To Rank Or To Be Ranked:
The Impact of Global Rankings in Higher Education

Simon Marginson
Centre for Research in International Education
Monash University, Australia
&
Marijk van der Wende
Centre for Higher Education Policy Studies
University of Twente, The Netherlands

1. Globalisation, competition and stratification

One generation ago international relations in higher education, while often generative of new developments, were largely marginal to the on-going day to day operations of HEIs and systems except in scientific research. Now the growing impact of the global environment in and through higher education systems and institutions is inescapable. Cross-border flows, relations, cooperation and competition have become an essential dimension of national policy making and of the strategic apparatus of executive and disciplinary leaders in individual HEIs. With global university rankings (SJTIHE 2006; Times Higher 2005), especially the global ranking of research performance, higher education itself has entered an era of open global competition between nations and between individual HEIs as global actors in their own right. Increasingly, national higher education systems and HEIs are judged by where they stand in global terms. Across the world national policy makers and HEIs must take account of a global higher education environment in which resources and educational status are distributed unequally, the Anglo-American nations (especially the USA) and the English language are often dominant, and the process of Europeanisation is opening up new possibilities

However the rise of global referencing does not signify that higher education has simply become a single worldwide network of HEIs. In global markets studies of international student choice-making indicate that on the whole; and with the partial exception of the small group of HEIs, the Harvards and Oxfords, that are household names all over the world; the national identity of HEIs continues to be more important in the eyes of the world than the institutional identity of the individual HEIs (OECD 2004, p. 266). Even advanced levels of deregulation and decoupling from national system requirements take place only at the behest of national governments, all of which retain an ordering function in relation to their higher education systems. In most, though not all, nations, government remains the principal financer and the public sector is the majority provider of HEIs overall. Though the role of the private sector is growing worldwide (Levy 2002), and in some nations it constitutes a majority of HEIs; in most nations foreign providers (which are all defined as part of the private sector when operating outside their own national jurisdiction) play only a marginal role, except in purely on-line education which overall enrols but a small proportion of students. In the multilateral GATS/WTO negotiations a national interest bias is strongly apparent: all OECD governments retain control over the national character of the systems under their jurisdiction; and among the exporting nations a typical stance is to expect a greater degree of deregulation in foreign nations than the exporter is prepared to countenance at home.

Yet globalisation does have transformative implications for the internal relations between nation-states and their HEIs. In one sense the single worldwide logic of global rankings is confirmed, in that within global networks universities deal directly with each other in their

own right. The model of stand-alone global actors was long practised among individual researchers and scholars and has always shaped the dealings of certain leading universities (mostly in the USA and UK) with the rest of the world. It is now much more widespread. Global linkages, especially in research and in cross-border education, are facilitating the more autonomous evolution of individual institutions. This process has been encouraged in many nations by policies of corporatisation and partial devolution based on governance by steering from a distance and more plural income raising; a model of provision which reflects informal cross-border norms influenced by practices in the English speaking nations and the policy templates of the World Bank. No doubt such changes at the national level facilitate an engagement with global trends that provide individual HEIs with more strategic options. Indeed, in many nations corporatisation and devolution are explicitly designed to further the cross-border effectiveness of HEIs, and in some nations HEIs operate on a relatively independent basis in their cross-border dealings. Everywhere research-intensive universities (especially leading ones) tend to enjoy more autonomy than do other HEIs, in this and all respects. In any case, in an electronically networked world direct faculty to faculty relationships, and HEI to HEI relationships, as expressed in messaging, knowledge transfers, trade and people mobility, tend to move beyond the ken and control of regulated cross-border relationships in governance and policy. Nation-states cannot fully comprehend all the cross-border linkages of HEIs and are unwise to try. However in some nations cross-border relations are partly articulated via the national authorities – this can enable a more coordinated global strategy, though there is a danger that openness to global developments will be inhibited – and overall, the 'strategic policies of national governments continue to play a major role in setting the frames for international communication, cooperation and mobility as well as for international competition' (Teichler 2004, p. 21).

2. Global University Rankings

Global university rankings have cemented the notion of a world university competition or market capable of being arranged in a single 'league table' for comparative purposes and given a powerful impetus to intranational and international competitive pressures in the sector. Global comparisons are possible only in relation to one model of institution, that of the comprehensive research intensive university. This model of HEI is the only one sufficiently widespread throughout the world to lend itself to the formation of a single competition; though there is nevertheless significant variation in the size and scope of leading research universities, which range from small establishments focused on graduate education and research to very large access-based national universities such as those of Mexico and Buenos Aires in Argentina. The rankings devised thus far have tended to favour the former kind of university rather than the latter. In this and other ways, such as the reliance on English language research literatures, the rankings systems are loaded in favour of some universities and systems at the expense of others. Any system of rankings is purpose-driven, with outcomes shaped by the assumptions and values built into the methods of comparison and calculation. In that sense all rankings systems are both incomplete as a description of the reality of higher education (for example the performance of a nation's research-intensive universities says nothing about the performance of its specialist business schools or its technical training institutes) and contain in-built bias. This does not rob rankings of their power, however.

