814397	0.889349617	0.966299515	0.907959115
SE0008	Kungl. Tekniska högskolan	0.743849362	1.34436	1	1	0.744442196	0.855639616	0.942541145	0.709378675
SE0010	Luleå tekniska universitet	0.593431545	1.68511	1	1	0.714894615	0.763539509	0.857269691	0.540700673
SE0012	Sveriges lantbruksuniversitet	0.876274073	1.14120	1	1	0.553491238	0.770841345	0.886024822	1.17249279
SE0013	Karlstads universitet	0.520549138	1.92105	0.957562912	1.04432	0.857573596	0.914352743	0.963694677	0.699179999
SE0015	Örebro universitet	0.524600648	1.90621	1	1	0.8280677	0.878614634	0.920654085	0.67815821

ETER ID	Institution Name	DEA Far	DEA She	FDH Far	FDH She	order_m (m=25)	order_m (m=50)	order_m (m=100)	order_α (α=95%)
SE0016	Mittuniversitetet	0.459894399	2.17441	1	1	0.802511857	0.85376631	0.897391189	0.55018543
SE0017	Blekinge tekniska högskola	0.605183067	1.65239	1	1	0.619657532	0.720520194	0.824222142	1.226243904
SE0020	Malmö högskola	0.434161937	2.30329	0.859067735	1.16405	0.949883961	1.032920958	1.078899607	0.524997573
SE0021	Mälardalens högskola	0.475973081	2.10096	1	1	0.750834865	0.815473402	0.883266748	0.633013325
SE0022	Gymnastik- och idrottshögskolan	0.731715405	1.36665	1	1	0.414370587	0.553181292	0.684728732	1.702113757
SE0023	Högskolan i Borås	0.506696231	1.97357	1	1	0.781911765	0.870274512	0.931542306	0.918055655
SE0024	Högskolan Dalarna	0.384678473	2.59957	0.834381551	1.19849	0.860070377	0.977284972	1.066563855	0.482473247
SE0026	Högskolan i Gävle	0.395646366	2.52751	0.921296296	1.08543	0.828440301	0.921976231	0.993574384	0.546004631
SE0027	Högskolan i Halmstad	0.478775405	2.08866	0.871050227	1.14804	0.786913586	0.936077371	1.004506493	0.865107727
SE0029	Högskolan i Skövde	0.470412878	2.12579	1	1	0.785631993	0.870531463	0.933981978	0.612321711
SE0030	Högskolan Väst	0.448005671	2.23211	0.944767442	1.05846	0.798710121	0.894126374	0.977929968	0.6376941
SE0031	Södertörns högskola	0.473260972	2.11300	1	1	0.739585627	0.871532333	0.927394892	0.680268482
SE0050	Linnéuniversitetet	0.427519085	2.33908	0.661844485	1.51093	1.110290086	1.135978976	1.305002412	0.447755051
SK0001	Univerzita Komenského V Bratislave	0.72320346	1.38274	1	1	0.835540405	0.904125921	0.957081415	0.838297272
SK0002	Univerzita Pavla Jozefa Šafárika V Košiciach	0.825064116	1.21203	1	1	0.580237016	0.628267976	0.678163478	1.480042545
SK0003	Prešovska Univerzita V Prešove	0.693351438	1.44227	1	1	0.631324148	0.760843641	0.877206904	1.057852963
SK0004	Univerzita Sv. Cyrila A Metoda V Trnave	0.675850799	1.47962	0.970350404	1.03056	0.577102267	0.703984308	0.831394232	1.006784099
SK0005	Katolická Univerzita V Ružomberku	0.816673215	1.22448	1	1	0.516169615	0.625688177	0.748791135	1.438035464
SK0007	Univerzita J. Selyeho V Komárne	1	1	1	1	0.276751738	0.365681305	0.492932949	2.434081673
SK0012	Univerzita Veterinárskeho Lekárstva V Košiciach	0.615098075	1.62576	1	1	0.446193557	0.558723742	0.679063917	1.919470524
SK0013	Univerzita Konštantína Filozofa V Nitre	1	1	1	1	0.579418659	0.708650001	0.88445036	1.222518088
SK0014	Univerzita Mateja Bela V Banskej Bystrici	0.90422126	1.10592	1	1	0.505182126	0.70228406	0.827618193	1.242757176
SK0015	Trnavská Univerzita V Trnave	0.880291586	1.13599	1	1	0.475279118	0.62784062	0.728273522	1.463255544
SK0016	Slovenská Technická Univerzita V Bratislave	0.560340758	1.78463	1	1	0.79922528	0.864529281	0.926839588	0.797405622
SK0017	Technická Univerzita V Košiciach	0.767807637	1.30241	1	1	0.629503118	0.668015691	0.821657887	1.137453426
