

Models for ranking European institutions of higher learning with an application to data from Greece

By

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Abstract

Monitoring the success of colleges and universities can be useful to many interested parties and for many purposes. For example, it can assist administrations to identify the strengths and weaknesses of their institutions and take corrective actions. It can enlighten the decisions of funding authorities, as transparency and accountability in public life are becoming subjects of wide social concern. And of course it can provide prospective university students and their parents with the data they need to make informed educational decisions. In this paper we propose a flexible analytical framework for ranking institutions of higher learning and apply it to data from 19 Departments of Economics, Business Administration, and European International and Economic Studies that operated in Greece in 1998. Our results suggest that the proposed model is robust with respect to several criteria. In particular, the rankings in each category remain unchanged for a wide range of the weights employed to sum the contributions of research, teaching and other activities of the faculties. The top departments retain their relative positions in their categories irrespective of whether the rating criterion is research or teaching, thus ascertaining the finding that good teaching goes hand in hand with good research. And last, but not least, it is found that market ratings of the various departments, as represented by the evaluations of graduates their employers, and other interested parties, are consistent with the rankings based on academic criteria.

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1. Introduction¹

Monitoring the success of colleges and universities can be useful to many interested parties and for many purposes. For example, it can assist administrations to identify the strengths and weaknesses of their institutions and take corrective actions. It can enlighten the decisions of funding authorities, as transparency and accountability in public life are becoming subjects of wide social concern. And of course it can provide prospective university students and their parents with the data they need to make informed educational decisions. However, despite their well-documented advantages, monitoring and even more so ranking of institutions of higher learning are very controversial, at least in the non Anglo-Saxon countries.

The objections are quite diverse. Among them one that is very frequently raised is that the efficiency requirements that these procedures would impose on colleges and universities are alien to the nature of research and teaching. Another springs from the conjecture that the services supplied by colleges and universities are too qualitative to afford measurement; and a third one claims that the technology to evaluate so complex organizations, such as colleges and universities are, leaves much to be desired in terms of generality and objectivity. Admittedly, most of them carry considerable merits that would be unforgivable to ignore. But having recognized their importance, the challenge still remains to construct a framework for monitoring and ranking that could attract wide support among colleges and universities particularly in state-run system of higher education.

To make progress in this direction, our study of the relevant literature suggested that the framework sought should be characterized by at least four properties. First, drawing on the view that colleges and universities produce services that are useful to society, it should be socially oriented. Second, it should be flexible in the sense that it may be adapted for monitoring and ranking colleges and universities with different objectives, different technologies of operations, different managerial structures, and different institutional settings. Third, it should be highly operational so as to afford easy implementation and, lastly, it should be quite general to permit the derivation of standard models as particular cases. Our efforts in this paper are directed at formulating an analytical framework that satisfies all these properties.

¹ This paper draws heavily on two research projects conducted under the supervision of the author with grants from the Center for Research in Education of the Greek Ministry of Education. The first project, by Bitros et al. (2000), focused on the rating of the departments of economics and business administration in Greek Universities and the second, by Christoforou et al. (2000), focused on the effectiveness of education in the same departments as assessed by business firms. Both reports are written in Greek and are available on request from the author. To the funding agency, to the colleagues who provided us with information regarding their academic activities and to the graduates and numerous business concerns that responded to our questionnaires, we extend our sincere appreciation.

In particular, to render the proposed framework socially relevant, we address the performance of colleges and universities in state-run systems from an internal and an external standpoint. This leads us to set up two algorithms, one for monitoring faculty and management outputs and another for monitoring educational success as perceived by graduates and their employers. Next, regarding the property of flexibility, we cast the said algorithms in terms of modules that can be combined at will. For instance, if a college has as its sole objective to excel in education, appropriate forms of the algorithms can be obtained by dropping the modules that are specific to research. As a matter of fact, owing to the modularization of these algorithms, the generality of the proposed framework is significantly enhanced, because the American, the British and the European models for monitoring and ranking of institutions of higher learning can be derived as special cases. Finally, the applicability of the algorithms is secured by using quantitative and qualitative variables that can be measured up to satisfactory approximations.

The paper is organized as follows. In Section II we review briefly the main approaches, mechanism and criteria, which have been employed for ranking colleges and universities. Without loss in generality, but also because of our prior knowledge and experience in the respective fields of social sciences, we limit our attention to rankings of Departments of Economics, Business Administration, and European International and Economic Studies. Drawing on the results from this survey, we then proceed in Section III to explain the structure of the model by focusing on its building blocks and the weights adopted to arrive at an overall index of performance for each department in our sample. Next, in Section IV, we describe the sample of our data, the measurement of variables that enter into the various modules of the model, as well as the results of our calculations and the interpretations to which they lead. And, finally, in Section V we summarize our conclusions and offer certain suggestions for further research.

2. The process of ranking institutions of higher learning

When colleges and universities function in an open society with a competitive economy, the quality of education they offer is evaluated in the markets through the mechanisms of reputation and value added. Thus educational standards, programs and procedures are continuously adjusted to respond to the emerging needs of society and economy. But under state monopoly in higher education the pressure for adaptation lags behind and frequently we hear complaints that the system leads to mismatches in the demand and supply of educational skills.

Significant differences are observed also with respect to the relative importance assigned to research activities and ancillary contributions by professors. In some countries re-

search is given high priority and professors are rated according to how well they perform in this activity, whereas in others professors are expected to provide also administrative services and services of particular interest to the wider community. As a result, the fundamental differences in the orientation of societies and the organization and functioning of their economies have led to different approaches when ranking institutions of higher learning and to different mechanisms and criteria for making such evaluations.

2.1. Approaches to rankings in western countries

Universities, colleges and departments started to be rated in the United States from the 1950s. In Europe the pressure for systematic assessment of institutions of higher learning began many years later, mostly because governments had to explain to tax payers how the funds allocated for their operation were used. For example, in a document entitled “Memorandum for the Academic Education in the European Union”, which was submitted to the Ministers of Education of member states, the European Commission recognized the need for such assessments in 1991.²

Turning first to education, in the United States and less so in Canada state and private universities and colleges compete in open markets for students. So, regarding the quality of the educational services they offer, the respective markets drive the processes of evaluation and ranking and there is no need for state initiated arrangements to monitor progress. The way markets perform these functions is multifaceted in the sense that markets establish endogenously a wide range of institutions which enforce well specified mechanisms and criteria that must be obeyed in order for universities to gain certification in certain associations of universities, schools, or departments. For example, in the United States in order for a university to enter into the so-called Ivey League, it must sustain for a number of years, if not decades, a certain standard of educational attainment comparable to the likes of Harvard, Yale, Chicago and Princeton. Or, for another example, in order for a Business School to be certified in an association of equal standing schools it must satisfy a lengthy assortment of requirements, ranging from the credentials of its teaching staff and the quality of its educational facilities up to and including the amenities that enhance students’ lives. Hence the assurance of educational quality in these countries is undertaken by

² According to this document “...national governments must focus on the need to account on behalf of the universities with the prospect to make optimum use of allocated financial resources.” Also it is recommended that the rating must proceed further than value-for-money auditing in order to provide “...information that will lead to reliable assessments about the quality of universities, which will help students choose universities and departments in a more open and accessible European academic market”.

market-based institutions, whose effectiveness is continuously monitored through the choices made by students when selecting universities and colleges for their study.

On the other hand success in research is assessed predominantly by internal procedures. This implies that institutions that give some priority to research activities have more or less explicit frameworks for evaluating and rewarding accomplishments. The number of publications, their quality in terms of the impact they exert in the same or neighboring fields of knowledge, the influence exercised through participation in the editorial boards of scientific journals, etc., are all taken as indicators of academic performance and determine the status of professors in the respective research communities. But this approach should not be interpreted too narrowly so as to imply that the market does not play any role in the ratings; because from the significant mobility of academic staff among institutions of higher learning we can surmise that the market in these countries is always there and ready to reward superior scientific achievements.