The most globally influential global rankings are those prepared by the Shanghai Jiao Tong University, first issued in 2003. The second set of global rankings, prepared by *The Times Higher*, was first published in 2004. These rankings were intuitively plausible because they confirmed the reputations of the leading American and British universities, the household names such as Harvard, Stanford, Yale, Berkeley, MIT, Cambridge and Oxford. The *Economist* (2005) cited the Jaio Tong group as the 'World Super-league'. Table 1 lists the top 20 universities as determined by each of the Shanghai Jiao Tong University and the *Times*

Higher. The *Times Higher* 'Super-league' is the more plural of the two, with 12 American universities in the top 20 rather than the 17 in the Shanghai Jiao Tong University table, four UK universities rather than two, and universities from four other nations (France, Japan, China and Australia) rather than the one (Japan) in the Jiao Tong listing. *Times* places 21-25 are also held by universities from nations other than the USA and UK.

Table 1. The Global Super-league: the world's leading universities as measured by the Shanghai Jiao Tong University, and The Times Higher, 2005

Shanghai Jiao Tong research university rankings				**The Times Higher university rankings**			
	university	**points**	**nation**		**university**	**points**	**nation**
1	Harvard U	100.0	USA	1	Harvard U	100.0	USA
2	U Cambridge	73.6	UK	2	Massachusetts IT	86.9	USA
3	Stanford U	73.4	USA	3	U Cambridge	85.8	UK
4	U California, Berkeley	72.8	USA	4	U Oxford	83.9	UK
5	Massachusetts IT	70.1	USA	5	Stanford U	83.4	USA
6	California IT ('Caltech')	67.1	USA	6	U California, Berkeley	80.6	USA
7	Columbia U	62.3	USA	7	Yale U	72.7	USA
8	Princeton U	60.9	USA	8	California IT ('Caltech')	71.5	USA
9	U Chicago	60.1	USA	9	Princeton U	64.8	USA
10	U Oxford	59.7	UK	10	Ecole Polytechnique	61.5	France
11	Yale U	56.9	USA	11	Duke U	59.1	USA
12	Cornell U	54.6	USA	11	London S. of Economics	59.1	UK
13	U California, San Diego	51.0	USA	13	Imperial College London	59.0	UK
14	U California, Los Angeles	50.6	USA	14	Cornell U	58.1	USA
15	U Pennsylvania	50.2	USA	15	Beijing U	56.3	China
16	U Wisconsin-Madison	49.2	USA	16	Tokyo U	55.1	Japan
17	U Washington (Seattle)	48.4	USA	17	U Calif., San Francisco	54.9	USA
18	U Calif., San Francisco	47.8	USA	17	U Chicago	54.9	USA
19	Johns Hopkins U	46.9	USA	19	U Melbourne	54.5	Australia
20	Tokyo U	46.7	Japan	20	Columbia U	53.9	USA

U = University; IT = Institute of Technology
Source: SJTUIHE (2006); Times Higher (2006)

The global rankings immediately secured great prominence in higher education, policy and public arenas; and have already had discernable effects in institutional and policy behaviours. While there has been some disquiet about the impact of the rankings and instances of critique of the methods (particularly in HEIs and nations where performance was less good than expected), there have been few concerted efforts to discredit the rankings process, which appears to have secured public credibility. Given this research universities know that they must succeed within the terms of the measures. The rankings have generated a strong drive to the position, particularly in the Shanghai Jiao Tong rankings which are seen as the more credible. Within national systems, the rankings have prompted desires for high ranking research universities both as a symbol of national achievement and prestige and as an engine of economic growth. There has been a growing emphasis on strategies of institutional stratification and concentration of research resources, some of which pre-dated the rankings. At the same time global rankings have stimulated global competition for leading researchers and the best younger talent. All of these responses have both cemented the role of the rankings themselves and further intensified competitive pressures.

3. Shanghai Jiao Tong University rankings

The Shanghai Jiao Tong University (SJTU) rankings are not holistic university rankings, though they have been widely interpreted as such, notwithstanding the strenuous efforts by the SJTU group In compiling its 'Academic Ranking of World Universities' the SJTU group made a deliberate decision to focus on research performance. It was considered impossible to

compare teaching and learning on a world-wide basis, 'owing to the huge differences between universities and the large variety of countries, and because of the technical difficulties inherent in obtaining internationally comparable data'. Nor did the SJTU group want to use subjective measures of opinion, or data that was sourced from the universities themselves. It was believed that the only data sufficiently reliable for the purpose were broadly available and internationally comparable data of measurable research performance (Liu & Cheng 2005, p. 133). An additional rationale for the use of research performance data is that arguably, research is already the most important single determinant of global university reputation, and the only indicator available that is unambiguously merit-based. The SJTU has consulted widely throughout the higher education world on the calculation of the index and the compilation of the data. The successive measures appear to be increasingly robust.

The major part of the SJTU index is determined by publication and citation performance in the sciences, social sciences and humanities: 20 per cent by citation in leading journals; 20 per cent by articles in *Science* and *Nature*; and 20 per cent by the number of 'HiCi' researchers in the institution, researchers named in the Thomson/ISI classification of the leading 250-300 researchers in their broad field of study, of which nearly all are science-based disciplines, on the basis of citation performance (ISI 2006). Another 30 per cent of the index is determined by the location of the winners of Nobel Prizes and Fields Medals in mathematics, during their training (10 per cent) and in their current employment (20 per cent). The remaining 10 per cent of the index is determined by taking the total derived from the above data and dividing by the number of staff. As such the SJTU rankings favour universities that are large and comprehensive enough to amass strong research performance over a broad range of research fields, while carrying relatively few staff that are research inactive. They also favour universities that are particularly strong in the sciences, favour universities from English language nations because English is the language of research – non English language work is both published less and cited less - and favour universities from the USA because of nationally circular citation patterns: Americans tend to cite Americans (Altbach 2006). Of the HiCi researchers, 3568 are located in the USA compared to 221 in Germany, 215 in Japan, 162 in Canada, 135 in France, 97 in Australia, 90 in Switzerland and 83 in the Netherlands. India has 10 HiCi researchers and mainland China 20. Among the US universities Stanford alone has 91 HiCi researchers, more than all the Swiss universities together; UC Berkeley 81 and Harvard and MIT each 72. There are 42 at the University of Cambridge in the UK. A limitation of the citation data is that they date from the second half of the 1990s. The SJTU index is open to the criticism that it measures past research rather than present research capacity. However, it is difficult to see how a reliable metric of present capacity could be created.

