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# Are European universities facing the Asian challenge in excellent S&T research?

Andrea Bonaccorsi, University of Pisa  
Innovation 4 Growth

Peter Haddawy, Director, United Nations University-IIST  
Saeed UL Hassan, United Nations University- IIST

Tindaro Cicero, University of Roma Tor Vergata  
Luca Secondi, University Uninettuno  
Enza Setteducati, ANVUR

## NOTICE

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## 1. Executive summary

The findings in this Report refer to the position of European universities vis-à-vis their counterparts in North America (USA, Canada) and Asia **in the top 30% and top 10% of the distribution of excellence of research**, as defined in the Methodological section.

The findings are based on the distribution at the level of **individual universities** of a composite indicator, combining quantity and quality of scientific publications, covering all scientific fields in science, technology and medicine (251 fields), for the period 2007-2010, using Scopus data.

While it is important that European research systems increase their **average** quality, involving all actors in the effort to improve over time, it is still true that in the evolution of science, some authors, some publications, some discoveries or ideas have a disproportionately larger impact. Excellent papers and authors get large recognition and accumulate credibility for the future. Colleagues read their articles with larger probability and top journals are keen to publish their articles. Over time, this translates into the ability to develop new research directions, to receive research grants, and to attract talented postgraduate students. Highly influential scientists are at the core of highly productive research teams, which are the backbone of modern laboratory science. For all these reasons it is important to combine the analysis of the overall production of science with the analysis of the **upper tail of the distribution of indicators of research**.

The following findings are worth to be considered.

- 🕒 **Europe lags behind North America in the top 30% while is still more competitive than Asia.**
- 🕒 In the top 30% European universities (n= 273) are able to compete at global level in as many as 2.863 scientific fields, or 32,9% of the world total. Thus European universities have a share of the global top 30% approximately equal to one third.

Distribution of regions in top 30% by number of fields

Region	Number of universities in top 30% in at least one field	Total number of fields in top 30%	Share of the number of fields out of the world total
			Unweighted
Europe	273	2863	32,9
North America	188	4064	46,8
Asia	181	1765	20,3
Total	642	8692	100

- 🕒 While North America account for approximately half of the top 30%, Asian universities are able to capture the remaining 20%. Thus the relative proportions among the regions of the world are in the order of 5:3:2 between North America, Europe and Asia, respectively.

- ⌚ However, scientific fields do not have the same size in terms of number of researchers, publications, and citations. If a country or region is able to excel only in small fields (e.g. narrow specializations), then the unweighted share illustrated above will overestimate its importance in the global landscape. We therefore re-calculate the share of publications produced and of citations received by universities found in the top 30%.

#### Distribution of regions in top 30% by number of publications and number of citations

Region	Number of publications	Share of publications (%)	Number of citations	Share of citations (%)
Europe	575,593	25.3%	2,717,652	26.5%
North America	1,028,763	45.1%	5,713,212	55.8%
Asia	675,333	29.6%	1,817,678	17.7%
<b>Total</b>	<b>2,279,689</b>	<b>100.00%</b>	<b>10,248,542</b>	<b>100.00%</b>

- ⌚ The resulting picture is mixed. Europe loses ground with respect to Asia in terms of publications at the top 30% (25.3% against 29.6%), while it still leads in terms of citations (26.5% against 17.7%). In this perspective, European universities produce a volume of excellent publications roughly comparable to Asia, but receive proportionally more citations.
- ⌚ The picture changes quite dramatically at the top 10%. **Here Europe lags behind not only USA and Canada, but also behind Asian countries on all indicators.**
- ⌚ In the top 10% tier 63 European universities, leading in 184 fields, represent only 22,6% of the world total, against 26,7% of 51 Asian universities.