Last but not least, a fundamental characteristic of this approach is that it discourages the academic staff from undertaking administrative and/or other public assignments, which distract their attention from teaching and research. In this regard it is convincing to mention that Harvard did not renew the appointment of Professor H. Kissinger, after his second term as Foreign Minister of the United States, and Stanford discontinued the appointment of Professor J. Stiglitz, after his service as Chairman of the Council of Economic Advisors. In short, we may conclude that the so-called American model for ranking institutions of higher learning combines market-driven evaluations for teaching quality with internal procedures for assessing research and active discouragement of academics from assignments unrelated to their main duties.

Compared to the above the rankings in this side of the Atlantic have followed two different paths. In the United Kingdom, the Netherlands and to some extent in Spain rankings rely exclusively on research³ and are undertaken by outside commissions comprising peer scientists with high reputation. According to Karayiannis (2002) the process of assessment in these countries works as follows. The departments concerned submit to an appropriate commission the records of publications accomplished by their faculty since the last rating took place. Then the commission evaluates the records by taking into account the journals in which the papers were published as well as their likely impact in the advancement of science. And, finally, drawing on its findings, the com-

³ In the Research Assessment Exercise of the Higher Education Funding Council (1995) in the UK, in addition to publications, account was taken also of such other factors as the funding of research programs from outside sources and the number of supported doctoral students. This fact should be stressed because doctoral students usually become the researchers of the future.

mission concludes its assessment by issuing an opinion, which in the case of the United Kingdom ranges between “research work of international level” and “needs improvement”. For convenience below we shall refer to this approach as the British model.

Clearly, given that in recent years the rankings in the United States have focused increasingly on research, the adaptation of the American into the British model holds significant merits. After all this may be the only way to accelerate European productivity in research, which in turn is tantamount to closing the technology and science gap between European Union and the United States. But we must not forget that higher education in the European Union is dominated by state run universities. So competition cannot be relied upon to apply the required pressure to safeguard quality in teaching. For this reason and until the liberalization of markets in higher education takes effect, the approach to rankings in this side of the Atlantic can be expected to develop along the second path.

This may be called the European Union model and all indications are that it evolves slowly around three main pillars. The first of them relates to the administration of the assessment process. In this regard the trend has been to assign the responsibility of evaluations to a state authority, which may be independent or semi-independent from government.⁴ The second pillar concerns the range of services to be evaluated. Presently the academic staff participates in administrative and consultative tasks within the university that transcend teaching and research. Also in many countries of the European Union the participation of academics in civic affairs is considered meritorious. Yet by their very nature these activities undermine the efforts of faculty to concentrate on the objective of excellence in teaching and research. So the scheme of assessment needs to provide incentives for the resolution of the conflicts that arise. Lastly, the third pillar refers to the social and economic relevance of educational programs. Since markets in higher education are suppressed, state university systems in the European Union may overproduce certain types of human capital and underproduce others, thus contributing to serious mismatches in the supply and demand for skills. For these reasons the European Union model for ranking institutions of higher learning supplements the process of assessment to include the quality of the educational programs.

⁴ For example in England there exists the Higher Education Quality Council (HEOC), in France the rating of the universities is assigned to the “National Rating Committee” and in Holland, according to Sapouna (1993) and Tsaousis (1993), the rating is conducted from university unions. In Greece, the law 2083/92 for the modernization of higher education introduced the notion of the rating of universities by establishing a “Committee for the Evaluation of the work of Universities”. In article 24, paragraph 1, it stated that: “The universities of the country will be rated with respect to their departments and as entities according to the educational, research and administrative work partly and as a whole”. But unfortunately this clause was abolished later with the law 2327/95.

To summarize, even though the American model for ranking institutions of higher learning has the advantage of emphasis on research, where the European Union lags behind and must catch up as quickly as possible, it is not applicable in this side of the Atlantic because here university markets are seriously suppressed. The same is true also with respect to the British model, which is an adaptation of the American one, and its validity rests on the supposition that good teaching goes hand in hand with good research. Consequently, the search is on for a European Union model, which will capture the main differences in the structure of European university systems, and our aspiration in the present paper is to contribute in this direction.

2.2. Mechanisms for the aggregation of assessments

Institutions of higher learning are like multi-product enterprises. They produce large arrays of educational services. Through research they generate new knowledge in a wide range of scientific fields. By participating in joint endeavors with organizations of the public and private sectors they help solve problems of everyday life, etc. So in principle rankings involve adding the rates obtained by their various departments when compared to similar departments from other universities. This task is difficult, if at all possible, because it entails judgments as to the proper weights for aggregation, which are far removed from whatever information one might be able to obtain through objective processes. But occasionally people feel confident to assert that one university is better than another because it has more departments in the excellent column, or because it is better in the hard sciences, and so on.

To reduce the degree of the difficulty involved, rankings are more frequently attempted at the department level. This is understandable because at that level the homogeneity of services produced increases and comparisons among similar or nearly similar departments are greatly facilitated. For example, if one wishes to rank the Departments of Business Administration in the European Union, one would have to rate the relative quality of their services and then derive indices by adding for each one the respective assessments by means of some weighting scheme. Certainly the choice of any such scheme is arbitrary as well. But it stands to be less so at the department rather than the university level, because the fields of knowledge promoted by Departments of Business Administration are more or less similar.

Aside from restricting rankings to similar educational and research units, the uncertainty that surrounds the impact of weighting schemes can be reduced further through two approaches. The first is to compute the weights on the basis of opinions from experts. For instance, if we wish to rank the Departments of Economics in the European Union, an objective approach would be to ask a wide spectrum of Professors of Economics in the United

States to give us the relative importance their departments assign to teaching and research, because by adopting their weights, we would be able to find out where do European Departments of Economics stand not only relative to themselves but also in relation to those in USA. The second approach is to use sensitivity analysis to test the robustness of rankings to changes in the weighting scheme. Presumably, if they remain stable to large changes in the weights, rankings can be trusted as good indicators of the underlying relationships.

At the end there remains the ultimate test of all, i.e. the view that informed people maintain as to the rankings of universities, colleges and departments. Ask anybody from this group to rank the universities in a European country where he would like his kids to study and the great probability is that he will confirm your rankings as a researcher. So the charge of excessive arbitrariness in weighting schemes usually leveled against attempts to sort out the leaders from the laggards through rankings, particularly in countries with state run university systems, should be viewed with considerable suspicion.

2.3. Criteria for measuring accomplishments

Rankings draw on four fundamental principles. These are: a) efficiency in the production and distribution of new knowledge; b) efficiency in the training and character formation of students; c) efficiency in operations, and d) social relevance in the sense of generating and propagating ideas and solutions that improve the prosperity of citizens. Starting from the latter principle, Machlup (1962) has stressed that the kind of knowledge most relevant to society is not the knowledge that someone keeps for himself, but the knowledge that is shared with others. In turn what this distinction implies is that for knowledge to be socially useful first, it must be communicated in the form of information, and, secondly, it must enhance directly or indirectly the efficiency of productive factors and give rise to various returns to scale and scope. Hence, since institutions of higher learning are essentially in the business of dealing knowledge as an economic commodity, their effectiveness should be rated by reference to the outputs produced and successfully distributed per unit of resource employed.

2.3.1. The rating of research performance

In applying this standard let us consider first the various criteria that have been proposed to assess the production and distribution of new knowledge. The criterion of publications was introduced initially by Fusfeld (1956) who ranked economics departments according to the number of papers presented by their academic staff in the American Economic Association for the period 1950-4. A few years later Cleary and Edwards (1960) ranked econom-

ics departments according to the rate of their publications in the *American Economic Review* for the period 1950-9. And soon after Yotopoulos (1961) included two more professional journals as bases for obtaining quality-weighted measures of publishing productivity.