The Nobel Prize criterion is perhaps the most controversial, as the prize is submission based and at times has been open to claims that an element of politicking enters the decisions; that is, scientific merit is not the only determining factor. Like the citation measures the Nobel Prize criterion also works in favour of a small select group of nations. David Bloom (2005, p. 35) notes that of the 736 Nobel Prizes awarded up till January 2003, 670 (91.0 per cent) went to people from high-income countries as defined by the World Bank, and a majority to people from the USA, with 3.8 per cent from the Russia/Soviet Union and Eastern Europe and 5.2 per cent from emerging and developing nations. People from the latter group had by far their best prospect of winning a Nobel Prize in the categories of Literature (10.1 per cent) or Peace (19.8 per cent) but these areas are excluded from the SJTU index of research performance. Further, of the nine scientists who originated from emerging or developing countries and who won Nobel Prizes in Chemistry, Physics, Physiology or Medicine, four were working in universities in the USA and two in the UK and Europe.

4. The Times Higher *rankings of universities*

The *Times Higher* has set out to provide a wholistic ranking of HEIs, self-described as 'the best guide to the world's top universities' (*Times Higher* 2005). The rankings appear to have been designed to service the market in cross-border degrees in which many UK universities are very active. A high value is placed on institutional reputation and on the level of 'internationalisation' of HEIs; and in the outcome the rankings tend to favour HEIs with a strong presence in the degree market. A total of 40 per cent of the *Times* index is comprised by an opinion survey of academics around the world, and another 10 per cent by a survey of 'global employers'. There are two internationalisation indicators: the proportion of students that are international (5 per cent) and the proportion of staff that are international (5 per cent). Another 20 per cent is determined by the student-staff ratio, which is treated as proxy for teaching 'quality', and the remaining 20 per cent of the *Times* index is comprised by research citation performance.

The emphasis on reputation tended to favour the best known universities in many nations. Along the way, the *Times* rankings boosted the number of leading British universities and reduced the number of US universities in the world's top 100 from the 53 in Jiao Tong to just 31. However, the *Times Higher* rankings are open to a number of methodological criticisms. The two surveys are non-transparent: it is not specified who has been surveyed or what questions were asked. Reputational surveys are open to the charge that they often recycle reputation (Guarino et al. 2005, p. 149) rather than rewarding known quality, and degenerate simply into 'popularity contests' (Altbach 2006). 'Raters have been found to be largely unfamiliar with as many as one third of the programs they are asked to rate' (Brooks 2005, p. 7). One problem here is that well known university 'brands' tends to generate 'halo' effects. One American survey of students found that Princeton was ranked in the top 10 Law schools in the country, but Princeton did not have a Law school (Frank and Cook 1995, p. 149). Further, the *Times* student internationalization indicator rewards supplier strategies of volume building, rather than the quality of student demand or the quality of programs. Teaching quality cannot be adequately assessed using a resource quantity indicator such as the student-staff ratio. And research plays a relatively minor part in determining the *Times* rankings. An HEI's marketing division is better rewarded than its researchers. This does not square well with the way that higher education is understood in most nations. Further by favouring HEIs active in the cross-border degree market, the Times rankings created anomalies. They inflated the performance of Australian universities, which achieved a 12 universities in the world's top 100. Canada, a similar system in many respects, achieved only three universities in the top 100. Arguably, Canadian higher education is stronger in terms of system size, resources per student, the level of participation in higher education, and research performance, though the Canadian system is weaker in the export market than Australia.

5. Special focus on research in global rankings

Research is not only the most globalised of all activities in higher education, research capacity is a key marker in the higher education landscape because the research standing of HEIs and nations feeds into both their capacity to produce globally-salient outputs and their generic attractiveness to other HEIs, to prospective students and to economic capital. The Shanghai Jiao Tong University Institute of Higher Education (SJTU) global university rankings provide data that enables the research performance of individual HEIs and the upper research level of national systems to be compared. The data are largely based on measurable quantitative and qualitative indicators of research outputs, plus the incidence of Nobel Prizes and Fields Medals in Mathematics. These data are helpful in mapping the global position of nations and HEIs, especially to the extent that higher education is imagined as a competition between nations and between HEIs for status and resources.

The SJTU data show that 53 of the world's leading research universities are located in the United States, led by Harvard at number one. The UK provides the University of Cambridge

at number 2 and eleven of the top 100 research universities. When Canada (four) and Australia (two) are added, the English-speaking nations between them constitute 70 per cent of top 100 group. A further 23 are located in Western Europe, five in Japan, and one in each of Israel and Russia. The principal Western European nations, in terms of the number of universities in the global 100, are Germany (five) France and Sweden (four each), Switzerland (three) and Netherlands (two). China and India have none of the top 100 research universities. India has just three in the top 500. China including Hong Kong has 18 of the top 500; another four are located in Taiwan.