SK0019	Žilinská Univerzita V Žiline	0.632777542	1.58033	1	1	0.687760594	0.78885061	0.893307772	1.042644373
SK0020	ončianska Univerzita Alexandra Dubčeka V Trenčí	0.850086179	1.17635	1	1	0.42521309	0.51430465	0.649879876	1.829714992
SK0021	Ekonomická Univerzita V Bratislave	0.848801241	1.17813	1	1	0.644271197	0.804617656	0.91431369	1.223911068
SK0026	Slovenská Poľnohospodárska Univerzita V Nitre	0.711437978	1.40560	1	1	0.611184472	0.73208839	0.859506556	1.168439102
SK0027	Technická Univerzita Vo Zvolene	0.634082911	1.57708	1	1	0.532599701	0.603313579	0.702201444	1.48620316
UK0001	Anglia Ruskin University	0.948700748	1.05407	1	1	0.759935664	0.86878968	0.9566521	0.967621461
UK0002	Aston University	0.697180244	1.43435	1	1	0.752966533	0.81565887	0.884314338	1.003918994
UK0003	Bath Spa University	0.716442846	1.39578	1	1	0.711193275	0.787161018	0.880494105	1.300191151
UK0004	The University of Bath	0.760974567	1.31410	1	1	0.828324838	0.893132527	0.935518624	0.968290106
UK0005	University of Bedfordshire	0.765074038	1.30706	1	1	0.831966929	0.909087386	0.97269458	0.993776131
UK0006	Birkbeck College	0.632057881	1.58213	1	1	0.881548682	0.937292919	0.966551406	0.901052534
UK0007	Birmingham City University	0.783893776	1.27568	1	1	0.925934956	0.96415084	0.985632973	0.956884738
UK0008	The University of Birmingham	0.89898573	1.11236	1	1	0.993021529	1	1	0.955242857
UK0011	The University of Bolton	0.727139455	1.37525	1	1	0.648900441	0.769552975	0.877790415	1.335720343
UK0013	Bournemouth University	0.675339876	1.48074	1	1	0.846826053	0.910863501	0.963734881	0.914459071
UK0014	The University of Bradford	0.761024193	1.31402	1	1	0.710176745	0.788629581	0.898684711	1.095588154
UK0015	The University of Brighton	0.705922298	1.41659	1	1	0.938014855	0.973407539	0.98796655	0.864560115
UK0016	The University of Bristol	0.866453556	1.15413	1	1	0.935952972	0.990957306	1	1
UK0017	Brunel University London	0.741812641	1.34805	1	1	0.827369989	0.882865093	0.945995929	0.976788465
UK0018	Buckinghamshire New University	0.690976378	1.44723	1	1	0.705196329	0.793070359	0.883937136	1.251897755
UK0020	The University of Cambridge	1	1	1	1	1	1	1	1.035452186
UK0022	Canterbury Christ Church University	0.729950151	1.36996	1	1	0.81627871	0.900212189	0.945306144	0.980463106
UK0023	The University of Central Lancashire	0.869030561	1.15071	1	1	0.912230624	0.967664398	0.992660154	1.041111347
UK0024	Central School of Speech and Drama	0.890003475	1.12359	1	1	0.276787927	0.321817655	0.457647136	3.790421947
UK0025	University of Chester	0.690273814	1.44870	1	1	0.731741065	0.820580263	0.892755122	0.940860382
UK0026	The University of Chichester	0.723923509	1.38136	1	1	0.711176972	0.806225929	0.881601465	1.276546307
UK0027	The City University	0.820361208	1.21898	1	1	0.870188799	0.929380009	0.972872115	1.116518812
UK0029	Courtauld Institute of Art	1	1	1	1	0.229682921	0.319544086	0.468335896	6.388637961
UK0030	Coventry University	0.887350108	1.12695	1	1	0.896850198	0.963250769	0.993753187	1
UK0032	University for the Creative Arts	0.74303642	1.34583	1	1	0.628900095	0.693259026	0.823885966	1.316649974
UK0033	University of Cumbria	0.848976026	1.17789	1	1	0.582932222	0.648145103	0.77528144	1.402558405
UK0035	De Montfort University	0.773523309	1.29279	1	1	0.912140477	0.946256877	0.979749671	0.98713291
UK0036	University of Derby	0.703603628	1.42125	1	1	0.87093607	0.931747757	0.961832413	0.960195562
UK0037	University of Durham	0.847293984	1.18023	1	1	0.874854636	0.941019816	0.984451101	1.017308156