Rankings of economics departments according to publications in 'pure academic journals' has been used also widely on the grounds that publishing in these journals "exposes the faculty of an institution to the profession, as well as being an indicator of high quality research conducted at that institution"(see Siegfried and Zak (1976), p. 291). To identify the group of 'pure academic journals' researchers have adopted two approaches. Berg (1971), Skeels and Taylor (1972), and Hawkins, Ritter and Walter (1973), for example, have employed questionnaires, whereas Lovell (1973), Laband and Sophocleus (1985), and Burton and Phimister (1995), to name just a few, have extracted information from citations that journals articles receive in other journals.

Still other criteria mentioned in the literature are the following. Publications weighted by the ranking of 'professional journals used by scholars' has been employed by Moore (1972), Niemi (1975), Scott and Mitias (1996) and Hartley and Robinson (1997) to rank economic departments and colleges in the U.S.A and Canada. Publications in 'top journals as weighted by the number of citations in the Social Science Citation Index' has been applied by Liebowitz and Palmer (1988) to rank the top 60 economics departments in the U.S.A and by Bairam (1994) to rank the top thirty world economics departments. The criterion of weighted publications using weights from samples of 'core journals' has been adopted by researchers to rank economics departments in U.S.A (Cosnoy, Dusansky, Drukker and Kildegaard (1995) and Dusansky and Vernon (1998)), Australia (Harris (1990)), Great Britain (Johnes (1990) and Johnes and Johnes 1993)), Europe (Kirman and Dahl (1994) and Kalaitzidakis, Mamuneas and Stengos (1999a, 1999b)) and Taiwan (Hsu (1995)). Tremblay, Tremblay and Lee (1990) have applied the measure of 'total pages published in the 45 most frequently cited journals in 19 fields', thus giving weight not only to the 'total' contributions to economics but also to the contributions in the selected fields. Last but not list, several researchers have constructed composite criteria by combining one or another from the above measures with various subsidiary determinants of research performance. In this category we find, for example, Siegfried (1972) and Siegfried and Zak (1976), who used the average number of Ph.Ds awarded and the average size of the faculty; Graves, Marchand, and Thompson (1982) and Hogan (1984), who used questionnaires to survey teaching load, teaching and research assistance, secretarial resources, student/faculty ratios, etc. in order to allow for constraints and incentives to publish; Dean (1976) and Gibbons and Fish (1991), who identified for each department the number of referees in professional economics journals on the presumption that '...the choice of referee may involve judgements

about different and broader dimensions of worth than does the judgement to publish a paper' (Dean, 1976, p. 147); and Laband (1985) and Brar, Nazemzaden and Chow (1987), who employed more synthetic measures by combining several of the above criteria.

In conclusion, research output is rated by considering the number of publications, the number of pages of publications, the quality of journals in which publications appear, the number and quality of citations achieved, participation in editorials boards, etc. According to a recent survey by Karayiannis (2002), out of a total of 43 studies rating economics departments, 33 were based on the number and the quality of publications. From the latter, 24 were conducted for universities in the United States, 4 for universities in Canada, 1 for Australia, 1 for Taiwan and 3 for countries in the European Union. From this account it follows that the number and quality of publications enjoy universal acceptance in rating research activities, at least regarding economics departments. The reasons to which we may attribute this finding are threefold. The first is that the number and the quality of publications can be measured quite objectively from the available data bases. The second is that publications reflect very well the range and the intensity of research conducted in every institution, since research efforts usually lead to publications. And the third reason is that, according to Skeels and Fairbanks (1968), university professors with several good publications as a rule and on the average turn out to be highly successful in their teaching assignments.

2.3.2. The rating of performance in education

However, aside from the new knowledge that professors produce and communicate through publishing, the efficiency of institutions of higher learning depends also on the quality of education that they offer to students. In principle education should aim at three objectives. The first is to transfer to students the body of established knowledge in their fields of study. In other words, by the time they leave the university the students must have adequate knowledge of what is known already in the area where they expect to apply their skills. The second objective is to train students on how to adapt their knowledge to new situations. This is the more creative part of education because it conveys to students modes of thinking and techniques of analysis that are very helpful in reducing the complexity of actual problems. Finally, the third objective of education is imparting to students intellectual discipline and moral character.

Rating the success with which universities, colleges and departments achieve these objectives is a highly complex endeavor. Its complexity is readily reflected in the technology that licensed institutions apply in order to certify the quality of education offered by institutions of

higher learning. The credentials of the teaching staff and its composition, the methods of instruction, the teaching environment as measured by the size of classes and the availability of instruction aids and physical facilities, the existence and degree of enforcement of codes for staff and student conduct, etc. are variables which are carefully weighted to determine the standing of every institution in the scale of the quality of education they offer.

In addition to the above more or less standardized approach to ratings of educational performance in western countries, teaching performance of university professors is rated also by internal and external techniques. The evaluations of students gathered through questionnaires that are distributed in the end of each course fall in the former category. Using information from such questionnaires, departments construct indicators regarding the teaching ability of professors, as well as their availability to consult and advise students, and then, by allowing for the findings during hiring and promotions, faculty members are induced to improve their teaching effectiveness.

Moreover, two common external methods for measuring teaching quality and program content use the responses to questionnaires addressed, for example, to chairmen of departments where students pursue post-graduate studies and to business firms that hire graduates for employment purposes. The usefulness of information extracted from these questionnaires is profound. By monitoring the performance of students at the graduate level and in comparison to students from other universities, departments can adjust their teaching procedures to increase the quality of their teaching, whereas having the evaluations of employers helps the departments streamline the content of their programs to meet the demand for skills.

2.3.3. The rating of operating efficiency

Finally, colleges and universities are rated for the efficiency of their operations. This criterion derives from the general principle of relative scarcity of resources and requires that new knowledge and human capital be produced at the least possible cost. For this reason the assessment mechanism must include pertinent variables for measuring the intensity and efficient use of resources that are devoted to research and teaching. The variables that are proposed in the relevant bibliography can be categorized as follows:

- Capacity indicators, measuring the maximum number of students that the institution can educate, given the range and quality of available facilities and teaching staff.
- Load indicators, measuring the proportion of educational capacity of a university that is actually utilized.
- Cost indicators, measuring the cost of education for every student that has graduated

from the university.

- Indicators measuring the degree to which the objectives agreed upon by the university and its financing authority are achieved. These indicators are of exceptional importance, because in the process of compiling them the parties concerned develop a spirit of cooperation and understanding that the procedure is not aimed at restricting the autonomy of the rated institutions.

By way of passing to the next section, a summary of the main conclusions reached above is in order. In the U.S.A, where universities, colleges and departments operate in open markets, ratings of research, education and operating efficiency have a long history and take place through market driven institutions. On the contrary in the European Union, where higher education markets are seriously suppressed, ratings started much more recently and take place through government initiated agencies. Another important difference between the American and the European Union rating models is that, whereas the former places the emphasis solely on research, the latter gives high priority also to teaching and operational efficiency. However, under the pressure felt in the European Union to close the gap with the U.S.A in the fields of science and technology, the methodology of ratings in both sides of the Atlantic shows signs of convergence. In particular, more and more countries in the European Union are led to raise the priority given to research and to relegate the ratings of educational and operating functions to markets.

3. A class of flexible ranking models

From the preceding it follows that in European Union rankings should focus on the performance of institutions of higher learning in the activities of research, education and operations. Research is evaluated internationally by reference to the quantity and the quality of publications. Moreover, the technology through which these two variables are defined and measured has evolved to maturity over many years and the relevant literature leaves now few grounds for disagreement. So one of the main building blocks of ranking models indexes research output weighted for quality.