Sometimes, for historical reasons and where resources and status have been concentrated in particular institutions, individual HEIs play a larger role in the world than the global resource position of the nation would suggest. One such case is the Moscow State University, ranked as 67th in the world in the Shanghai Jiao Tong University rankings but one of just two Russian universities named in the top 500 research universities (SJTUIHE 2006). The opposite example is China, which at this point lacks the level of research university performance commensurate with its standing as a world economic power, though policy aims to redress the imbalance. For the most part, however, there is a broad correlation between a nation's overall economic capacity and the standing of its research universities. Table 2 maps each nation's share of global economic capacity against its share of the Shanghai Jiao Tong University top 100 and top 500 research universities. National economic capacity is calculated by multiplying National Income with National Income per head, thus taking into account both quantitative economic weight and the intensity of wealth as measured by income per person. Each nation's share of global economic capacity is calculated by comparing its national economic capacity to the global total. The nations whose university systems are above average performers in research terms, relative to national economic capacity are Israel, Sweden, Switzerland, UK, Netherlands, Canada, Finland, Denmark, Australia and the USA. The United States performs very well in its share of the top 100 research universities but interestingly, it under-performs in its share of the world's top 500. This indicates the stratification effects of a highly competitive system – in the USA there is a concentration of research resources in the leading universities at the expense of the regional knowledge economies. Germany does well at the level of the top 500, indicating that there is a broad-based research capacity across the national system, but less well in its share of the top 100. Japan underperforms on both measures. China, Korea, Singapore, Belgium, Spain, Norway, Hungary, New Zealand, Brazil, South Africa and others are strong in the top 500 group relative to economic capacity but have no top 100 research universities.

It is significant that in the nations that do best relative to economic capacity, aside from the USA (which is so often the exception in national patterns of higher education) the private sector plays a relatively minor role in the sector; and in most of these cases, especially in OECD Europe, research resources are broadly distributed across the public university sector. Several nations that under-perform at the top 100 level have large private sectors and a highly stratified research effort, including Japan, Korea, Poland, Brazil and Mexico. This underlines the dependence of research capacity on public investment, given the public good character of research (Stiglitz 1999).

Table 2. Nations' share of the top 500 and 100 research universities as measured by Shanghai Jiao Tong U, compared to their share of world economic capacity, 2003 / 2005

nation	Gross National Income 2003	population 2003	GNI per head 2003	share of world economic capacity	share of top 500 research universities 2005	share of top 100 research universities 2005
	$b USD PPP		$ USD PPP	%	%	%
United States	10,978	290.8	37,750	41.8	33.6	53.0
United Kingdom	1643	59.3	27,690	4.6	8.0	11.0
Germany	2279	82.5	27,610	6.3	8.0	5.0
Japan	3629	127.6	28,450	10.4	6.8	5.0
Canada	950	31.6	30,040	2.9	4.6	4.0
France	1652	59.8	27,640	4.6	4.2	4.0
Sweden	239	9.0	26,710	0.6	2.2	4.0
Switzerland	237	7.4	32,220	0.8	1.6	3.0
Australia	572	19.9	28,780	1.7	2.8	2.0
Netherlands	463	16.2	28,560	1.3	2.4	2.0
Italy	1546	57.6	26,830	4.2	4.6	1.0
Israel	130	6.7	19,440	0.3	1.4	1.0
Austria	241	8.1	29,740	0.7	1.2	1.0
Finland	143	5.2	27,460	0.4	1.0	1.0
Denmark	167	5.4	31,050	0.5	1.0	1.0
Norway	173	4.6	37,910	0.7	0.8	1.0
Russian Federation	1284	143.4	8950	1.3	0.4	1.0
China *	6410	1288.4	4980	3.2	6.5	0.0
Spain	910	41.1	22,150	2.0	4.5	0.0
Korea	862	47.9	18,000	1.6	4.0	0.0
Belgium	300	10.4	28,920	0.9	3.5	0.0
China Hong Kong	195	6.8	28,860	0.6	2.5	0.0
Taiwan	n.a	n.a.	n.a.	n.a.	2.5	0.0
New Zealand	86	4.0	21,350	0.2	2.5	0.0
Brazil	1326	176.6	7510	1.0	2.0	0.0
South Africa	464	45.8	10,130	0.5	2.0	0.0
India	3062	1064.4	2880	0.9	1.5	0.0
Ireland	123	4.0	30,910	0.4	1.5	0.0
Poland	428	38.2	11,210	0.5	1.5	0.0
Singapore	103	4.3	24,180	0.3	1.0	0.0
Hungary	140	10.1	13,840	0.2	1.0	0.0
Turkey	475	70.7	6710	0.3	1.0	0.0
Greece	220	11.0	19,900	0.4	1.0	0.0
Mexico	919	102.3	8980	0.8	0.5	0.0
Argentina	420	36.8	11,410	0.5	0.5	0.0
Chile	155	15.8	9810	0.2	0.5	0.0
Czech Republic	159	10.2	15,600	0.3	0.5	0.0
Portugal	185	10.4	17,710	0.3	0.5	0.0
all other nations **	8219	2338.2	3456	2.9	0.0	0.0
world total	51,401	6272.5	8190	100.0	100.0	100.0

* China Hong Kong is listed separately ** Population and GDP data include Taiwan World economic capacity is measured as an aggregate of the individual nations' economic capacity, defined as GNI multiplied by GNI per head. All nations without any top 500 research universities are treated as one unit.
sources: World Bank (2006); SJTUIHE (2006)