#### Distribution of universities at the top 10% per region

Region	Number of universities in top 10% in at least one field	Total number of fields in top 10%	Share of the number of fields out of the world total
			Unweighted
Europe	63	184	22,6
North America	69	412	50,7
Asia	51	217	26,7
<b>Total</b>	<b>183</b>	<b>813</b>	<b>100</b>

- ⌚ When the share of world total is weighted by the number of publications European universities fall to 14,2%, while they account for only 13,8% when the share is weighted by number of citations. The share of Asian universities is 38,1% and 22,4%, respectively.
- ⌚ **In the top tier of world research excellence Asia is not challenging Europe, but has already overtaken Europe.**

- ⌚ Thus the relative proportions among the regions of the world are drastically changed at the very top. If we take the shares at top 10% weighted by number of citations, the proportions are in the order is 6:3:1 between North America, Asia, with Europe last.

#### Distribution of regions in top 10% by number of publications and number of citations

Region	Number of publications	Share of publications (%)	Number of citations	Share of citations (%)
Europe	47395	14,2%	216040	13,8%
North America	159174	47,7%	1000186	63,8%
Asia	127060	38,1%	351321	22,4%
<b>Total</b>	<b>333629</b>	<b>100.00%</b>	<b>1567547</b>	<b>100.00%</b>

- ⌚ A key element of the explanation of the poor aggregate performance of Europe is given by the difficulty for European universities in keeping quality of research high consistently and sustainably across many disparate fields. Excellent researchers, research teams and departments are dispersed in many universities.
- ⌚ The relative “academic size of excellence” at European universities is much smaller. In Europe, 273 universities are able to compete in 2863 fields in the top 30%, or 10,5 fields on average. In North America, only 188 universities account for 4064 fields, or 21,6 on average. **North American excellent universities are twice the size of European ones**, while being comparable in terms of overall size.
- ⌚ While in USA and Canada there are many universities that are both large (i.e. have many fields in the top 30%) and excellent (i.e. fields in the top 30% represent a large share of the total number of fields in which universities are active), this is not true at all for Europe.
- ⌚ **The first 7 US universities in the top 10%** (Harvard, Johns Hopkins, MIT, University of California at San Francisco, Pittsburgh, Stanford, University of Michigan at Ann Arbor) **account for a larger number of fields of excellence than all European universities combined together.**
- ⌚ There are also wide variations across European countries in the number of universities that are able to compete at the top, as well as in the share of the fields in which they excel out of the total number of fields in which are active.
- ⌚ it appears that **only 4 countries (United Kingdom, Netherlands, Switzerland and Sweden) account for 46,2% of the (unweighted) fields in which all European universities are able to compete.** With the exception of UK, these are relatively small countries. The other 4 large European countries (Germany, France, Italy, Spain), taken together, account for 24,6% of the fields.

Distribution of universities in top 30% and number of fields, per country

Country	Number of universities in top 30%	Number of fields in top 30%	Average number of fields in top 30% per university	Share of the country in terms of fields (%)
United Kingdom	53	171	3,2	15,2
Netherlands	13	148	11,4	13,2
Switzerland	9	101	11,2	9,0
Sweden	11	99	9,0	8,8
Germany	43	93	2,2	8,3
Denmark	5	80	16,0	7,1
Belgium	7	79	11,3	7,0
France	26	67	2,6	6,0
Italy	29	67	2,3	6,0
Spain	30	49	1,6	4,4
Finland	7	48	6,9	4,3
Norway	7	28	4,0	2,5
Greece	8	27	3,4	2,4
Austria	6	24	4,0	2,1
Portugal	7	23	3,3	2,0
Ireland	4	12	3,0	1,1
Czech Republic	2	3	1,5	0,3
Poland	3	2	0,7	0,2
Estonia	1	1	1,0	0,1
Romania	1	1	1,0	0,1
Slovenia	1	1	1,0	0,1
Total	273	1124	4,1	100,0

- ⌚ There is evidence of a **distinctive European model of excellence**: top quality research is distributed across many more universities, each of which is able to compete in a small number of fields, which in turn represent a small share of the overall offering profile of research and teaching. At the same time those universities that are able to compete across a broad spectrum of fields are few in number and smaller in size than their counterparts in North America.
- ⌚ The pros and cons of a **distributed model of excellence**, as opposed to a **concentrated model of excellence**, should therefore be discussed openly in the European policy debate.