UK0038	The University of East Anglia	0.848462253	1.17860	1	1	0.865036081	0.938859873	0.988571133	1.01196919
UK0039	The University of East London	0.804901875	1.24239	1	1	0.82631892	0.927661484	0.969989023	1
UK0040	Edge Hill University	0.798295633	1.25267	1	1	0.780889732	0.860079462	0.941375502	1.040089492
UK0041	The University of Essex	0.817491512	1.22325	1	1	0.78045986	0.842256592	0.913900076	1.073966018
UK0042	The University of Exeter	0.889780673	1.12387	1	1	0.886311459	0.953022832	0.993361853	1.063764453
UK0043	Falmouth University	0.839032823	1.19185	1	1	0.50362648	0.572955826	0.704696867	1.533476853
UK0044	University of Gloucestershire	0.74442961	1.34331	1	1	0.732094476	0.817163404	0.891660177	1.279025769
UK0045	Goldsmiths College	0.824539148	1.21280	1	1	0.715463367	0.759883251	0.840094816	1.285963144
UK0046	The University of Greenwich	0.828817579	1.20654	1	1	0.907328889	0.946425488	0.980106931	1.014323694
UK0048	Harper Adams University	0.754435823	1.32549	1	1	0.449215178	0.528345195	0.622144838	2.070280203
UK0049	University of Hertfordshire	0.775684649	1.28918	1	1	0.899643019	0.954458472	0.987764644	0.884870354
UK0050	Heythrop College	0.71273293	1.40305	1	1	0.341239761	0.428128967	0.53738767	3.475599414
UK0051	The University of Huddersfield	0.718787582	1.39123	1	1	0.817003886	0.873454766	0.945441133	0.883245749
UK0052	The University of Hull	0.745399141	1.34156	1	1	0.839352127	0.910016627	0.943760807	0.91531692
UK0053	perial College of Science, Technology and Medici	1	1	1	1	0.979470634	0.996267388	1	1.166239862
UK0054	Institute of Education	0.888507417	1.12548	1	1	0.595973906	0.660909204	0.768422223	1.639752512
UK0055	The University of Keele	0.74857559	1.33587	1	1	0.758614384	0.83234456	0.903219912	1.105061608
UK0056	The University of Kent	0.72413999	1.38095	1	1	0.909582095	0.948098314	0.985750846	0.897468198
UK0057	King's College London	0.918732918	1.08846	1	1	0.99859175	1	1	1
UK0058	Kingston University	0.954505884	1.04766	1	1	0.849697242	0.944781326	0.985156911	1.022935989
UK0059	The University of Lancaster	0.810572186	1.23370	1	1	0.885411966	0.94818559	0.970477762	1.05864342
UK0061	Leeds Beckett University	0.818448551	1.22182	1	1	0.943832155	0.97790492	0.995068668	0.912175127
UK0062	The University of Leeds	0.953349373	1.04893	1	1	1	1	1	1
UK0063	Leeds Trinity University	0.702448174	1.42359	1	1	0.429431832	0.54095811	0.667896379	1.716113545
UK0064	The University of Leicester	0.841576595	1.18825	1	1	0.890591203	0.955457253	0.992549868	1.119330548
UK0065	The University of Lincoln	0.701136657	1.42626	1	1	0.847461908	0.902378249	0.954027352	1
UK0066	Liverpool Hope University	0.730019516	1.36983	1	1	0.564846863	0.658640778	0.741718301	1.324522748
UK0067	Liverpool John Moores University	0.83954091	1.19113	1	1	0.931159408	0.968783575	0.992222033	1
UK0069	The University of Liverpool	0.884812783	1.13018	1	1	0.970987651	0.993171995	0.999431	0.966743084
UK0070	University of the Arts, London	0.806573384	1.23981	1	1	0.921278277	0.973062271	0.99448423	0.940366319
UK0073	London Metropolitan University	0.774026086	1.29195	1	1	0.828243961	0.884998229	0.95077048	1.046304061
UK0074	London South Bank University	0.703383091	1.42170	1	1	0.866567568	0.901368019	0.943253103	0.967434083
UK0075	London School of Economics and Political Science	1	1	1	1	0.798469082	0.906287934	0.970575551	1.48417998
UK0077	Loughborough University	0.756951951	1.32109	1	1	0.905845948	0.954329908	0.986836258	0.9244013
