The role of national university rankings in an international context: the case of the I-UGR Rankings of Spanish universities

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Abstract
The great importance international rankings have in the research policy arena calls for caution as they present many flaws and shortcomings. One of them has to do with the inability to accurately represent national university systems as their original purpose is only to rank world-class universities. Another one has to do with the lack of representativeness of universities' disciplinary profiles as they usually provide a unique table. Although some rankings offer a great coverage and others offer league tables by fields, no international ranking does both. In order to surpass such limitation from a research policy viewpoint, this paper analyzes the possibility of using national rankings in order to complement international rankings. For this, we describe the Spanish university system as a study case presenting the I-UGR Rankings for Spanish universities by fields and subfields. Then, we compare their results with those obtained by the Shanghai Ranking, the QS Ranking and the NTU Ranking, as they all have basic common grounds which allow such comparison. We conclude that it is advisable to use national rankings in order to complement international rankings, however we observe that this must be done with certain caution as they differ on the methodology employed as well as on the construction of the fields.

Conference Topic
Science Policy and Research Evaluation: Quantitative and Qualitative Approaches (Topic 3) and Management and Measurement of Bibliometric Data within Scientific Organizations (Topic 9).

1. Introduction
Since the launch of the first edition of the Shanghai Ranking in 2003, interest has grown on the development of tools for benchmarking and comparing academic and research institutions. As a result of the massification of higher education, the race for excellence and a fierce battle for research funding, universities now strive for positioning themselves in these international rankings (Hazelkorn 2011). These tools have gain an undisputable position in the research managers 'toolkit' for measuring the state of health of higher education institutions and the main resource for many universities and countries when taking decisions in a research policy context (Marginson & van der Wende, 2007). The great effect they have, - not only in the media and the public but also for research managers, politicians and decision makers, - relies on the perception that highly ranked institutions are usually more productive, produce higher quality research and teaching and contribute best to society than the rest of universities (Shin & Toutkoushian, 2011).

However, despite their advantages as easy-to-read tools, they also have many inconsistencies and shortcomings that warn against a careless use (Delgado López-Cózar, 2012). In this sense, we can identify five major issues which must be addressed: 1) methodological and technical errors and difficulties such as the recollection of reliable and standardized data (Toutkoushian & Webber, 2011), 2) the criteria for selecting the indicators are not scientifically supported (Van Raan, 2005), 3) the multidimensional nature of universities (Orduña-Malea, 2012; Waltman et al., 2012) leads to a wide heterogeneity among institutions (Collini 2011), 4) using a unique table to rank universities neglects their disciplinary focus (Visser et al., 2007), and 5) international rankings cannot reflect the state of national higher education systems as they usually cover just the top universities of each country (Torres-Salinas et al., 2011a).

While the issue of data reliability still remains a major shortcoming and there is no consensus yet over which indicators represent better the nature and quality of universities, the other issues have been somehow surpassed using approaches which do not solve completely their dangers but at least, diminishes the flaws. For instance, rankings such as the Leiden Ranking (Waltman et al., 2012) or the Scimago Institutions Rankings (henceforth SIR) have emerged focusing uniquely on the research dimension of universities to the neglect of other aspects such as innovation, transference of knowledge or teaching. Others, such as the Shanghai Ranking, the Times Higher Education World University Rankings (henceforth THE Ranking), the QS Rankings or the National Taiwan University Ranking (henceforth NTU Ranking, previously produced by the Higher Education Evaluation and Accreditation Council of Taiwan) now publish, along with a global ranking, rankings by subjects and fields, which offer a better picture of universities' performance (García et al., 2012). Also, some rankings such as the SIR or the Ranking Web of World Universities cover now not just top-class universities but the former includes more than 3,000 research institutions and the latter, more than 19,000.

Rankings have not been fully developed and still draw serious shortcomings (van Raan, 2005). But their dominance as decisive factors in research policy (Hazelkorn, 2011) at national and supranational level puts them in the spotlight. One of the most important threats rankings entail is that they ignore universities' diversity, which can affect seriously the health of higher education systems and lead to dangerous and simplistic conclusions when interpreting and developing ranking systems (e.g., Moed et al., 2011). These differences affect institutions at two levels, at their organizational structure, and in the national configuration of higher education systems, affecting their multidisciplinary nature and diversity (Orduña, 2012). The phenomenon of university rankings has influenced deeply all university systems, even those that were not conceived at first to establish a competitive framework. Therefore, in order to analyze the success or failure of different countries in their research policy, university systems should be assessed as a whole, and not considering each university as an individual and autonomous unit. Such approach was applied by Docampo (2011) using the Shanghai Ranking in order to analyze the university systems of the countries represented.