## 2. Sources of data and methodology

Readers not interested in methodological issues may skip this section and focus on results, perhaps coming back to this section for clarifications on the nature of the data. Since our findings depend on the definitions and methods used, it is important to highlight the potential and limitations of the data.

### 2.1 Sources of data

The analyses carried out in the report are based on the Global Research Benchmarking System (GRBS)<sup>1</sup> dataset provided by the United Nation University – International Institute for Software Technology (UNU-IIST).

Concerning the sources of the data to which GRBS refers, the 2011 release covers 24,936 source titles of types Journal, Conference Proceedings, and Book Series from *Elsevier's Scopus database*. Publication types included are articles, reviews, and conference papers. In GRBS, source titles (journals, conference proceedings and book series) are classified into discipline-specific tiered outlets based on their *Source Normalized Impact per Paper* (SNIP) values in each of the 15 Top level GRBS categories. In order for the statistics to be meaningful, only those source titles with at least 50 publications in the 4-year window being considered for inclusion in the SNIP rating.

By dealing with objective data and providing analyses to benchmark research performance in traditional disciplinary subject areas and in interdisciplinary areas for the purpose of strengthening the quality and impact of research, the GRBS supports universities to determine their own research profile and identify niche areas in which they can excel to make more rational strategic and resource allocation decisions and to publicize program strengths .

The release of the dataset used for this Report covers 1337 universities from Asia-Pacific, North America (USA and Canada) and Europe<sup>2</sup>. European universities represents 45.5% of the universities included in the dataset, while Asian and North-American universities are 36.5% and 18%, respectively.

The period covered for this Report is the four-year period 2007-2010. The last release of data cover the 2008-2011 period and will be used in the future for updating the exercise proposed in this Report.

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<sup>1</sup> See [www.researchbenchmarking.org](http://www.researchbenchmarking.org). The GRBS is a collaborative effort between the United Nations University International Institute for Software Technology and the Center for Measuring University Performance, who founded and lead the initiative. Contributing organizations include: Arizona State University, Institute for Scientific and Technical Information of China, Korean Academy of Science and Technology, Ministry of Higher Education of Malaysia, National Agency for the Evaluation of the University system and Research (Italy), National Assessment and Accreditation Council of India, National Institute for Informatics (Japan), National Institution for Academic Degrees and University Evaluation of Japan, ProSPER.Net, University of Melbourne, and University of Pisa. The governance structure of the initiative includes an [International Advisory Board](#) providing expertise in university performance evaluation, bibliometrics, and Sustainable Development, and representing diverse regional and stakeholder perspectives.

<sup>2</sup>For Asia Pacific the countries included are: Australia, China, Honk Kong SAR, India, Japan, Malaysia, New Zealand, Singapore, South Korea, Taiwan – Province of China and Thailand. The North America includes USA and Canada. European countries included are: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

The approach followed in the attribution of publications to universities is full-counting, i.e. publications are attributed entirely to each of the affiliations named in publications.

The GRBS provides two types of indicators: primary and experimental. Primary indicators are used for rating and benchmarking and they deal with aspects such as publications, citations, international collaboration and research funding while experimental indicators are only provided for benchmarking and concern like international impact and authorship affiliation..

A central principle driving the GRBS is to provide insight to support the diversity of university research. Firstly, to do so, university research performance is analyzed in the GRBS at a finer level of detail than has previously been done by any international ranking or evaluation system. Secondly, the GRBS has formulated a definition of university framed around the fundamental operational and organizational features central to the concept of university as a research entity. For the purposes of university research benchmarking the term “*university*” refers to “a single institution that has substantially independent academic decision-making authority whatever the title of the chief executive officer. It admits students either with reference to its own local standards or through a national system for student admission. These institutions hire, promote, and tenure faculty through processes that substantially rely on locally referenced standards. They typically have a strategic plan that addresses issues of research quality and focus. They also typically have an administrative position such as vice president for research or dean of research that is responsible for research strategy and management of research funding. Where an institution is geographically separate and has independent academic decision making then it is appropriate to consider that campus as a separate institution. The university as here defined is the fundamental entity for the purpose of gathering data for benchmarking” (Abbey, Capaldi and Haddawy, 2011).