Other measures of the worldwide distribution of research output confirm the Jiao Tong map of research performance. The United States alone produced almost a third of the world output of scientific articles in 2001, and 'its scientific literature accounted for 44 per cent of citations in the world scientific literature' (Vincent-Lancrin 2006, p. 16). The vast majority of Nobel

prizes are awarded to people from high income countries and the majority to scientists from the USA (Bloom 2005, p. 35). Likewise, the potential for productive synergies between university research and industry is unequally distributed. 'Rich countries, home to 15 per cent of the world's population, are responsible for over 90 per cent of the patents granted' (Bloom 2005, p. 25). These patterns are replicated in research publishing. In 2001 scientists and social scientists in the United States published 200,870 papers in major journals. The volume of the papers from Japan was 57,420, the UK 47,660, Germany 43,623, France 31,317 and Switzerland 8107. By contrast, in Indonesia, a middle level developing nation with two thirds of the population of the USA, there were 207 papers. There were 11,076 from India and 20,978 from China (NSF 2006).

Table 3. Output of published articles in science and engineering (including medicine and social sciences), OECD nations and selected comparators, 1988 and 2001

nation	**total popul'n**	**number of published science and engineering articles**		**proportion of total world output of S & E articles**		**change in number of articles**
	2003	**1988**	**2001**	**1988**	**2001**	**1988-2001**
	millions			%	%	1988 = 100
United States	290.8	177,682	200,870	38.1	30.9	113.1
Japan	127.6	34,435	57,420	7.4	8.8	166.7
United Kingdom	59.3	36,509	47,660	7.8	7.3	130.5
Germany	82.5	29,292	43,623	6.3	6.7	148.9
France	59.8	21,409	31,317	4.6	4.8	146.3
Canada	31.6	21,391	22,626	4.6	3.5	105.8
Italy	57.6	11,229	22,313	2.4	3.4	198.7
Spain	41.1	5432	15,570	1.2	2.4	286.6
Australia	19.9	9896	14,788	2.1	2.3	149.4
Netherlands	16.2	8581	12,602	1.8	1.9	146.9
Korea	47.9	771	11,037	0.2	1.7	1431.5
Sweden	9.0	7573	10,314	1.6	1.6	136.2
Switzerland	7.4	5316	8107	1.1	1.2	152.5
Belgium	10.4	3586	5984	0.8	0.9	166.9
Poland	38.2	4030	5686	0.9	0.9	141.1
Finland	5.2	2789	5098	0.6	0.8	182.8
Denmark	5.4	3445	4988	0.7	0.8	144.8
Austria	8.1	2241	4526	0.5	0.7	202.0
Turkey	70.7	507	4098	0.1	0.6	808.3
Greece	11.0	1239	3329	0.3	0.5	268.7
Norway	4.6	2192	3252	0.5	0.5	148.4
Mexico	102.3	884	3209	0.2	0.5	363.0
New Zealand	4.0	2075	2903	0.4	0.4	139.9
Czech Republic	10.2	2746	2622	0.6	0.4	95.5
Hungary	10.1	1714	2479	0.4	0.4	144.6
Portugal	10.4	429	2142	0.1	0.3	499.3
Ireland	4.0	790	1665	0.2	0.3	210.8
Slovak Republic	5.4	n.a.	955	n.a.	0.1	n.a.
Iceland	n.a.	69	174	n.a.	-	252.2
Luxembourg	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
China	1295.2	4619	20,978	1.0	3.2	454.2
Russian Federation*	143.4	n.a.	15,846	n.a.	2.4	n.a.
India	1064.4	8882	11,076	1.9	1.7	124.7
Taiwan	n.a.	1414	8082	0.3	1.2	571.6
Brazil	176.6	1766	7205	0.4	1.1	408.0
Israel	6.7	4916	6487	1.1	1.0	132.0
Argentina	36.8	1423	2930	0.3	0.5	205.9
Singapore	4.3	410	2603	0.1	0.4	634.9

South Africa	45.8	2523	2327	0.5	0.4	92.2
Chile	15.8	682	1203	0.1	1.9	176.4
Egypt	67.6	1130	1548	0.2	0.2	137.0
Indonesia	214.7	59	207	-	-	350.8
Pakistan	148.4	235	282	0.1	-	120.0
Bangladesh	138.1	95	177	-	-	186.3
Nigeria	136.5	886	332	0.2	0.1	37.5
world total	6272.5	466,419	649,795	100.0	100.0	139.3

* The number of articles from the USSR was 31,625 in 1988, 6.8 per cent of world output. The number of articles from Russia declined from 21,612 (3.8 per cent) in 1994 to 15,846 (2.4 per cent) in 2001. n.a. = data not available.
Source: NSF (2006); World Bank (2006)

Though inequalities between nations in scientific capacity will persist, the specific patterns change over time. Table 3 provides each OECD nation's number and share of papers published in science and engineering fields, including medicine and social sciences, in 1988 and 2001, plus data for all other nations producing more than 1000 papers in 2001and four emerging nations with populations of more than 100 million but little scientific infrastructure. OECD Europe excluding UK published 29.4 per cent of the world's papers in 2001, compared to 44.6 per cent in all English-speaking countries. The data show that there has been some pluralisation of scientific publication since 1988. The number of papers from South Korea increased remarkably from 771 in 1988 to 11,037 in 2001, from 0.2 to 1.7 per cent of world output. The number of papers from China also grew rapidly, from 4619 papers (1.0 per cent) in 1988 to 20,978 (3.2 per cent) in 2001. Likewise Taiwan's share rose from 0.3 to 1.2 per cent, and Singapore's share from 0.1 to 0.4 per cent. The US share of world scientific papers fell from 38.1 per cent in 1988 to 30.9 per cent in 2001. In 1999 the total output of scientific papers from Western Europe moved past that of North America. Between 1988 and 2001 the total output of articles from North America rose by 13 per cent compared to 59 per cent in Western Europe and 119 per cent in Asia (Vincent-Lancrin 2006, p. 16; NSF 2006).