UK0078	The Manchester Metropolitan University	0.957928032	1.04392	1	1	0.998497163	1	1	0.935311677
UK0079	The University of Manchester	1	1	1	1	1	1	1	1
UK0080	Middlesex University	0.977394423	1.02313	1	1	0.877985866	0.948294496	0.983863641	1.131018927
UK0081	University of Newcastle-upon-Tyne	0.913753565	1.09439	1	1	0.964691797	0.991889814	0.998648302	1
UK0083	The University of Northampton	0.808564863	1.23676	1	1	0.759002063	0.83698634	0.876612097	1.19638846
UK0084	University of Northumbria at Newcastle	0.943100559	1.06033	1	1	0.875155247	0.940528409	0.996477541	1.018979104

ETER ID	Institution Name	DEA Far	DEA She	FDH Far	FDH She	order_m (m=25)	order_m (m=50)	order_m (m=100)	order_α (α=95%)
UK0086	University of Nottingham	0.930550931	1.07463	1	1	1	1	1	0.999904222
UK0087	The Nottingham Trent University	0.937464491	1.06671	1	1	0.908844634	0.968847583	0.997423168	0.968938037
UK0089	Oxford Brookes University	0.738288666	1.35448	1	1	0.868527017	0.923671474	0.95612641	0.921511369
UK0090	The University of Oxford	0.995298057	1.00472	1	1	1	1	1	0.986802643
UK0092	University of Plymouth	0.863432531	1.15817	1	1	0.888197233	0.957911665	0.984451411	0.97873547
UK0093	The University of Portsmouth	0.788666106	1.26796	1	1	0.950658231	0.984968417	0.99728066	0.930963418
UK0094	Queen Mary University of London	0.857102509	1.16672	1	1	0.877188808	0.957028052	0.998621076	1.041870102
UK0096	The University of Reading	0.790882286	1.26441	1	1	0.927610204	0.967158683	0.990181812	1.037447346
UK0097	Roehampton University	0.714665013	1.39926	1	1	0.696363092	0.772524219	0.819527052	1.169976397
UK0099	Royal Academy of Music	0.780379035	1.28143	1	1	0.303757263	0.47587145	0.558363856	3.218079498
UK0100	Royal Agricultural University	0.924931426	1.08116	1	1	0.284796614	0.355512697	0.453392017	3.539075895
UK0102	Royal College of Music	0.77473545	1.29076	1	1	0.314476949	0.372454926	0.480092112	3.231575507
UK0103	Royal Holloway and Bedford New College	0.781490618	1.27961	1	1	0.742010239	0.798510035	0.867817499	1.161780526
UK0104	Royal Northern College of Music	0.73314234	1.36399	1	1	0.392835364	0.448853905	0.641907884	2.974991724
UK0106	St George's Hospital Medical School	0.714119519	1.40033	1	1	0.444328078	0.52814023	0.665922306	1.409678139
UK0108	The University of Salford	0.747342985	1.33807	1	1	0.934768806	0.971332569	0.989985307	0.942512776
UK0109	The School of Oriental and African Studies	0.788883511	1.26761	1	1	0.643048949	0.733300714	0.819501607	1.454561252
UK0111	Sheffield Hallam University	1	1	1	1	0.981935325	1	1	1
UK0112	The University of Sheffield	0.927416666	1.07826	1	1	0.984176588	0.998342207	1	1
UK0113	Southampton Solent University	0.697309187	1.43408	1	1	0.811548806	0.889824136	0.949717528	1.011840761
UK0114	The University of Southampton	0.86236743	1.15960	1	1	0.987989996	0.997413432	1	0.962640743
UK0115	Staffordshire University	0.641003271	1.56005	1	1	0.891937636	0.935672336	0.973033641	0.896380941
UK0117	The University of Sunderland	0.84824543	1.17890	1	1	0.808148776	0.872942503	0.953717296	1.209458708
UK0118	The University of Surrey	0.782935696	1.27724	1	1	0.852316186	0.916075246	0.966837505	1.028528422
UK0119	The University of Sussex	0.830812189	1.20364	1	1	0.836122377	0.906666267	0.968157248	1.014202268
UK0120	Teesside University	0.757889492	1.31945	1	1	0.781875988	0.87216485	0.921584499	1.102836338
UK0121	The University of West London	0.704175251	1.42010	0.999034749	1.00097	0.74792581	0.828878979	0.926537104	1.106346245