Despite its limitations, this study offers a glimpse of the global scenario regarding the research excellence of different countries' university systems. In Table 1 we show the clusters emerged from the study carried out by Docampo (2011) and the number of universities by country in different intervals according to the 2012 edition of the Shanghai Ranking. Therefore we observe a dominance of the United States and the United Kingdom which alone, represent more than a third of the universities included in the ranking (37.6%), followed by Germany and Canada as the next with the highest number of universities included. However,

despite the numbers, except Japan, which in this new edition includes a university in the top20, none of the others have a university positioned within this interval. In this context, the truth is that the high visibility Anglo-Saxon universities have in rankings leaves little space for others, blurring the state of other countries which are working towards a successful university model. In fact, it clearly shows the incapability of the ranking to represent national university systems with exhaustiveness.

Table 1. University systems by country considering the results in Docampo (2011) and the 2012 Shanghai Ranking edition. Leaders, Fast followers and followers

	Countries	Nr of Universities Top20	Nr of Universities Top100	Nr of Universities Top300	Nr of Universities Top500
Leaders	United States	17	53	109	150
	United Kingdom	2	9	30	38
	Switzerland	---	4	7	7
Fast followers	Australia	---	5	9	19
	Canada	---	4	17	22
	Sweden	---	3	7	11
	Israel	---	3	4	6
	Netherlands	---	2	10	13
	Denmark	---	2	4	4
Followers	Germany	---	4	24	37
	France	---	3	13	20
	Belgium	---	1	6	7
	Norway	---	1	3	4
	Finland	---	1	1	5

Thus, these rankings do not offer a complete view of national higher education systems, preventing research managers and decision makers to have an accurate picture of the state of each country's university system. For this reason, in 2010 we developed the Rankings I-UGR of Spanish Universities according to Fields and Scientific Disciplines[1] (henceforth I-UGR Rankings) available at http://rankinguniversidades.es. This website offers 49 rankings for Spanish universities divided in 12 fields and 37 disciplines, according to their international research performance. Spain is a good example of a misrepresented higher education system. For instance, in the 2012 edition of the Shanghai Ranking only 11 universities out of 74 met the criteria for inclusion in the global ranking. In fact, none made it to the top 100 and only three were included in the 201-300 interval. Also, as it occurs with other countries such as Italy (Abramo, Cicero & D'Angelo, 2011), it is a non-competitive higher education system, which means that universities do not act as individual units but within a national framework, therefore decisions should not be taken relying in such a poor sample.

The main goal of the present paper is to justify that national rankings are necessary in order to complement international rankings. For this we will use the I-UGR Rankings analyzing:

1) Levels of agreement with international rankings: are the top Spanish universities the ones visible in international rankings?

2) Disciplinary concordance: do the different classifications by fields and subjects allow an analysis by areas?

The paper is structured as follows. First we present the Spanish case analyzing its current state and we introduce the I-UGR Rankings, we contextualize its creation and we describe the

[1] I-UGR stands for Institutions - University of Granada.

methodology employed for their development. Next, we address the main issue of this paper: we compare the results of the main international rankings and the I-UGR Rankings for Spanish universities. To do so, we selected the Shanghai Ranking, the QS Ranking and the NTU Ranking. Finally, in Section 4 we resume our main findings and their consequences in a research policy scenario.

2. Spain as a case study: introduction to the I-UGR Rankings

The Spanish university system is formed by 74 universities: 48 public and 26 private. However in the 2012 edition of the Shanghai Ranking only 11 met the minimum requirements to be included. It is a country poorly represented in the main international rankings due to the scarce number of universities considered as World-Class universities. But the impact these rankings have in research policy threatens a good governance and sensible decision making as they do not offer a complete picture of the university system (Docampo, 2011). In fact, as observed in Table 2, only 20 universities (19 public and 1 private universities) are included in three of the most important rankings; that is, 27.03% of the whole system. For this reason, other tools are needed in order to complete this fragmented picture of the Spanish higher education scenario.