Another building block concerns the quality of education. This is rated by reference to the intensity of teaching, the structure of educational programs, the teaching aids and facilities, and the various cultural, athletic and recreational amenities that make for an attractive student life. The quantification of the respective processes is pursued invariably through questionnaires addressed to:

- Students during their education, thus constituting mechanisms for the evaluation of teaching efficiency on the part of faculty as well as rating the quantity and the

quality of available facilities.

- Students after graduation and when they have joined their professions, thus constituting mechanisms for evaluating the degree of response of educational programs to the demand signals for various skills.
- Employers and employer associations, thus constituting mechanisms on the one hand of confirmation regarding the relevance of university education to the society and the economy, and on the other, of building reputation for the universities.

Clearly, as long as the ratings of educational inputs and outputs are based on questionnaires, the indicators of performance constructed from them will remain highly subjective. But even so the dominant view is that the information extracted from them is sufficiently reliable to warrant the conclusions and the policy recommendations derived from their analysis.

The third and final building block of ranking models refers to the operational efficiency of institutions of higher learning. This comprises indicators that measure the quality and availability of plant and equipment as well as the objectives, attitudes and moral values they pursue. Classroom space, laboratories, libraries, recreation facilities and other essential infrastructure per registered student are taken carefully under consideration. Also the existence of good governance provisions and the enforcement of codes of ethical conduct on the part of students are given particular emphasis.

Drawing on the above, we devised and propose a class of models for the evaluation of institutions of higher learning, which consists of three modules. The first module aims at ratings based on the multitude of contributions made by the academic staff, whereas the second module focuses at ratings based on evaluations of teaching quality and program content from graduates and employers. The third module would focus on the rating of the quality of university facilities and operating efficiency. But it is not shown separately because it was not necessary for our application.

As indicated in **Figure 1** in the next page, the potential contributions of academic staff can be classified into the following categories: a) research, b) teaching, c) administration, and d) civic affairs. In the American model, only contributions to research would be rated, so those in the last three categories would be ignored. However, in the European Union setting there are legitimate arguments in favour of including these activities as well, but with lower weights. Thus, given that the structure of the proposed class of models is very flexible in the sense that we can add or subtract categories of contributions to allow for the actual circumstances that prevail in each European country, **Figure 1** is presumed to represent the contributions of academic staff in Greece.

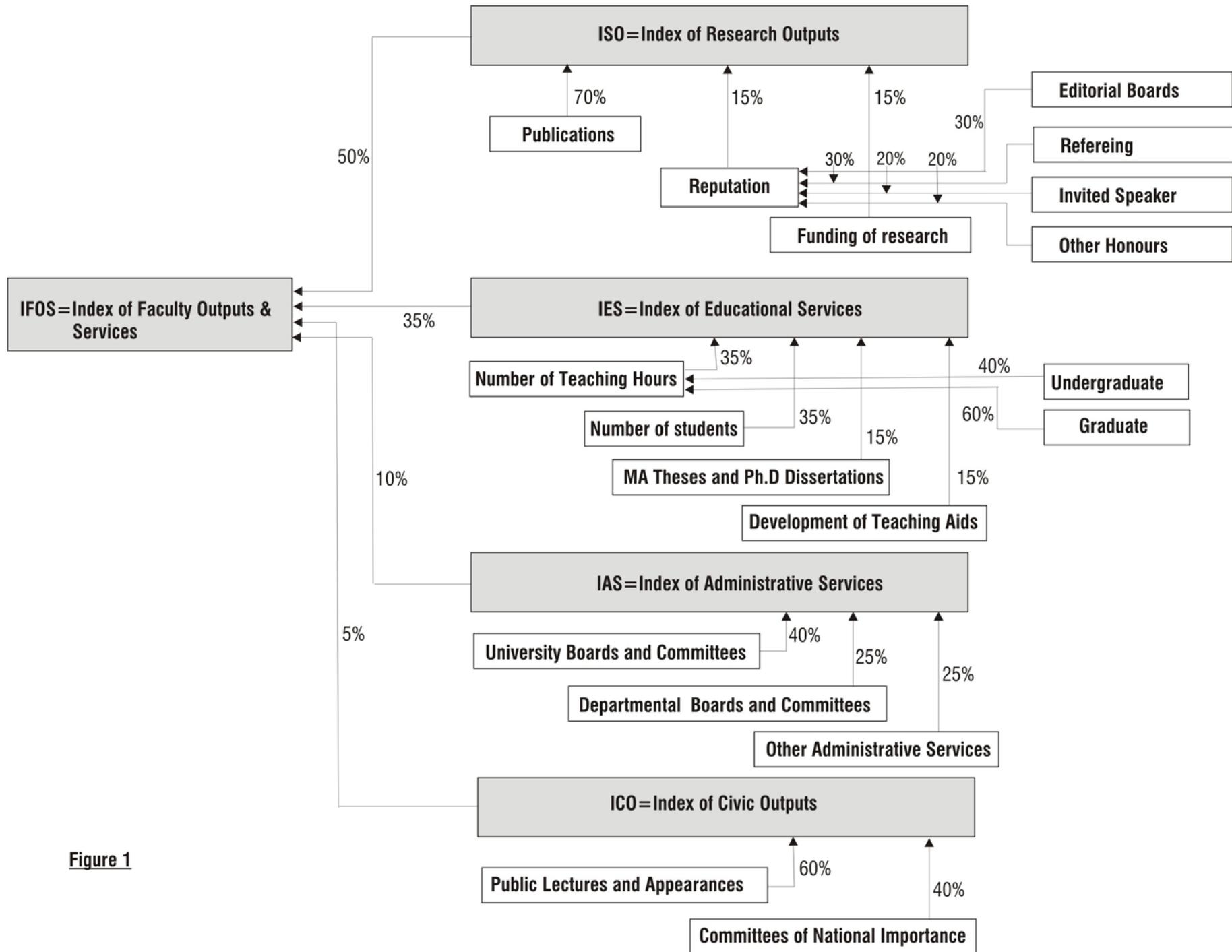


Figure 1

From this figure it can be observed that the Index of Faculty Outputs and Services, IFOS, is derived as a weighted average of four sub-indices. The weights employed were derived from the responses to a questionnaire addressed to university professors of Greek origin in western countries. Most of them advised us to use zero weights for the indices of administrative services, IAS, and civic outputs, ICO, on the grounds that such activities should be discouraged. But in the present institutional setting in Greek and European Union universities, these activities are considered almost mandatory for academic staff. So we decided to include them, albeit with low weights. However, we should like to stress that the point of view taken by our western colleagues is well taken because such activities distract the academic staff from teaching and research. For this reason we suggest that over time the weights for these two clusters of activities should be reduced to zero.

In the same figure we show also the weights that we propose to use in order to derive the values of the four sub-indices from their constituent components. These weights represent our judgements regarding the importance that we ought to assign to the various tasks in which the academic staff is involved. Hence they may stir controversy among our Greek and European Union colleagues, since this is the most subjective part to our modelling approach and it is natural that not everybody will agree with our judgements. But we hope that at least the weights chosen reflect correctly the priorities in the European Union among research, education and other faculty activities. Consequently, later on in the application of the model to data from Greece, we will be able to test the robustness of our results to small changes in the weights.