UK0123	University College London	1	1	1	1	1	1	1	1
UK0124	The University of Warwick	1	1	1	1	0.959994123	0.993143101	1	1.025315988
UK0125	University of the West of England, Bristol	0.850046913	1.17641	1	1	0.894856064	0.972019222	0.994	0.923452656
UK0126	The University of Westminster	0.774151334	1.29174	1	1	0.90618058	0.954698178	0.983206648	1
UK0127	The University of Winchester	0.71068595	1.40709	1	1	0.681599431	0.772697812	0.840690189	1.282959783
UK0128	The University of Wolverhampton	0.761343858	1.31347	1	1	0.82931394	0.893942393	0.960086458	0.864098858
UK0129	University of Worcester	0.7692692	1.29994	1	1	0.699513404	0.764633188	0.836784536	1.242672204
UK0131	York St John University	0.735357666	1.35988	1	1	0.565494333	0.651806677	0.747803639	1.212758096
UK0132	The University of York	0.868340124	1.15162	1	1	0.869479822	0.943752383	0.989203581	1.035810064
UK0133	Aberystwyth University	0.750164155	1.33304	1	1	0.774376819	0.881882272	0.942697964	1.130142305
UK0134	Bangor University	0.815308442	1.22653	1	1	0.718316156	0.792280456	0.888158747	1.246694587
UK0135	Cardiff University	0.852697427	1.17275	1	1	0.980932601	0.994481574	1	0.933373317
UK0136	Cardiff Metropolitan University	0.711818577	1.40485	1	1	0.744926757	0.840674627	0.922410345	1.045579647
UK0138	Glyndwr University	0.695387182	1.43805	1	1	0.650158459	0.795317053	0.859045083	1.353345203
UK0142	Swansea University	0.755149102	1.32424	1	1	0.859197793	0.908829741	0.952168723	0.999236371
UK0144	The University of Aberdeen	0.730510835	1.36891	1	1	0.921084858	0.956143545	0.981941342	0.960298293
UK0145	University of Abertay Dundee	0.627372949	1.59395	1	1	0.572139777	0.692268999	0.791360187	1.307297899
UK0146	The University of Dundee	0.697483933	1.43372	1	1	0.946015386	0.985944432	0.995345618	0.867905955
UK0148	The University of Edinburgh	0.934696024	1.06987	1	1	1	1	1	0.960793629
UK0149	Glasgow Caledonian University	0.627554032	1.59349	1	1	0.87137952	0.937224989	0.977859213	0.871608645
UK0151	The University of Glasgow	0.946724124	1.05627	1	1	0.985741695	0.997766661	1	1.082060596
UK0152	Heriot-Watt University	0.780864847	1.28063	1	1	0.67175208	0.75816974	0.856812825	1.036360374
UK0153	Edinburgh Napier University	0.697124656	1.43446	1	1	0.85831367	0.918916222	0.964932345	1
UK0154	Queen Margaret University, Edinburgh	0.558148337	1.79164	1	1	0.661907089	0.768001109	0.876363031	1.202146484
UK0155	The Robert Gordon University	0.649763131	1.53902	1	1	0.866934833	0.922969759	0.955003683	0.982363508
UK0157	The University of St Andrews	0.739341702	1.35255	1	1	0.758389289	0.814951594	0.876225928	1.006699947
UK0159	The University of Stirling	0.681427305	1.46751	1	1	0.852162076	0.901353245	0.949536216	0.995262828
UK0160	The University of Strathclyde	0.794929461	1.25797	1	1	0.884730413	0.938467989	0.974867826	0.94053559
UK0161	University of the Highlands and Islands	1	1	1	1	0.153112891	0.255963751	0.32395686	1.429377258
UK0162	The University of the West of Scotland	0.8455244	1.18270	1	1	0.772749446	0.876824407	0.933153861	1.17534667
UK0163	The Queen's University of Belfast	0.818098257	1.22235	1	1	0.908915679	0.973277116	0.993984541	1
UK0166	University of Ulster	0.720924596	1.38711	0.952582557	1.04978	1.001055299	1.027830607	1.042954501	0.795842978
UK0170	University of Wales Trinity Saint David	0.7688039	1.30072	1	1	0.773726485	0.831594752	0.901549944	1.211285673
UK0172	University of South Wales	0.808243367	1.23725	1	1	0.953511616	0.983886632	0.99531374	1.016457625