Table 2. Spanish universities represented in the 2012 edition of the Shanghai Ranking, the QS Ranking and the NTU Ranking

Position of Spanish Universities in Shanghai Ranking		Position of Spanish Universities in QS Ranking		Position of Spanish Universities in NTU Ranking	
Barcelona	201-300	Autónoma de Barcelona	176	Barcelona	115
Autónoma de Madrid	201-300	Barcelona	187	Autónoma de Barcelona	191
Complutense de Madrid	201-300	Autónoma de Madrid	206	Autónoma de Madrid	231
Valencia	301-400	Complutense de Madrid	226	Valencia	253
Autónoma de Barcelona	301-400	Pompeu Fabra	266	Complutense de Madrid	259
Politécnica de Valencia	301-400	Carlos III de Madrid	343	Santiago de Compostela	330
País Vasco	301-400	Politécnica de Cataluña	350	Granada	335
Granada	401-500	Navarra	359	Zaragoza	382
Pompeu Fabra	401-500	Politécnica de Valencia	401-450	Pompeu Fabra	408
Zaragoza	401-500	Politécnica de Madrid	401-450	País Vasco	420
Vigo	401-500	Granada	451-500	Oviedo	461
		Salamanca	451-500	Politécnica de Valencia	471
		Santiago de Compostela	451-500	Sevilla	483
		Valencia	451-500		
		Zaragoza	501-550		
		Sevilla	551-600		
		Alcalá de Henares	601+		
		Murcia	601+		

The first edition of the I-UGR Rankings was launched on 2010. Its development was motivated by the scarce visibility Spanish universities have in international rankings, which leads to a fragmented picture of the Spanish university system. Though other national rankings had already been developed, these were considered insufficient due to the limitations they presented which made them unsuitable as research policy tools. Among other limitations we address the following: lack of continuity over time, exclusion of private institutions, disregard of disciplinary focus, use of rudimentary bibliometric indicators, selection of unsuitable time periods or election of databases with dubious selection criteria of sources (Torres-Salinas et al., 2011a).

Data is retrieved from the Thomson Reuters Web of Science database. In its first edition 12 rankings were offered for 12 broad fields. These fields were later expanded with 19 subfields or disciplines in the second edition (Torres-Salinas et al., 2011b) and finally, 37 disciplines in

the 2012 edition. The fields and disciplines were constructed by aggregating the subject categories to which records from the Science Citation Index and Social Science Citation Index are assigned. Aggregating subject categories is a classical perspective followed in many bibliometric studies when adopting a macro-level approach (e.g., Moed, 2005; Leydesdorff & Rafols, 2009). For further information on the coverage on the I-UGR Rankings and the development of the fields and subfields the reader is referred to the Methodology section of the rankings' website available at http://rankinguniversidades.es. Once the data is compiled into a relational database, the indicators defined in Table 3 are computed and normalized in [0, 1], and the index for rating each university is calculated. To rank universities we use the IFQ^{2}A Index (Torres-Salinas et al., 2011c). This indicator measures the quantitative and qualitative dimensions of the research outcome of a group of institutions in a given field. It is based on six primary bibliometric indicators, three focused on the quantitative dimension (QNIF) and the other three focused on the qualitative dimension (QLIF). In Table 3 we summarize the methodology employed for calculating the IFQ^{2}A Index. For a detailed explanation on the IFQ^{2}A Index the reader is referred to Torres-Salinas et al. (2011c).

Table 3. Calculation of the IFQ2A Index and definition of indicators.

$QNIF = \sqrt[3]{NDOC \times NCIT \times H}$		$QLIF = \sqrt[3]{\%1Q \times ACIT \times TOPCIT}$	
NDOC	Number of citable papers published in scientific journals	%1Q	Ratio of papers published in journals in the top JCR quartile
NCIT	Number of citations received by all citable papers	ACIT	Average number of citations received by all citable papers
H	H-Index as proposed by Hirsch (2005), over all the publications of the institution	TOPCIT	Ratio of papers belonging to the top 10% most cited papers calculated within all institutions
$IFQ^2A = QNIF \times QLIF$			

The selection of the indicators as well as the conceptualization of the index, are based on the following criteria:

1) The indicators chosen must not be restrictive. That is, they should be applied to all institutions. For instance, the Shanghai Ranking uses the number of Nobel Prizes as an indicator to measure research excellence. In the Spanish case only one university is affected by it (Complutense de Madrid).