For each university in GBRS, data are organized according to a 3-level hierarchical structure of subject areas. The data covers 23 ASJC top level disciplines and 251 ASJC sub-disciplines. In addition, the GRBS includes a higher level of broad categories that groups the 23 All Science Journal Classification (ASJC<sup>3</sup>) top level disciplines into the following 15 broad disciplinary areas:

- ① Agricultural & Biological Sciences(all);
- ① Biochemistry, Genetics and Molecular Biology;
- ① Chemistry;
- ① Computer Science;
- ① Earth and Planetary Sciences;
- ① Economics and Business Sciences;
- ① Engineering (all);
- ① Environmental Sciences
- ① Health Professions & Nursing,
- ① Materials Sciences;
- ① Mathematics
- ① Medicine
- ① Multidisciplinary;
- ① Other Life and Health Sciences
- ① Physics And Astronomy

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<sup>3</sup> The All Science Journal Classification (ASJC) maps source titles in a structured hierarchy of disciplines and sub-disciplines allowing research activity to be categorized according to the field of research. ASJC classifies about 30,000 source titles into a two - level hierarchy. The top level contains 27 subject areas including a Multidisciplinary category and second level contains 309 subject areas. Because GRBS currently only covers Science and Technology, only 23 of the top level subject areas and 251 of the sub-areas are currently used in the system.



Universities are selected for inclusion in GRBS by examining research output in the period 2007-2010 (4-year window) at two levels. First in each of the third level subject areas the universities with the highest number of publications is identified. For Asia-Pacific the top 50 are taken and the US & Canada the top 40 are taken. For Europe the 100 universities in each third level and second level subject category of the GRBS were considered. The different depths are due to the differences in the sizes of the regions. Then in each category a minimum cut-off of 50 publications is applied for statistical reasons, so that universities with fewer than 50 publications in the 4-year window in that subject area are not included in the list. In addition, the 200 universities with the highest number of publications are identified in broader 2nd level categories. The reason is to include universities that have significant publication output in a broad category but not in any of its subareas. The set of universities included in GRBS is then the union of all these resulting subject area lists. Any university that appears in at least one list is included in GRBS and analyzed in all subject areas. In this way the GRBS is able to recognize universities that have particular niche strengths.

Table A below describes the indicators included in the GRBS release used for the analyses in the report.