Moreover, notice that we distinguish between outputs and services. The rationale for introducing this distinction emanates from the need to stress the conceptualisation that outputs constitute measures of success evaluated mainly by market driven processes, whereas services represent faculty efforts whose contribution is rated by procedures partly internal and partly external to the university. One important service in the latter category is education, which aims at producing human capital. In this regard the success of institutions of higher learning depends not only on the intensity of educational services rendered by the academic staff but also on the value the graduates and their employers attribute to the results. For this purpose we devised a supplementary algorithm suitable for rankings based on evaluations of educational effectiveness by graduates, their employers and the department chairmen where they pursue their postgraduate studies. This algorithm is presented in **Figure 2** and as we can see it gives the value of the Index of Educational Effectiveness, IEE, as a weighted average of three sub-indices corresponding to success in employment, educational intensity, and certain other pertinent variables.

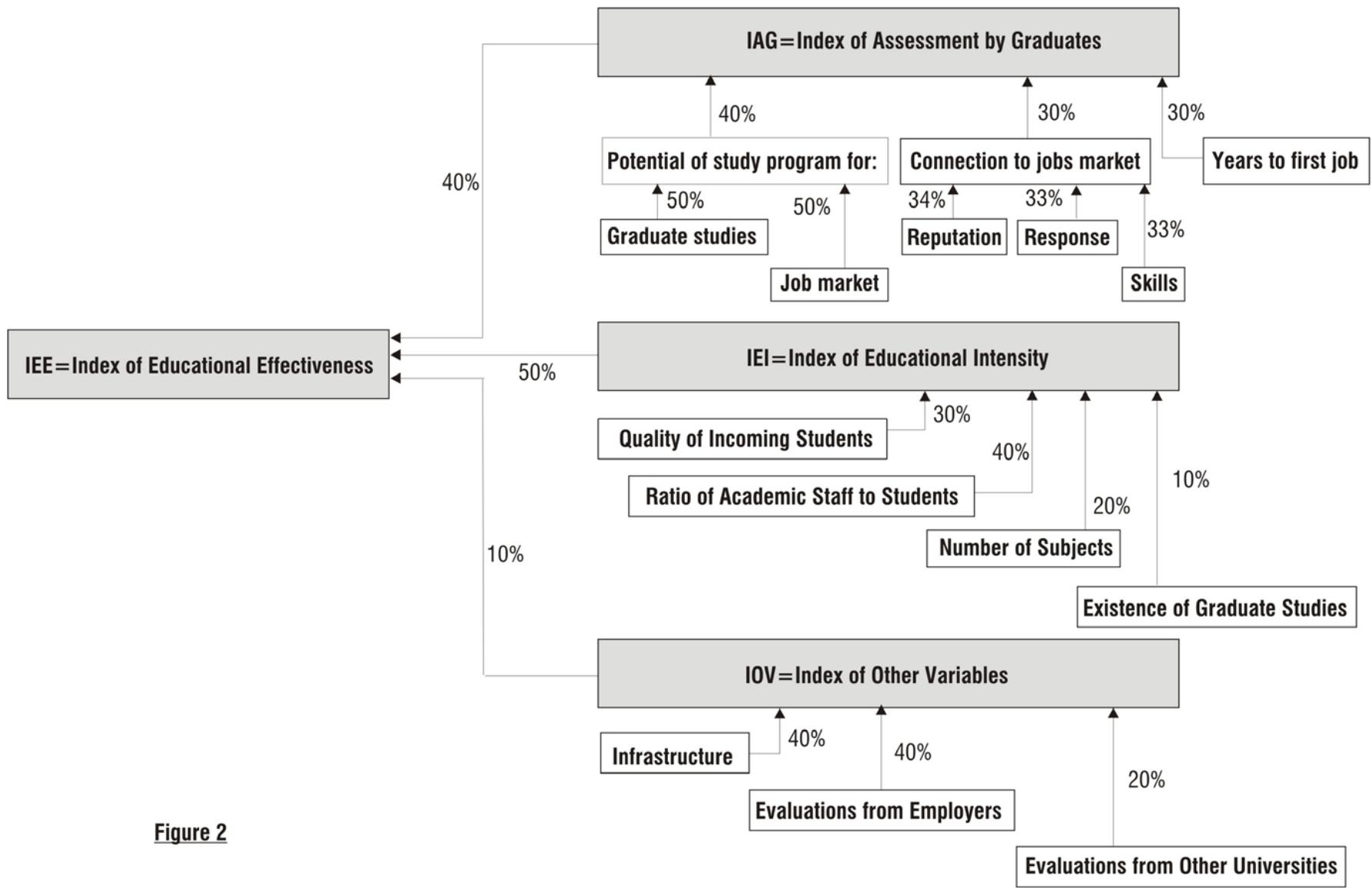


Figure 2

To be sure the above algorithm can be integrated into the first one by replacing in **Figure 1** the module that determines the Index of Educational Services, IES. An easy way to accomplish this would be to introduce a new index, say the Index of Educational Accomplishments, IEA, and compute its value as a weighted average of the indices IES from **Figure 1** and IEE from **Figure 2**. The weights for carrying out the aggregation may be chosen so as to allow for some bias in favor of the index IEE in order to place the emphasis on the value of education as seen by graduates, their employers, and other interested parties. However, in the present research we decided to keep the two algorithms separate because in the application we wished to find out whether shifting the main criterion of comparison from research to education does lead to significant changes in the rankings.

In conclusion, what we did in this section was to propose two mechanisms for ranking institutions of higher learning. These mechanisms determine the Index of Faculty Outputs and Services, IFOS, and the Index of Educational Effectiveness, IEE. To compute their values, the sub-indices involved in each index are aggregated using weights extracted from questionnaires addressed to experts. This is not to claim that the adopted weights are subjective. No. What is implied is that the weights reflect the value judgments of people who are able to know the relative significance of various contributions made by academic staff. Moreover, from the flexible nature of the proposed algorithms it follows that both their modules and the weights used in the aggregations can be easily adapted to suit the conditions prevailing in the systems of tertiary education in the countries of the European Union.

4. An application with data from Greece

In order to compute the values of the indices IFOS and IEE, and thus obtain the rankings sought, we limited our attention to three more or less homogeneous categories of institutions of higher learning. These were the Departments of Economics, the Departments of Business Sciences, and certain other related Departments that operated in Greek universities during the five-year period leading to 1998. In turn, this delimitation resulted in a sample comprising the 19 departments shown in **Table 1**. Below we explain the sources of our data, the benchmarks that we adopted for rating the various contributions of academic staff, the results that emerged and the conclusions derived from them.

4.1. The sources of our data

The primary data for carrying out the computations were obtained as follows. To determine the various weights that enter into the index IFOS as well as its sub-indices, we drew on the

Table 1 Departments in the sample

	Name of University	Type of Department	Initials
1	Aristotelian University of Salonica	Economics	AUS
2	Athens University of Economics and Business	Economics	AUEB
3	National and Kapodistrian University of Athens	Economics	NKUA
4	University of Crete	Economics	UMA
5	University of Macedonia	Economics	UCR
6	University of Patras	Economics	UPA
7	University of Piraeus	Economics	UPI
8	Athens University of Economics and Business	Business Administration	AUEB
9	University of the Aegean	Business Administration	UAE
10	University of Macedonia	Business Administration	UMA
11	University of Piraeus	Business Administration	UPA
12	Athens University of Economics and Business	Managerial Operations and Marketing	AUEB
13	University of Macedonia	Accounting and finance	UMA
14	University of Piraeus	Statistics and Actuarial Sciences	UPI
15	University of Piraeus	Financial and Banking Management	UPI
16	University of Piraeus	Maritime studies	UPI
17	Athens University of Economics and Business	International European and Economic Studies	AUEB
18	University of Macedonia	International European Economic and Political Studies	UMA
19	Pantion University	Public Administration	PU

responses to a questionnaire addressed to Greek colleagues teaching in universities and colleges in Western countries. However, even though we tried in general to follow their advice, in some cases we deviated to allow for the particular circumstances that characterize the operations of Greek universities. For example, whereas they recommended that we use zero weights for the contributions of academic staff to administrative tasks and civic affairs, we thought that both activities should be weighted positively, albeit with low weights. Turning next to the information regarding publications, teaching assignments, and other academic activities, we used three sources: (a) the responses to a questionnaire addressed to faculty members of the above departments; (b) the curriculum vitas that many of them were very kind to send us;⁵ and (c) the programs and teaching schedules that we received from the chairmen and the administrative offices of the various departments. Moreover, for reasons of consistency and accuracy, the publications that were identified