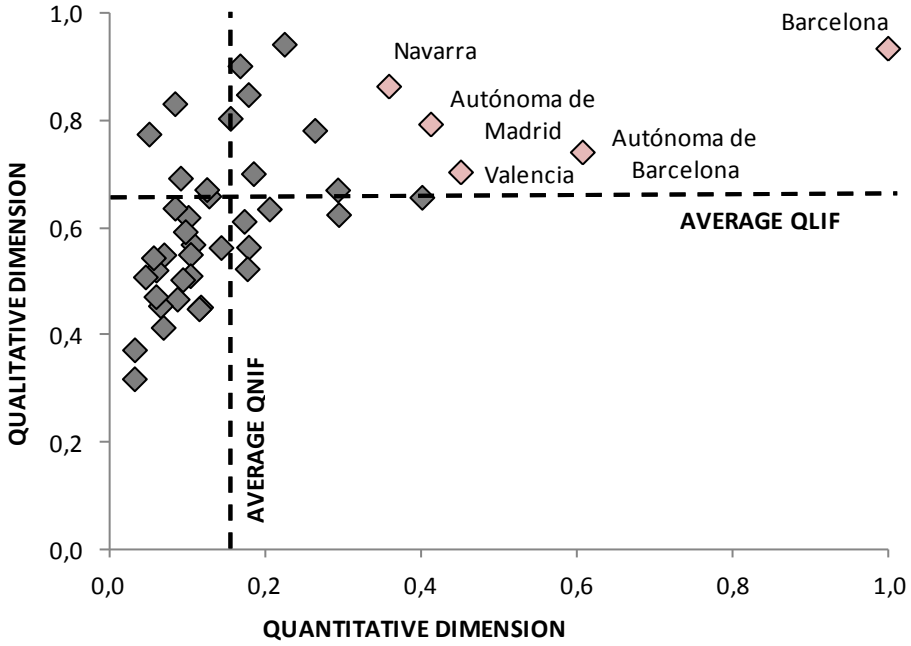
2) Rankings must be size-independent. This leads to the use of a bidimensional index which takes into account research outcome but also excellence, benefiting equally: small and large institutions.

3) Rankings must take into account the disciplinary focus of universities. For this, a unique list cannot be provided. Contrarily one most offer rankings by field of specialization in order to provide useful tools for research managers.

4) Seniority must not be rewarded. For this fixed time periods must be used. Also, when calculating the H-Index, this must be considering the time frame used. In this sense, the I-UGR Rankings offer a five-year window and a ten-year window.

5) Stability must be assured. This means that the fixed time frame must be wide enough to offer stable results. A five-year time frame allows results to be consistent and significant.

Figure 1. Distribution of universities according to their qualitative and quantitative dimensions in the field of Medicine and Pharmacology. 2007-2011.



In Figure 1 we show the distribution of universities according to the QNIF and QLIF in the field of Medicine and Pharmacology for the 2007-2011 time period. The dashed lines show the average values of each dimension. Universities positioned at the top right hand of the figure are those which outstand in both dimensions. Those positioned on the bottom right outstand on the quantitative dimension but not on the qualitative dimension. At the top left, we observe university with small research output but high quality research. Lastly, in the bottom left, universities which do not outstand in any dimension are represented. As we can observe, although top universities outstand in both dimensions, many universities outstand in the qualitative dimension but do not do so in the quantitative dimension. Due to the bidimensional nature of the IFQ^{2}A index, these small institutions are reflected in the rankings.

3. Comparison by fields of the main international rankings and the I-UGR for Spanish universities

In this section we analyze the state of the Spanish university system using international and national rankings. For this, we first establish in Section 3.1 a set of criteria for the selection of the rankings we will use in order to set some basic common grounds which will allow a fair comparison between them. Then, in Section 3.2 we match rankings by fields between the international and national rankings and finally, we analyze the level of agreement between them. For this we use two indicators. On the one hand, we calculate the Spearman's rank correlation coefficient or Spearman's rho, which will indicate to what extent are the different rankings coherent between them. On the other hand, we show the level of agreement between rankings, which indicates if universities included in an international ranking coincide with those which occupy the top positions of the national ranking.