Table A – Description of indicators included in the GRBS dataset

Name of the variable	Description
Total Pubs	Total number of publications during a 4-year time window. Here the window 2007-2010 is used.
Pubs in Top 10% SNIP	Publications published in journals that are within top 10% of that subject area, based on SNIP value of year 2010.
Pubs in Top 25% SNIP	Publications published in journals that are within top 25% of that subject area, based on SNIP value of year 2010.
<i>[%Pubs in Top 10% SNIP]</i>	Percentage of Total Pubs published in source titles that are within top 10% of that subject area, based on the SNIP value of the last year in the time window . For the window 2007 - 2010, the SNIP values for 2010 are used
<i>[%Pubs in Top 25% SNIP]</i>	Percentage of Total Pubs published in source titles that are within top 25 % of that subject area, based on the SNIP value of the last year in the time window
Total Cites	Total number of citations within a 4-year time window to papers published in that time window. All citation counts used in GRBS exclude self citations
Cites from Top 10% SNIP	Citations received from publications in journals that are within top 10% SNIP value.
Cites from Top 25% SNIP	Citations received from publications in journals that are within top 25% SNIP value.
<i>[%Cites from Top 10% SNIP]</i>	<i>[Percentage of Total Cites received from publications in journals that are within top 10% based on SNIP value]</i>
<i>[%Cites from Top 25% SNIP]</i>	<i>[Percentage of Total Cites received from publications in journals that are within top 25 % based on SNIP value]</i>
4 -year H-Index	A university having 4-year h-index of X means that at least X of their publications (during that 4-year window ) have no less than X publications citing them (during that window ). A 4 - year h-index of a university is computed for a particular subject area.
Internationally Co-authored Pubs:	Number of publications which are written in collaboration with at least one researcher from outside the country in which university is located.
%International Collaboration	Percentage of Total Pubs with international co-authorship
Total Cites of Internationally Co-authored Pubs	Total number of citations received by internationally co-authored publications
International Cites	Citations received from papers authored (only) by researchers from outside the country in which a given university is located. This is a strong definition of international cites so that citations from internationally co-authored publications are not counted.
% International Cites	Percentage of International Cites relative to Total Cites
Int'l Cites of Internationally Co-authored Pubs	International citations received by internationally co-authored publications.
International Impact	Measure of the impact a university's research is having outside the country and measures the ability of a university to attract citations from outside the country. It is defined as the ratio of International Cites (as already defined) to the total number of references made by the papers in a given field which are authored (only) by researchers from outside the country in which the university is located. The denominator normalizes for the size of the market of citations outside the country.

When we refer to fields in the Report we mean level-3 fields, or the 251 narrowly defined fields.

Note that the definition of fields based on journal categories is subject to a classical problem of overlapping. In some fields the total number of publications and citations is subdivided using a finer classification, leading to a larger number of fields. This is one of the reason why we not only use the unweighted count of fields in top 10% and 30%, but we introduce weighted and normalized weighted measures.

Table B, C and D show descriptive statistics of the variables related to publications (*Total Pubs*, *%Pubs in 10% SNIP*, *% Pubs in 25% SNIP*) and citations (*Total Cites*, *% Cites from top 10% SNIP*, *% Cites from Top 25% SNIP*) grouped for the 15 broad disciplinary areas and for universities in Asia-Pacific, Europe and North-America, respectively.

Table B - Descriptive statistics for Universities in Asia-Pacific (period 2007-2010): analyses at broad disciplinary area level

Asia Pacific	Total Pubs		% Pubs in 10% SNIP		% Pubs in 25% SNIP		Total Cites		% Cites in 10% SNIP		% Cites in 25%SNIP
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Agricultural & Biological Sciences(all)	472.4	323.0	27.8	26.1	54.5	55.8	926.1	491.0	36.9	37.3	66.0
Biochemistry, Genetics and Molecular Biology	681.1	392.0	20.8	20.2	49.4	49.1	2520.2	1224.0	39.6	40.2	69.9
Chemistry	713.1	413.5	26.5	25.8	51.5	52.4	2159.1	965.5	37.5	38.8	65.2
Computer Science	648.8	346.0	8.8	6.9	22.6	20.9	789.9	374.5	22.2	22.5	40.1
Earth and Planetary Sciences	456.4	264.0	46.4	49.5	77.3	80.5	816.2	364.0	50.3	51.2	70.3
Economics and Business Sciences	229.6	185.0	22.7	19.9	43.2	42.9	425.4	307.0	30.9	32.0	50.6
Engineering (all)	1487.1	728.0	25.0	23.4	57.0	59.5	2279.8	955.0	33.9	34.9	59.7
Environmental Sciences	324.1	224.5	43.8	44.6	67.6	72.6	741.5	469.0	42.5	43.7	67.0
Health Professions & Nursing	251.7	194.0	32.9	32.6	60.4	61.5	519.9	362.5	42.2	42.5	70.5
Materials Sciences	966.5	533.0	19.2	18.7	49.3	50.8	1811.3	784.0	31.8	32.5	61.8
Mathematics	548.5	304.0	9.4	7.8	27.8	26.7	580.4	305.5	18.7	18.4	44.1
Medicine (all)	1199.0	721.0	37.2	37.9	69.7	78.0	3276.0	1518.0	40.2	41.2	70.8
Multidisciplinary	217.9	95.5	24.1	5.2	62.4	73.0	873.8	228.5	33.8	38.4	60.4
Other Life and Health Sciences	494.0	328.0	21.6	20.4	54.7	57.0	1513.0	928.0	37.7	38.1	68.7
Physics And Astronomy	1095.4	558.0	10.8	8.7	36.1	36.1	1982.0	867.5	26.8	26.4	54.4
<b>Total</b>	<b>766.7</b>	<b>384.5</b>	<b>23.7</b>	<b>20.2</b>	<b>50.7</b>	<b>50.8</b>	<b>1664.4</b>	<b>689.0</b>	<b>34.3</b>	<b>35.4</b>	<b>61.3</b>