⁵ From a total of 381 faculty members serving in the 19 departments in 1998, 164 completed the questionnaires satisfactorily and 163 sent us also their curriculum vitas. So our efforts to secure a sizeable sample of responses were met with success since we managed to cover 43% of the population of the faculties under consideration. A notable exception in this regard was that of the academic staff of the Department of Business Administration of the University of Piraeus who not only refused to cooperate with us but also argued that we did not have the right to include their department in the ranking. For this reason all information in this case was obtained exclusively from subsidiary sources including electronic databases of publications.

from the curriculum vitae of each faculty member were also crosschecked against those listed in several electronic databases.⁶ As for the data that were employed to compute the index IEE, these came from separate inquiries into the views held by graduates, their employers and the department chairmen of foreign universities where graduates pursue further studies. To gather them we sent questionnaires to samples of graduates from each of the above departments as well as to a sample of foreign university department chairmen, whereas the views of employers were obtained from Christoforou et al. (2000). Finally, information regarding the infrastructure was obtained from the administrative offices of the departments under consideration and/or the respective university wide authorities.

4.2. Benchmarks for rating research accomplishments

The output that results from research activities of the academic staff is channelled to the wider scientific community through publications in (a) professional journals, and (b) monographs, collective volumes, and international dictionaries. Hence, in order to rank departments on the basis of research accomplishments, we searched for a common standard to compare the impact of publications of each and every academic staff on the state of knowledge in their fields of specialization as well as neighbouring areas of scientific endeavours.

Systematic rating of scientific journals in social sciences begun in the 1970s and comprised mainly those that focused in Economics. Initially the method was by sending questionnaires to professors, department chairmen and other people in a position to know and asking them to rate the journals.⁷ But beginning with the pioneering work of Lovell (1973) this method was abandoned and ratings of Journals in Economics started to adopt the criterion of the number and the quality of citations received by the articles published in them, on the presumption that this measure captures well the impact of publications on the development of economic science. As a result, in a series of notable contributions by Bush, Hamelman and Staff (1974), Eagly (1975), Liebowitz and Palmer (1984), Laband and Sophocleus (1985), Laband and Piette (1994), and Burton and Phimister (1995), this criterion was established as the method of choice for rating Journals in Economics.

Similar efforts to develop methods for rating Journals in Business Sciences and related branches of knowledge started in the 1990s. Brown and Huefner (1994) assessed the quality of journals in Accounting. Three years later Hult, Neece and Bansaw (1997) did the same for the

⁶ In particular, the searchable electronic bases that we consulted were the following: ECONLIT, MATHSCI, TRANSPORT, ADI, WILSON and ANBAR.

⁷ Two examples in this category are Moore (1972) and Hawkins, Ritter and Walter (1973).

journals in Marketing. McNulty and Boekelloo (1999) and Tahai and Meyer (1999) rated respectively the journals in Finance and Management. And, finally, Soteriou, Hadjinicola, and Patsia (1999) ranked the journals in Production and Operations Management. So by the time we started our research there existed a significant body of literature regarding the quality of journals in the areas of social sciences where the departments in our sample focus.

Searching in this literature for guidance regarding the present application, we found little that could be of direct assistance. For example, from the various rankings of Journals in Economics we realized that only the top ten journals maintain their position, whereas the rankings of all other journals vary significantly. But if we were to rate publications by reference only to these ten journals, the great majority of academic staff publishing in other less renown journals would be excluded. For this reason, we proceeded as follows. First, in the interest of maintaining our neutrality with respect to the ranking of various journals, we adopted the rankings obtained by Laband and Piette (1994), regarding the Journals in Economics, and the rankings supplied by the above-mentioned researchers, regarding the rankings of Journals in Business Sciences and related fields of knowledge. Second, from these rankings we extracted two lists of journals, one comprising those that serve usually as outlets of publications by economists and another for publications by academic staff specializing in business and related social sciences. Third, in each of these two lists we defined four groups of journals on the basis of citations received by the papers they publish. For each list this stipulation resulted in four groups of journals as follows: (a) top 30 journals, (b) next best 30 journals, (c) next 38 good journals, (d) all the rest. Finally, drawing on the average number of citations of papers published by journals in each of the above groups, we established the following benchmark:

- Papers in the top 30 journals receive 10 points
- Papers in the next best 30 journals receive 5 points
- Papers in the next 38 good journals receive 2.5 points
- Papers in all remaining journals receive 1 point.
- Papers published in refereed journals listed in the database EconLit, but absent from the rankings in the above-mentioned literature, receive 0.5 points.

Moreover, given that the papers in all groups of journals may be written by more than one author, following the norm in such assessments, we adopted the rule that the points allocated to each publication are equally divided among its authors.

However, besides publications in scientific journals, research work is published also in

monographs, collective volumes and international dictionaries. For this reason monographs published by universities of international reputation and other research-oriented institutions (e.g. National Bureau of Economic Research (NBER), Center for Economic Policy Research (CEPR), Brookings Institutions (BI), Cowles Commission (CC), and others) receive 5 points. Similarly 5 points are given for monographs published in well-known research series (e.g. Contributions to Economic Analysis, by North-Holland). Otherwise, monographs that are not included in the above categories but are published by reputable institutes of research get 1.5 points. Finally, papers included in the proceedings of international congresses of leading scientific organizations (e.g. American Economic Association, European Economic Association, International Economic Association, American Finance Association, and others) or in collective volumes published by internationally recognized universities and institutes of research, international publishing houses or internationally recognized dictionaries (e.g. Palgrave), receive 1 point.

Lastly, we consider the remaining research accomplishments of the academic staff. These include: (a) participation in the publication of scientific journals, which may take the form of editor or co-editor, associate editor, or editorial advisor, (b) serving as referee of scientific papers, (c) acting as invited speaker in various congresses, (d) competing and getting research grants, and (e) receiving various distinctions and honours for contributions to science. For all these accomplishments the academic staff may be rewarded as follows:

- Member of editorial board in at least one top scientific journal, 2 points. Otherwise, 1 point.
- Referee in at least one top journal, 2 points. Otherwise, 1 point.
- Invited speaker in international congresses, 1 point. The same kind of participation in a congress held in Greece, 0,5 points.
- Success in getting funds for research from international sources, 2 points. If the sources are from Greece, 1 point.
- Honorary doctorate, 5 points.
- Participation in the voting procedure or in the award committee of big prizes, like the Nobel Prize, 2 points.
- Citation in international publications like the “Who is Who”, 0.5 points.

Clearly, rating faculty accomplishments in the above fields requires the availability of detailed information from the academic staff, whereas the assessment of publications can be achieved by reference to searchable electronic databases like the ones mentioned in footnote 6.

4.3. Benchmarks for rating educational and other outputs and services

The teaching load of faculty may be rated by 1 point per 50 students taught. The number of students indicates the level of educational effort rendered by faculty members. But it fails to capture the effects of many other influences, as for example, how many courses are taught by each academic staff, whether the course is compulsory or elective, the availability of academic staff to students, etc. Yet in the present application we did not have the required information to allow for them. An exception was that with the establishment of graduate programs, we thought it pertinent to reward faculty members with 5 points for the supervision of each doctoral dissertation and 1 point for Master's Theses.