3.1 Selection of rankings

The aim is to use international and national rankings as complementary tools to offer on the one hand, a global perspective of the position of Spanish universities and, on the other hand, a

complete picture of the Spanish university system. For this, we first need to establish a set of criteria for choosing the most relevant rankings for our purposes. These are the following:

1) As we are analyzing the research dimension of universities, rankings must be based on the research performance of universities, at least partially.

2) Data retrieved for the construction of the rankings must come from a reliable bibliometric database or information resource, at least partially.

3) They must offer rankings by fields, as we have considered that only this way we can provide an accurate image of universities' research performance.

Based on these criteria we selected the I-UGR Rankings as national rankings and the following international rankings. The methodology of each ranking is available at its website, due to space limitations it has not been included in this paper:

1) Shanghai Ranking (http://www.shanghairanking.com/). It was not only the first international ranking launched (Liu & Cheng, 2005) but it is used as yardstick to measure the research excellence of universities worldwide (Docampo, 2011). It is based on six indicators, two of them (40% of the total rating) are based on data retrieved from the Web of Science (for more information on this ranking the reader is referred to Liu & Cheng, 2005; van Raan, 2005; Docampo 2011; Aguillo et al., 2010). Since 2007 it offers five rankings by field and since 2009, five ranking by subject.

2) *QS Ranking* (http://www.topuniversities.com/). The first edition of this ranking was launched in 2004. Until 2009 it was produced in partnership with the Times Higher Education, however, since then each company develops its own ranking (for more information on this ranking the reader is referred to Aguillo et al., 2010; Usher & Savino, 2007). 20% of the total rating assigned to each university is based on data retrieved from the database Scopus. It offers along with the global league table, 29 rankings by discipline classified into five major fields.

3) *NTU Ranking* (http://nturanking.lis.ntu.edu.tw). This ranking was first launched in 2007. It aims at measuring solely the quality of universities' research. It is based on 8 indicators all of them supported by bibliometric data from the Web of Science and the Thomson Reuters Essential Science Indicators (for more information on this ranking the reader is referred to e.g., Aguillo et al., 2010). Along with the global table league, it offers rankings by field and subject in a similar structure to that of the Shanghai Ranking. In this case, it offers 6 rankings by field and 14 rankings by subject.

3.2 Concordance between international and national rankings and levels of agreement

In order to establish fair comparisons and provide a global picture of the state of Spanish universities using national and international rankings, we first need to ensure that the classification of fields of national and international rankings is somehow similar and therefore, compatible. For this, we would need to analyze the way these fields are constructed for the four rankings used in this study and determine to which grade the methodology employed by each of them allows fair comparisons. As mentioned before, the I-UGR Rankings construct fields and disciplines by aggregating the Thomson Reuters subject categories. The NTU Ranking uses the same approach, and the construction of fields and subjects is declared at their website (http://nturanking.lis.ntu.edu.tw). However, this does not

occur for the other two rankings, which do not declare the methodology employed for establishing such fields. This lack of transparency is a shortcoming that must be taken into account when using these rankings for research policy.

We analyzed the fields and subjects of the selected international rankings and we established the homologous field or discipline according to the I-UGR Rankings. In Tables 4-6 we show the matching of fields per ranking. In general terms, we observe that it is possible to match most of the fields between the three international rankings selected and the I-UGR Rankings, although some exceptions are noted. The areas misrepresented in the I-UGR Rankings were Mechanical Engineering (QS Ranking and NTU Ranking), Law (QS Ranking) and all of the areas considered of the Arts & Humanities fields by the QS Ranking. This is due to the way the I-UGR Rankings are constructed, as they rely on the JCR and these lack journal rankings for these fields. Also, we observe that some fields of the international rankings (i.e., the Shanghai Ranking and the field of Social Science) include more than one of the tables by field of the I-UGR Rankings. Finally, the classification of fields and subfields does not always match between rankings. Although this issue has no relevance for the purposes of this analysis, we must point out that subjects considered as major areas in one ranking are considered in the other as subfields or disciplines.