6. Limitations and methodological issues

Rankings are also used in many national systems, to provide data supporting student choice-making and in some nations guide allocations of public funds, and also simply to feed public and sector appetites for data on institutional status. It is no coincidence that media companies have often been in the forefront of rankings development: comparative rankings are entertaining in their own right, regardless of the administrative uses to which the data are put and the effects they might have. In the United States the annual *US News and World Report (USNWR)* survey, which commenced in 1983, has become very influential in determining institutional prestige and influencing flows of students, faculty and resources. In China several systems of national rankings are in use (Liu & Liu 2005). Global and national rankings are now the subject of a burgeoning research literature, which is appropriate given their importance. The comparison of ten rankings by Van Dyke (2005) concludes that although the rankings share broad principles and approaches, they differ considerably in detail related to aims, systems, cultures and availability and reliability of data. A common problem is that most rankings systems purport to 'evaluate universities as a whole' (Dyke 2005, p. 106). As Rocki (2005, p. 180) notes in reflecting on the Polish experience: 'The variety of methodologies, and thus of criteria used, suggest that any single, objective ranking could not exist'. Dill and Soo (2005) compare five rankings system. They find that the tables vary in their validity, comprehensiveness, comprehensibility, relevance, and functionality; though they conclude that nevertheless, definitions of academic quality are tending to converge. This is disputed by Usher and Savino (2006) who cover 19 league tables and university rankings systems from around the world. Like Van Dyke (2005) they make the point that the different rankings systems are driven by different purposes and are associated with different notions of

what constitutes university quality. 'Quality in higher education is a highly contested notion' (Usher and Savino, 2006, p. 9). They also note the arbitrary character of the weightings used to construct composite indexes covering different aspects of quality or performance. 'The fact that there may be other legitimate indicators or combinations of indicators is usually passed over in silence. To the reader, the author's judgment is in effect final' (Usher and Savino 2006, p. 3).

A recurring difficulty is that no ranking or quality assessment system has been able to generate data based on measures of the 'value added' during the educational process; and few focus on teaching and learning at all (Dill & Soo 2005, p. 503 & 505) though data in these areas would be most useful for prospective students. Indicators such as student selectivity and research performance have become proxies for 'quality'; yet these qualities drive the reputation of an HEI more than they drive its educational program. There is no *necessary* connection whatsoever between the quality of teaching and learning, and the quantity and quality of research (let alone the level of student selectivity). Dill and Soo remark (2005, p. 507) that 'empirical research … suggests that the correlation between research productivity and undergraduate instruction is very small and teaching and research appear to be more or less independent activities'. As Altbach states, 'there are, in fact, no widely accepted methods for measuring teaching quality, and assessing the impact of education on students is so far an unexplored area as well' (Altbach 2006; see also Guarino et al. 2005, p. 149). When criteria such as research and student selectivity are adopted as the base of a holistic rankings of institutions for market purposes, the terms of inter-institutional competition are being defined by credentialism not the formative role of higher education, as if students' only concern is the status of their degrees not what they learn. However, US and UK research suggests that only some potential students are interested primarily in the prestige ranking of HEIs; and interestingly, these students tend to be drawn disproportionately from high achieving and socially advantaged groups (Dill & Soo 2005, p. 513). It is as if those students who expect to participate and to succeed in higher education are primarily interested in their status position within the sector, whereas others such as those from first generation higher education families might be more conscious of the absolute benefits of participation, and rather less focused on the map of relative advantage within the sector. This area would benefit from further research, conducted on a comparative basis.

Nevertheless, whether individual students are primarily concerned with status or not, and regardless of the particular selection of qualities that each ranking scheme measures, any system of global rankings must function as a reputation maker that entrenches competition for prestige as a principal aspect of higher education, and this is an effect that tends to feed on itself over time. The SJTU and *Times* rankings both tend to reproduce and to exacerbate the existing vertical differences in the higher education landscape. 'The fact is that essentially all of the measures used to assess quality and construct rankings enhance the stature of the large universities in the major English-speaking centres of science and scholarship and especially the United States and the United Kingdom' (Altbach 2006). What is more open is the extent to which the prestige fostered by rankings is grounded in real differences in HEI quality or merely recycles the status order; whether ranking feeds into a process of continuous improvement in quality and student servicing or not; and whether there are downsides of rankings form the point of view of students, HEIs, systems or the public interest. In the United States, over the years HEIs have learned to target their behaviour to maximise their *USNWR* position. This has had perverse effects from the public interest viewpoint, for example the manipulation of student entry to maximise student scores and refusal rates, and the growth of merit-based student aid at the expense of needs-based aid (Kirp 2004). Despite this there has been little challenge to the continued functioning of the *USNWR* survey which has entrenched itself in the public domain. It is likely that global HEI rankings will prove to be just as irresistible. Certainly, they are unlikely to go away. The worst case outcome is that there will again be policy downsides without a compensating dynamic of quality improvement or better data for students.