Finally, the contribution of faculty members to administrative tasks in the university and the department as well as to civic affairs is rated as follows: rector, 2 points; vice-rector, 1.5; dean, 1 point; department chairman, 2 points; head of the graduate program committee, 1 point; head of research institute, 1 point; advocacy of public issues in the press and the television, 1 point; delivery of public lectures, 1 point; and participation in committees of national importance, 2 points.

4.4. Results

Drawing on the above we computed an index based on the stock of quality-adjusted publications per academic staff. The values of this index and the corresponding rankings of the departments in the sample are shown in **Table 2**. Looking closer at these results, several comments are in order. One of them has to do with the ranking of the departments in each of the three more or less homogeneous groups of the classification. In particular, first among all Departments of Economics ranks the Department of Economics of the Athens University of Economics and Business, followed by the Department of Economics of the Athenian and Kapodistrian University of Athens and the Department of Economics of the University of Crete in the same order. As a matter of fact, the difference between the first and the second department in this group is so large that all but guarantees the same ranking under any conceivable experiments with reasonable alternative weighting schemes and journal benchmarkings. On the other hand, top with significant margins among the departments in the second group is the Department of Management Operations and Marketing of the Athens University of Economics and Business, followed by the Department of Financial and Banking Management of the University of Piraeus, whereas in the third group of departments first ranks the Department of International European and Economic Studies, again of the Athens University of Economics and Business. Consequently, with respect to publications, the Athens University of Economics ranks first among all universities mentioned in **Table 1**.

Table 2 Ranking of all departments in the sample on the basis of the quality-adjusted publications per academic staff

Rank	Value of Index of Publications	Department ²	University
1	34,5	Economics	Athens University of Economics and Business
2	18,5	Economics	National and Kapodestrian University of Athens
3	16,2	Economics	University of Crete
4	8,3	Economics	University of Macedonia
5	6,5	Economics	Aristotelian University of Salonica
6	5,1	Economics	University of Patras
7	4,9	Economics	University of Piraeus
1	27,4	Operations Management and Marketing	Athens University of Economics and Business
2	18,0	Financial and Banking Management	University of Piraeus
3	11,9	Business Administration	Athens University of Economics and Business
4	9,4	Business Administration	University of the Aegean
5	5,6	Business Administration	University of Macedonia
6	4,3	Maritime studies	University of Piraeus
7	4,2	Accounting and finance	University of Macedonia
8	1,7	Business Administration	University of Piraeus
9	0,2	Statistics and Actuarial Sciences	University of Piraeus
1	19,2	Int. Europ. & Economic Studies	Athens University of Economics and Business
2	5	Int. Europ. Economic & Political Studies	University of Macedonia
3	0,5	Public Administration	Pantion University

Note : 1. To account for the differences in the size of the departments, the index ISO was divided by the number of faculty members.

2. The ranking of the Departments of the University of Piraeus in the second group was based exclusively on the publications that we found in the searchable electronic databases mentioned in footnote 6.

Another finding is that in all three groups of departments more than half lag seriously behind in the production and dissemination of new knowledge in their fields. More specifically, among Departments of Economics the publications achieved per academic staff by the three top departments are higher on the average than those of the three lagging departments by a ratio of 4 to 1, whereas the same comparison with respect to the departments in the second group turns out to be even worse. This implies that research and publications in the lagging departments may not be emphasized as criteria for hiring and promoting academic staff. But if this is the case, one is left to wonder about the quality of knowledge conveyed to the students through the educational process. So it will be interesting to find out how the graduates and their employers assess the effectiveness of these departments.

Finally, observe that certain relatively new departments have managed to attract academic staff with publications that enabled them to rank well ahead of older and more established departments. These departments are the Department of Economics of the University of Crete and the Department of Business Administration of the University of the Aegean.

The above findings have been subjected to several criticisms. One of them maintains that, since some of the departments in the sample are fairly new, their comparison with older departments is ill conceived, because they might not have the necessary time to optimize the composition of their academic staff. Our view is that the ranking does not place younger departments at a disadvantage because the academic staff in older departments is loaded with professors who are less productive in publications. Another criticism suggests that certain departments are under-rated because the publications of some of their academic staff appear in journals different than the ones included in our benchmarks. While we cannot exclude this possibility, for a department to be significantly under-rated for this reason, the composition of its academic staff must be seriously distorted with members from alien faculties. But if so, these departments would operate under false pretences and should be penalized for doing so. Still another criticism suggests that the ranking is biased because it counts publications as if the research for them were conducted in the departments to which they are credited.⁸ This is a valid criticism and we would have liked to allow for its impact by identifying the institutions where the research for the various publications took place. But this task proved untenable and it was relegated to future research endeavors.

Lastly, various people have argued that, since this ranking does not discriminate between recent publications and publications achieved many years ago, it may attribute to the departments productivity that they may not have presently. To confront this criticism the ranking ought to focus exclusively on the publications in the last years. But if we applied this criterion, young departments would be given an unfair advantage because it is them that hired most academic staff in the last years and mainly in the lower ranks, which are known to be more productive in terms of publications. For this reason our approach has been to rank the departments on the basis of the stock of publications of their academic staff and do the same a few years from now using the flow of publications achieved in the meantime.

Next we ranked the departments in the sample on the basis of the Index of Research Outputs, IRO. As we expected, this ranking did not change the order of the departments in the three groups. The obvious reason being that the differences in the rankings of the departments on the basis of “Other Scientific Contributions” and “Research funding” were small and their

⁸ To corroborate the seriousness of this criticism, consider the following example. At the time of this research the Department of Financial and Banking Management of the University of Piraeus hired at least two staff members from abroad, whereas the Department of Economics of the same university hired one staff member from the Department of International European and Economic Studies of the Athens University of Economics and Business. Without these appointments the former department would be placed in the middle of the ranking, whereas the latter would be placed last.

relative significance declined further because of their low weights. Hence, regarding the ranking of the departments with respect to the overall research contributions by their academic staff, the conclusions remained the same with those derived above on the basis of publications.

Table 3 presents the results of ranking the departments in the sample according to the Index of Faculty Outputs and Services, IFOS. From them we observe that, when we allow for the services of faculties to education, administration, and civic affairs, the wide differences

Table 3 Ranking of all departments in the sample on the basis of overall contributions per academic staff

Rank	Value of Index IFOS ¹	Department ²	University
1	19,3	Economics	Athens University of Economics and Business
2	12,8	Economics	National and Kapodestrian University of Athens
3	12,3	Economics	University of Crete
4	11,8	Economics	Aristotelian University of Salonica
5	11,7	Economics	University of Macedonia
6	9,4	Economics	University of Piraeus
7	8,2	Economics	University of Patras
1	19,1	Operations Management and Marketing	Athens University of Economics and Business
2	15,0	Business Administration	Athens University of Economics and Business
3	14,8	Financial and Banking Management	University of Piraeus
4	11,4	Business Administration	University of the Aegean
5	10,2	Business Administration	University of Macedonia
6	10,1	Accounting and finance	University of Macedonia
7	9,7	Statistics and Actuarial Sciences	University of Piraeus
8	9,4	Maritime studies	University of Piraeus
9	8,2	Business Administration	University of Piraeus
1	13,5	Int. Europ. & Economic Studies	Athens University of Economics and Business
2	9,1	Public Administration	Pantion University
3	6,7	Int. Europ. Economic & Political Studies	University of Macedonia

Note : 1. See note 1 in Table 2.

2. See note 2 in Table 2.

that were discovered among the various departments on the basis of publications declined considerably. In this regard notice that the three departments of the Athens University of Economics and Business continue to occupy the top ranks in all three categories. But their differences from the departments in the lower ranks have narrowed significantly. This implies that the departments that lag in research lead in teaching but not by a difference large enough to change the ranking of departments that was obtained on the basis of publications. Consequently, what these rankings reveal is a dichotomy between departments that strive for a balance between research and teaching and departments that are mainly teaching institutions with little or no emphasis on research and publications.