Table 4. Matching of fields and disciplines between the Shanghai Ranking and the I-UGR Rankings

SHANGHAI RANKING	I-UGR RANKINGS	RHO	A
Natural Sciences & Mathematics	Mathematics / Physics / Chemistry	-0,50; -0,50; 0,50	0/3; 3/3; 2/3
Engineering/Technology & Computer Sciences	Engineering / Information & Communication Technology	*	1/3; 2/3
Life & Agricultural Sciences	Agricultural Sciences / Biological Sciences	1,00; 1,00	1/2; 2/2
Clinical Medicine & Pharmacy	Medicine & Pharmacy	1,00	2/2
Social Science	Other Social Sciences / Psychology & Education / Economics, Finance & Business	*	0/2; 0/2; 2/2
Mathematics	Mathematics	-0,23	4/8
Physics	Physics	0,72	5/5
Chemistry	Chemistry	0,26	8/10
Computer Science	Computer Science	0,41	3/6
Economics & Business	Economics, Finance & Business	*	2/2

Note: Rho indicates the Spearman's coefficient. A indicates the level of agreement between rankings, that is, the number of universities present in both rankings.
*Insufficient values to calculate the indicator

The three selected rankings included a total of 30 Spanish universities dispersed in 40 different fields and subfields. In Tables 4-6 we show the levels of agreement between international and national rankings according to the assignment of areas. For each area we calculate the Spearman coefficient to analyze the consistency between both rankings and the number of universities included in international rankings which take up the top positions of the national ranking. That is, if 6 Spanish universities are included in an international ranking but only two occupy positions between 1 and 6, the coincidence will be 2/6.

The Shanghai Ranking is the less consistent with the I-UGR Rankings as only two fields have significant correlations (Life & Agricultural Sciences and Physics), while the NTU Ranking shows high correlations in 11 out of 20 fields (Table 6) and the QS Ranking correlates in 7 out of 21(Table 5). The three fields with the highest correlations between the NTU Ranking and the I-UGR Rankings are Clinical Medicine (1,00), Materials Sciences (1,00) and Natural Sciences (0,94 with Physics). In the case of the QS Ranking, these three fields are Earth & Marine Sciences (1,00) and, Biological Sciences, Environmental Sciences and Account& Finance, all of them with a value of 0,87. The fields with high correlation belong in most

cases to the fields of Biomedicine, Life Sciences and Exact Sciences, and the ones with least correlation belong to the Social Sciences. Only one exception is noted in the field of Social Science for the NTU Ranking, which has a high correlation with the field of Economics of the I-UGR Rankings.

Table 5. Matching of fields and disciplines between the QS Ranking and the I-UGR Rankings

	QS RANKING	I-UGR RANKINGS	RHO	A
Arts & Humanities	Philosophy			
	Modern Languages			
	Geography	Geography & City Planning	0,68	2/6
	History			
	Linguistics			
	English Language & Literature			
Engineering & Technology	Computer Science & Information Systems	Computer Science	-0,87	1/3
	Chemical Engineering	Chemical Engineering	0,84	4/7
	Civil Engineering	Civil Engineering	-0,5	1/3
	Electrical Engineering	Electric & Electronic Engineering	-0,43	4/7
	Mechanical Engineering			
Life Sciences & Medicine	Medicine	Medicine	0,50	3/3
	Biological Sciences	Biological Sciences	0,87	3/3
	Psychology	Psychology	0,26	6/7
	Pharmacy & Pharmacology	Pharmacy & Toxicology	0,74	3/5
Natural Sciences	Physics & Astronomy	Physics	0,67	4/5
	Mathematics	Mathematics	0,21	2/4
	Environmental Sciences	Earth & Environmental Sciences	0,87	2/3
	Earth & Marine Sciences	Earth & Environmental Sciences	1,00	1/2
	Chemistry	Chemistry	0,80	3/4
	Materials Science	Materials Science	0,83	3/6
Social Sciences & Management	Statistics & Operational Research	Statistics	-0,62	3/6
	Sociology	Sociology	-1,00	1/2
	Politics & International Studies	Political Science	**	0/1
	Law			
	Economics & Econometrics	Economics	0,50	4/6
	Account & Finance	Business	0,87	2/3
	Communication & Media	Communication	0,00	0/3
	Education	Education	0,29	1/5

Note**:** Rho indicates the Spearman's coefficient. A indicates the level of agreement, that is, the number of universities present in both rankings.