The central dilemma of rankings is two-fold. First, whether rankings are specifically derived from existing reputation or not, they tend to foster holistic reputational judgments of HEIs that are not strictly mandated by the data used to compile the rankings and the methods used to standardise and weight the data. 'League tables' become highly simplistic when they are treated as summative. But this is normally the case. The desire for rank ordering overrules all other considerations. For example a common problem is that in rankings systems HEIs are rank ordered even where differences in the data are not statistically significant. Second, HEIs have different goals and missions and are internally differentiated. This again suggests that it is invalid to measure and compare individual HEIs as a whole; and still less to compare different HEIs in a national system on a holistic basis, let alone to compare HEIs across national and regional borders. A better approach to rankings begins from the recognition that all rankings are partial in coverage and contain biases, and that all rankings are purpose-driven. It is valid to engage in rankings provided they are tailored to specific and transparent purposes, and interpreted only in the light of those purposes. At the same time, the different purposes and their corresponding data should not be combined, using arbitrary weightings, in the search for the chimera of a holistic order. Composite approaches 'muddy the waters' and undermine the validity of the information. The link between purpose and data is lost. For example it is valid in itself to seek data based on reputational surveys, as reputation is an important indicator of competitive position. What is invalid is to mix the subjective data with \objective data such as those about resource levels or research performance.

7. European responses to rankings

In Europe the weak representation of European higher education in the two global rankings systems - only nine European universities in the Jiao Tong top 50 and twelve in the *Times Higher* top 50 – has prompted policy reflection and action in both EU and national government circles. This rankings performance is often cited in public proposals for greater investment in the European higher education and research area, and proposals for the further concentration of funding in networks and centres of excellence. Germany is focused on building a top ten group of research universities. The EU has proposed the European Institute of Technology which would draw together existing research bases in a mega-university or network that is capable of challenging the superior rankings position of the US universities. At the same time, European higher education does not have the long standing tradition of league tables such as in the USA, and the global rankings have also met with considerable scepticism and critique. Nevertheless, in Europe it has become clear that a global higher education market is emerging, consistent with the introduction of market-type steering models at national level. One widely recognised implication is the importance of transparent consumer information and measures to secure consumer protection. Moreover, it is clear that there will be strong policy pressure to ensure that the additional investments in higher education and R&D provided as part of the Lisbon strategy will be located in successful institutions that have demonstrated their capacity to generate high dividends on the investment. This favours the systematic use of rankings and other kinds of comparison as a guide to policy.

Thus from a public policy perspective rankings are inevitable because those who finance and use higher education want to know which academic institutions are doing well (Altbach, 2006). But if policy-useful rankings are to emerge problems of methodology and issues of ownership remain to be dealt with. In this respect the following minimum design requirements are suggested (Van der Wende 2006). Rather than seeking to construct spurious holistic measures, policy-related research should facilitate a broad range of comparative measures, corresponding to the different purposes. Institutions should not be ranked as a whole, but on their various functions taken separately; including the different aspects of research and teaching, and the different disciplines, locations and discrete service functions.

The systems of rankings should be based on a transparent balance of facts about performance, and perceptions of performance based on peer review. Ranking methods should generate information relevant for different stakeholders, and provide data and information that are internationally accessible and comparative. Because 'quality is in the eye of the beholder', ranking should be interactive for users, particularly students. Users should be able to interrogate the data on institutional performance using their own chosen criteria. In terms of ownership, it is important that institutions are involved themselves and committed to maximum openness. HEIs, operating within a European framework of cooperation, should establish an independent agent to collect, process and analyse data, and undertake publication with a designated media partner.

8. The CHE ranking system

The present system of rankings which most nearly meets these requirements is that developed by the Centre for Higher Education Development (CHE) in Germany (www.che.de) and issued in conjunction with the publisher Die Zeit. This system includes data on all higher education institutions in Germany and is now also encompassing Switzerland and Austria. The Netherlands and Belgium (Flanders) are preparing to join the system; and some Nordic institutions are also showing interest. The CHE ranking system is thus well positioned to develop into a European-wide system. It has also some attracted attention from other parts of the world; being recently described by the Canadian-based Education Policy Institute as best practice in higher education rankings and 'nothing short of brilliant' (Usher and Savino 2006; see also Van Dyke 2005). The chief strategic virtue of the CHE rankings, one with far-reaching implications for the character of competition in higher education, is that it dispenses with the spurious holistic (overall or summative) rank ordering of HEIs, and instead provides a great range of data in specific areas, including single disciplines. As CHE states, there is no 'one best university' across all areas, and 'minimal differences produced by random fluctuations may be misinterpreted as real differences' in holistic rankings systems. The CHE data are made available though an interactive web-enabled database that permits each student to examine and rank their chosen institutions based on their own chosen criteria (CHE 2006).

The Commission on the Future of Higher Education in the US is working on a comparable concept that would allow consumers to rank colleges based on variables of their choosing, allowing customised rankings similar to those developed by CHE and Die Zeit. The new system would serve as a very different kind of alternative to the *US News and World Report* rankings (Field, 2006)

9. The Berlin Principles on Ranking of Higher Education Institutions

With a view to the above presented methodological problems, an expert group was established in 2004 to develop a set of principles of quality and good practice in higher education rankings. This International Ranking Expert Group (IREG) was founded by the UNESCO European Centre for Higher Education (UNESCO-CEPES) in Bucharest and the Institute for Higher Education Policy in Washington. Together with the Centre for Higher Education Development (CHE), who's successful approach to ranking has been acknowledged in the previous section of this article, IREG published its Principles on Ranking of HEIs in May 2006 (see: http://www.che.de/downloads/Berlin_Principles_IREG_534.pdf). These principles focus on the purposes and goals of ranking, the design and weighting of indicators, the collection and processing of data, and on the presentation of ranking results. They are meant to set a framework for the elaboration and dissemination of rankings, to support the continuous improvement and refinement of the methodologies used, and to guide those producing

rankings to hold themselves accountable for the quality in their own data collection, methodology and dissemination.