We turn now to the assessment of educational effectiveness. The data for the measurement of the variables that enter into the determination of the index IEE come from a separate inquiries into the views held by graduates, their employers and other interested parties regarding the quality of education that is offered by the various departments. But as many from the departments were just starting to introduce computerized management information systems, it proved impossible to obtain samples from the respective populations. In addition, when we addressed our questionnaires to employers and chairmen of foreign departments where Greek graduates pursue post-graduate studies, they were unable to rate the quality of education at the level of individual departments. As a result we were obliged to adopt a limited information strategy. In particular, we confined our research only to 9 out of the 19 departments in the sample and when computing the index IEE we equated to zero the weights of all sub-indices for which we did not have adequate information. For these reasons, we like to warn that the results should be considered as tentative.

Table 4 presents the ranking of 9 departments according to the Index of Assessment by Graduates, IAG. Looking at the values of this index in the second column from the left we observe the following. First, in general the graduates from business oriented departments rank the quality of their education higher in comparison to graduates from the other two groups of

Table 4 Ranking of 9 departments in the sample on the basis of the Index of Assessment by Graduates

Rank	Value of Index IAG	Department	University
1	85,8	Economics	Athens University of Economics and Business
2	77,8	Economics	University of Piraeus
3	45,1	Economics	National and Kapodestrian University of Athens
1	115,0	Financial and Banking Management	University of Piraeus
2	113,2	Business Administration	Athens University of Economics and Business
3	104,8	Business Administration	University of the Aegean
4	91,8	Business Administration	University of Piraeus
1	91,0	Int. Europ. & Economic Studies	Athens University of Economics and Business
2	24,9	Public Administration	Pantion University

departments. Given the abstract nature of economic theory and the lack of direct linkages to solving everyday problems, this finding is consistent with the ranking that we would have expected on a priori grounds. Second, the graduates of the Department of Economics of the National and Kapodestrian University of Athens have extremely low esteem for the value of their education. Actually they rank the department from where they graduated almost 50% below the

same department of the University of Piraeus, which ranks second. However, as we will see below, when employers hire economists prefer graduates from this rather than any other economics department. So there arises a contradiction, which must be resolved through further research. Finally, the third observation is that two departments from the Athens University of Economics and Business rank at the top of their groups. This provides further evidence regarding the robustness of our ranking methodology.

Referring next to the assessments by the employers who hire graduates from the departments under consideration, our research showed that 56.6% of those that were surveyed pay attention to the university where their employees have studied. A clear majority of them declared their preference for graduates from the Athens University of Economics and Business (80%), followed by the graduates of the University of Piraeus (60.7%) and those from the Aristotelian University of Salonica (38.5%). Also, we found indications to the effect that, when business concerns hire economists, they prefer graduates from the National and Kapodestrian University of Athens over those from the Athens University of Economics and Business, whereas when hiring graduates in business administration they prefer those who hold degrees from the Department of Business Administration of the Athens University of Economics and Business.

Finally, **Table 5** displays the results of ranking on the basis of the Index of Educational Effectiveness, IEE. From them we observe that: (a) the Department of Economics of the Athens University of Economics and Business occupies the top spot. Actually its difference from the other two economics departments is so large that we feel confident to conclude that the ranking indicates the true position of the three departments in the scale of educational effectiveness; (b) economics departments in general lag considerably behind those in business administration. This

Table 5 Ranking of 9 departments in the sample on the basis of the overall educational effectiveness

Rank	Value of Index IEE	Department	University
1	71,6	Economics	Athens University of Economics and Business
2	54,7	Economics	University of Piraeus
3	53.2	Economics	National and Kapodestrian University of Athens
1	75	Financial and Banking Management	University of Piraeus
2	74,3	Business Administration	University of the Aegean
3	74,2	Business Administration	Athens University of Economics and Business
4	63.6	Business Administration	University of Piraeus
1	75,3	Int. Europ. & Economic Studies	Athens University of Economics and Business
2	31.4	Public Administration	Pantion University

finding was expected on a priori grounds because the graduates from economics departments, particularly in recent years, are in less demand in the job market relative to those from business administration departments; (c) two out of the nine departments under consideration belong to the Athens University of Economics and Business. This corroborates our previous findings and ascertains the dominance of this institution in the fields of Economics and Business Administration in the country; (d) the Department of Business Administration of the University of the Aegean ranks very favorably in terms of educational effectiveness in comparison to the department of Financial and Banking Management, of the University of Piraeus, and the Department of Business Administration, of the Athens University of Economics and Business. This finding reinforces the evidence regarding the ranking of this department on the basis of overall contributions by academic faculties; (e) the Department of Public Administration of Pantion University continues to lag far behind in terms of educational effectiveness. This, in conjunction with our earlier findings, suggests that it faces serious problems in both research and educational activities, and ought to attract the attention of supervising authorities.

In summary, the ranking of departments on the basis of the various indices of educational accomplishments, is consistent with that base on the contribution by academic staff. This finding increases our confidence in the results and reinforces our conviction that the algorithms we proposed for carrying out the rankings as well the data we employed to compute the various indices have revealed the true relationships prevailing in the standing of Departments of Economics and Business Administration in Greece.

5. Conclusions and recommendations for further research

Our study of the relevant bibliography revealed that the approaches to ranking institutions of higher learning depend on the degree of openness to competition that characterizes the various markets in tertiary education. In the United States of America, where universities, colleges, and departments compete in open markets, rankings are based predominantly in the production and distribution of new knowledge as measured by publications. On the contrary, in the European Union, where competition in university markets is suppressed due to the prevalence of state monopoly, rankings took much longer to be introduced and give emphasis not only to the quality of research but also to teaching and other activities of faculty members. So drawing on this fundamental difference, what we did in this paper was first to propose two algorithms for rating European Union institutions of higher learning by considering all contributions made by their academic staff as well as the evaluations held regarding their educational effectiveness. The first of them evaluates the contribution of academic staff to research, education, administra-

tive work and civic affairs, whereas the second evaluates educational effectiveness as viewed by graduates, their employers and other interested parties.

Then, in an effort to demonstrate how these two algorithms may be employed, we used data covering 19 Departments of Economics and Business Administration that operated in Greece in the years leading to 1998 and ranked them on the basis of various indices. Irrespective of the intrinsic value that these rankings may have for Greek parents and businesses, the Greek ministry of education, Greek university authorities and even European Union funding agencies, from our point of view the importance of this application lies in that the proposed model is robust with respect to several criteria. In particular, the rankings in each category remain unchanged for a wide range of the weights employed to sum the contributions of research, teaching and other activities of the faculties. The top departments retain their relative positions in their categories irrespective of whether the rating criterion is research or teaching, thus ascertaining the finding that good teaching goes hand in hand with good research. And last, but not least, we found that market ratings of the various departments, as represented by the evaluations of graduates their employers, and other interested parties, are consistent with the rankings based on academic criteria.

Clearly, the most contentious of all the issues that may be raised with respect to the proposed ranking algorithms is the determination of the appropriate weights for adding up the various indices and sub-indices. We trust the views of experts because they have the knowledge and experience to judge. But determination of these weights might be left also to negotiation, say, between the university and the funding authority, or the institutions themselves may decide in accordance with the objectives they adopt in the fields of research, education and other activities. Yet achieving some convergence in this regard requires additional research. Similarly, additional research is required to shed light on the processes by which graduates, employers, and other interested parties evaluate the quality of education. And certainly more research should be undertaken to test the sensitivity of rankings to shifts in the benchmark lists of journals where publications appear.

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