*Insufficient values to calculate the indicator

Table 6. Matching of fields and disciplines between the NTU Ranking and the I-UGR Rankings

NTU RANKING	I-UGR RANKINGS	RHO	A
Agriculture	Agriculture	0,34	10/13
Clinical Medicine	Medicine	1,00	2/3
Engineering	Engineering	0,19	9/11
Life Sciences	Biological Sciences	0,77	6/6
Natural Sciences	Mathematics / Physics / Chemistry & Chemical Engineering	0,14; 0,94; 0,75	7/10; 8/10; 9/10
Social Sciences	Other Social Sciences / Psychology & Education / Economics…	0,36; -0,69; 0,95	3/4; 3/4; 2/4
Agricultural Sciences	Agricultural Sciences	0,38	17/21
Environment/Ecology	Earth & Environmental Sciences	0,53	6/9
Plant & Animal Science	Biological Sciences	0,55	6/10
Computer Science	Computer Science	0,754	8/13
Chemical Engineering	Chemical Engineering	0,55	8/11
Civil Engineering	Civil Engineering	0,47	8/12
Electrical Engineering	Electrical & Electronic Engineering	0,58	8/11
Mechanical Engineering			
Materials Science	Materials Science	1,00	4/5
Pharmacology &	Pharmacy & Toxicology	0,6	5/5
Chemistry	Chemistry	0,84	14/15
Geosciences	Geosciences	0,89	5/6

Mathematics	Mathematics	0,88	11/12
Physics	Physics	0,89	6/7

Note: Rho indicates the Spearman's coefficient. A indicates the level of agreement. *Insufficient values to calculate the indicator

4. Conclusions

In this paper we explore the possibility of using national rankings to complement international rankings, as the latter usually offer a poor representation of national university systems. We insist on the importance of rankings by fields (García et al., 2012) as these do not neglect universities' disciplinary focus and offer a complete picture of universities' research performance. For this we use Spain as a study case and we introduce the I-UGR Rankings for Spanish universities. This ranking uses the IFQ^2A Index, an indicator which measures the qualitative as well as the quantitative dimension of research (Torres-Salinas, 2011c). Then, we select three international rankings (Shanghai Ranking, QS Ranking and NTU Ranking) according to a given set of criteria; we analyze the concordance between the fields these rankings offer and the ones given by the I-UGR Rankings in order to establish equivalences between them. Finally, we calculate the Spearman's coefficient and we analyze the levels of agreement between the universities included in the international rankings and the top positions of the national rankings. From this analysis we conclude that national rankings can complement international rankings in order to provide a complete picture of university systems despite the methodological differences aroused from the comparisons by fields.

Although there are differences between the methodologies employed by the various rankings, it is possible to use both and combine them in a research policy context. The coherence between them is especially significant for the fields of Biomedicine, Life Sciences and Exact Sciences. This does not occur in the Social Sciences where the only exception noted is Economics. In general terms, the NTU Ranking is the one which seems to be more consistent with the I-UGR Rankings. This is not surprising as it is the only one which measures solely the research dimension and fully based on the Web of Science, as it occurs with the I-UGR Rankings. Also, the confection of the fields and subfields is similar as both rankings aggregate subject categories to construct the fields, while in the other two cases this is not explained. Another issue which affects the correlation between rankings has to do with the way results are presented in the Shanghai Ranking and the QS Ranking, as they only show the intervals in which each university is positioned after they surpass certain threshold. Although the QS Ranking provides the rating of each university, allowing the user to rank universities, this those not occur with the Shanghai Ranking. Having said this and despite of the shortcomings mentioned, we observe coherent results between rankings leading us to assure that it is possible to use national rankings as complement to international rankings in order to offer a complete picture of national university systems in a research policy context.

Acknowledgments

Nicolás Robinson-García and Jose G. Moreno-Torres are currently supported by a FPU grant from the Ministerio de Educación y Ciencia of the Spanish Government.

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