10. Stratification, classifications and typologies

The extended and intensified competition fostered by global rankings and their echoes at regional and national level has a number of secular effects with inevitable consequences, unless these effects are modified by policy intervention. First, ranking and competition together enhance vertical differentiation between research intensive HEIs and others, and between the different grades of research intensive HEIs in what in many cases have been unitary national university systems; for example in China (Yang 2005, pl. 186). In some nations the tendency to vertical differentiation is already being exacerbated by the new emphasis on concentration and internal system stratification, designed to secure a stronger Jiao Tong position for selected HEIs. If some HEIs build research strength only through the weakening of other HEIs, this would seem to constitute little gain in national capacity overall, unless improved Jiao Tong rankings for particular HEIs can open a broader set of global strategic options and/or generate economies of scale and scope at the national level. Second, intensified competition on the basis of research performance will exacerbate demand for high quality scientific labour, with likely effects also on mobility and price. There already appears to be an increase in the mobility of ISI-defined HiCi researchers though this has yet to be subject to detailed empirical investigation. Thus one likely outcome of the intensified global competition and its mediation by rankings is to increase the stratification of research labour and the academic profession(s) both within national labour markets and between global and national labour markets. The instrumental importance of HiCi and other productive researchers in composing the Jiao Tong index strongly suggests that the global element in labour markets will grow in importance, though by how much is difficult to judge.

Third, and paradoxically, as well as tendencies to vertical differentiation, intensified global competition may become associated with a certain flattening of national system typologies so as to lead to more unitary systems. Both rankings systems, particularly Shanghai Jiao Tong University, reinforce the status of the comprehensive research intensive university model (Clarke 2005, p. 196). The effect of the SJTU rankings is to tell HEIs everywhere that global ranking is the measure of prestige and that research performance is the high road to better global rankings. Correspondingly, the absence of specialised rankings in vocational education and in teaching functions reduces the status attached to specialisation in those domains. There is no reason to assume that competition in itself will generate specialisation unless the incentive structure favours this. In addition, certain conjunctural developments favour a drift towards homogeneity: the trend to corporate autonomy in many nations provides some HEIs with greater freedom in determining their mission according to a market logic; while in Europe some polytechnics might seek to reshape themselves to fit the new common program structure secure. This draws attention to the importance of policy measures to sustain existing typologies or to develop new ones as required.

In this context a basic policy requirement in Europe is the development of a typology of higher education institutions. The European Higher Education Area is in size comparable to that of the US higher education system, and is even more complex, as it is primarily organised at national and regional levels, each with their own legislative conditions, cultural and historical frames, and a vast array of different languages in which the various forms, types and missions of higher education institutions may be expressed. It is generally agreed that diversity as such should be conserved and even increased. The EC (2003) states that ‘European universities have for long modelled themselves along the lines of some major models, particularly the ideal model of the university envisaged nearly two centuries ago by Alexander von Humboldt, in his reform of the German university, which sets research at the heart of the university and indeed makes it the basis of teaching. Today the trend is away

from these models and towards greater differentiation' (p. 5-6). Diversity is seen as important as autonomy in order to widen access and improve quality. But in order to make diversity useful it needs to be made understood, by publicly defining the missions and characters of HEIs. Hence the need to develop a typology of higher education institutions. Such a typology will allow individual higher education institutions to design their own missions and profiles, while at the same time offering the various stakeholders more transparency about the characterising dimensions of those institutions (Van Vught et al., 2005).

The proposed multi-scheme typology acknowledges that institutions can be grouped and compared in a variety of ways. The heart of the typology will be formed by the various characteristics upon which differences and similarities of institutions are mapped, each highlighting a different aspect of the profile of the institution. In this way, the typology will be made up of a number of parallel 'schemes', each based on a different characteristic (Van Vught et al., 2005, p. 14-17). The preliminary work on this typology was carried out in conjunction with a review of the U.S. Carnegie Classification of higher education institutions, including the reasons for and principles of its revision in 2005, when the single classification system was replaced by a set of multiple, parallel classifications (Sapp & McCormick, 2006). Both the revised Carnegie classification and the new European typology would be similar in employing a multi-scheme approach aiming to optimise the information-producing advantages of classification while minimising its downsides; that is, its potential to be used as a ranking mechanism. .

In China also the classification of HEIs is being reconsidered, using the original framework of the Carnegie Classification, now known as the 'basic classification', in conjunction with the indicators developed by the SJTU to define a 'world class university' (Liu 2006). The OECD IMHE programme is planning an international seminar in late 2006 on ranking and typologies/ classifications in order to compare approaches, practices and impact across the continents.

11. Conclusions

Rankings of higher education institutions and programs are a global phenomenon, related to the demand for transparent information on the quality of teaching provision and the standing of higher education institutions offering it. They are also related to and further stimulate competition among institutions across national borders. It is expected that more regions and nations will see the development of rankings in the future. Many methodological challenges still need to be addressed and overcome. The initiated development of internationally agreed principles for good practice will be a crucial help in this. Strategic and policy implications also need to be better understood, in particular the fact that (1) institutional status is predominantly defined by research performance, without clear evidence on its relationship with teaching quality, (2) the impact on stratification and diversification of higher education systems, and (3) the link to national systems for accountability and quality assurance, and decisions on the allocation of funds.

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