Table C - Descriptive statistics for Universities in Europe (period 2007-2010): analyses at broad disciplinary area level

Europe	Total Pubs		% Pubs in 10% SNIP		% Pubs in 25% SNIP		Total Cites		% Cites in 10% SNIP		% Cites in 25%SNIP
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Agricultural & Biological Sciences(all)	489.3	329.0	38.4	40.8	69.1	74.3	1460.5	885.0	44.9	46.2	73.2
Biochemistry, Genetics and Molecular Biology	787.1	471.0	33.2	34.7	67.1	71.1	4525.7	2049.0	44.8	45.8	75.0
Chemistry	534.1	417.5	34.4	36.0	66.7	70.2	2020.1	1382.0	41.4	42.7	70.3
Computer Science	391.8	302.0	10.9	10.7	27.4	27.7	639.2	425.0	25.3	25.6	42.2
Earth and Planetary Sciences	412.9	293.0	61.0	60.9	85.9	88.0	1392.4	880.5	61.0	60.7	79.8
Economics and Business Sciences	206.3	170.0	20.2	20.1	44.4	43.8	370.3	278.0	32.2	32.4	54.9
Engineering (all)	630.4	403.5	40.5	42.6	71.5	74.3	1646.5	907.0	39.5	40.4	63.3
Environmental Sciences	293.7	216.5	55.0	57.6	79.7	82.6	924.0	650.5	48.7	49.2	74.3
Health Professions & Nursing	233.7	178.5	42.9	42.3	69.4	70.4	665.5	507.0	45.2	45.3	72.3
Materials Sciences	500.2	381.0	27.8	29.0	56.8	59.0	1291.4	801.0	36.2	37.1	63.4
Mathematics	431.5	325.0	10.9	10.4	30.0	30.3	530.3	349.0	21.6	21.8	44.8
Medicine (all)	1408.4	672.0	52.8	54.0	81.3	84.9	5694.5	2323.0	44.4	44.7	73.7
Multidisciplinary	174.4	143.0	36.6	39.1	90.4	96.8	4453.0	3688.0	53.3	54.8	78.0
Other Life and Health Sciences	601.1	363.5	38.2	39.9	74.3	77.7	3056.6	1528.5	44.3	45.3	74.8
Physics And Astronomy	857.9	592.0	17.1	16.2	42.2	42.5	2327.2	1255.0	31.5	30.5	53.1
<b>Total</b>	<b>602.2</b>	<b>345.0</b>	<b>33.9</b>	<b>34.4</b>	<b>61.4</b>	<b>67.5</b>	<b>2190.3</b>	<b>849.0</b>	<b>39.4</b>	<b>41.2</b>	<b>64.9</b>

Table D - Descriptive statistics for Universities in North-America (period 2007-2010): analyses at broad disciplinary area level