Appendix B

DMUs with Bias Corrected scores outside the Confidence Interval:

ETER ID	Institution Name	DEA	bias corrected (bc)	bias eff	stand dev	LB	UB	bc- LB	UB-bc	UB-LB
IT0068	Università degli Studi di ROMA "La Sapienza"	1	0.465833155	0.534167	0.38603244	0.631412674	0.975459	-0.16558	0.509626	0.344047
HU0001	Budapesti Corvinus Egyetem (BCE)	1	0.475138532	0.524861	0.382270401	0.635548245	0.975498	-0.16041	0.50036	0.33995
DE0142	Hochschule für Fernsehen und Film München	1	0.474760375	0.52524	0.38387811	0.634860368	0.979226	-0.1601	0.504466	0.344366
UK0020	The University of Cambridge	1	0.475830236	0.52417	0.382201441	0.632824429	0.985214	-0.15699	0.509384	0.352389
UK0161	University of the Highlands and Islands	1	0.478083305	0.521917	0.384584495	0.632430242	0.981869	-0.15435	0.503786	0.349439
DE0030	Charité - Universitätsmedizin Berlin	1	0.476422914	0.523577	0.392626956	0.630357654	0.975654	-0.15393	0.499231	0.345297
HU0073	Nemzeti Közszolgálati Egyetem (NKE)	1	0.489358928	0.510641	0.365059782	0.63865988	0.9802	-0.1493	0.490841	0.34154
DE0024	Hochschule für Politik München	1	0.497338894	0.502661	0.380502015	0.63578414	0.982726	-0.13845	0.485387	0.346942
UK0079	The University of Manchester	1	0.549853586	0.450146	0.283498471	0.664166449	0.97927	-0.11431	0.429416	0.315103
HR0007	Sveučilište u Zagrebu	1	0.566411493	0.433589	0.25911005	0.674212995	0.979401	-0.1078	0.41299	0.305188
DE0062	Medizinische Hochschule Hannover	1	0.556882262	0.443118	0.297639627	0.6517199	0.98355	-0.09484	0.426668	0.331831
UK0029	Courtauld Institute of Art	1	0.595506228	0.404494	0.234011381	0.689157684	0.980286	-0.09365	0.38478	0.291129
DE0021	Ludwig-Maximilians-Universität München	1	0.624769787	0.37523	0.261984641	0.663857478	0.978223	-0.03909	0.353453	0.314366
UK0111	Sheffield Hallam University	1	0.702934209	0.297066	0.151027988	0.729674889	0.982505	-0.02674	0.27957	0.25283
UK0075	London School of Economics and Political Science	1	0.76668822	0.233312	0.09286908	0.791346673	0.983581	-0.02466	0.216892	0.192234
SK0007	Univerzita J. Selyeho V Komárne	1	0.733784842	0.266215	0.119288457	0.756412197	0.97996	-0.02263	0.246175	0.223547
HU0006	Liszt Ferenc Zeneművészeti Egyetem (LFZE)	1	0.802984299	0.197016	0.066469329	0.814849767	0.97075	-0.01187	0.167766	0.1559
IE0002	University College Cork	1	0.782393466	0.217607	0.093991209	0.787656132	0.979361	-0.00526	0.196968	0.191705
LT0015	Šiauliu universitetas	1	0.764541878	0.235458	0.106138665	0.766375651	0.977169	-0.00183	0.212627	0.210793

Remaining 7 efficient DMUs:

ETER ID	Institution Name	DEA	corrected	bias eff	stand dev	LB	UB	bc- LB	UB-bc	UB-LB
PT0012	Universidade do Porto	1	0.817282	0.182718	0.067897	0.81073	0.981063	0.006552	0.163782	0.170334
UK0123	University College London	1	0.733415	0.266585	0.168262	0.720772	0.983408	0.012643	0.249993	0.262637
UK0124	The University of Warwick	1	0.823486	0.176514	0.069268	0.808738	0.97814	0.014748	0.154654	0.169402
DE0135	Staatliche Hochschule für Gestaltung Karlsruhe	1	0.77679	0.22321	0.111034	0.760388	0.978057	0.016401	0.201267	0.217668
IE0001	University College Dublin	1	0.85209	0.14791	0.057556	0.833096	0.982433	0.018994	0.130343	0.149337
UK0053	Imperial College of Science, Technology and Medicine	1	0.821831	0.178169	0.089779	0.785048	0.980903	0.036783	0.159072	0.195855
SK0013	Univerzita Konštantína Filozofa V Nitre	1	0.828947	0.171053	0.110974	0.769303	0.982385	0.059644	0.153439	0.213083