North America	Total Pubs		% Pubs in 10% SNIP		% Pubs in 25% SNIP		Total Cites		% Cites in 10% SNIP		% Cites in 25%SNIP
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Agricultural & Biological Sciences(all)	760.3	471.0	41.4	42.0	77.6	76.8	2689.9	1615.0	49.7	50.2	77.9
Biochemistry, Genetics and Molecular Biology	1408.7	956.0	39.5	39.2	76.2	76.5	9909.1	5431.0	49.7	50.0	78.7
Chemistry	529.4	401.0	46.0	47.4	71.7	72.8	2641.3	1678.0	48.4	49.3	74.2
Computer Science	587.5	419.0	19.0	18.9	39.9	40.8	1428.7	910.0	27.7	27.5	43.9
Earth and Planetary Sciences	568.8	373.0	69.5	71.4	89.8	91.0	2383.6	1170.0	64.6	64.8	82.1
Economics and Business Sciences	282.3	213.0	30.5	31.3	56.3	57.3	613.5	435.0	39.6	40.2	60.9
Engineering (all)	997.9	730.0	45.9	46.0	74.9	76.0	3263.3	1953.0	42.6	42.7	64.2
Environmental Sciences	418.6	323.5	56.1	55.2	83.7	84.6	1431.5	1015.5	52.4	53.0	78.0
Health Professions & Nursing	351.4	285.5	39.0	39.6	64.5	64.6	1023.2	791.5	45.4	45.3	73.1
Materials Sciences	553.9	402.0	31.1	31.5	56.6	57.8	1794.6	1030.0	40.1	40.4	64.8
Mathematics	555.9	397.5	15.8	15.5	35.5	35.6	951.5	581.5	26.5	26.7	49.1
Medicine (all)	2686.3	1337.0	60.8	61.7	88.8	89.9	15018.4	5564.5	48.1	48.0	77.1
Multidisciplinary	207.4	139.0	93.3	94.4	96.9	97.8	5602.6	3394.0	54.4	55.2	79.2
Other Life and Health Sciences	937.3	622.0	43.5	43.8	79.7	80.6	5825.5	3434.0	48.3	48.4	78.6
Physics And Astronomy	1126.6	687.5	20.6	19.6	47.7	47.0	4136.4	1991.0	33.3	32.3	51.9
<b>Total</b>	<b>876.1</b>	<b>443.5</b>	<b>42.3</b>	<b>41.3</b>	<b>69.1</b>	<b>73.9</b>	<b>4262.0</b>	<b>1491.0</b>	<b>44.5</b>	<b>46.5</b>	<b>68.9</b>

In addition to the variables described in Table A, a composite indicator - with a score normalized to range from 0 to 100 - was introduced with the aim of rating universities in any subject category at any level. By default, equal weights are assigned to all indicators for rating universities across all subject categories. Results are displayed according to bands<sup>4</sup>, with each band corresponding to a score range of 10: 100 – 90 (Band 1), 90 – 80 (Band 2), 80 – 70 (Band 3) 70-60 (Band 4), etc.

The following indicators have been used to compute the bands: i) Total Pubs ii) %Pubs in Top 10% SNIP; iii) %Pubs in Top 25%; iv) %Cites from Top 10% SNIP; v) %Cites from Top 25% SNIP; vi) 4 -year H-Index.

This composite indicator gives large importance to quality indicators expressed in percentage, and then independent on absolute size. This is a major departure, among many other substantive differences, from existing rankings that implicitly place weight to absolute size of universities. At the same time, given the correlation between percentages of publications and citations in the top 10% and 25%, respectively, this measure gives visibility to excellence as measured by the ability to compete for good journals.

The analyses carried out in our report firstly focused on a stringent definition of “excellence position” by only considering universities in the first top 10% values of the composite indicator (BAND 1). By proceeding in this way we carried out statistical analysis for the 251 ASJC sub-disciplines and the 15 broad disciplinary areas.

Secondly we extended the analysis by considering universities with values of the composite indicators from 70 to 100 (thus considering BANDS 1,2,3), or top 30%.

Therefore the Report introduces two notions of excellence:

- top 10%
- top 30%

Therefore when we say that the university X is in the top 10% for the field A this means that it has published at least 50 articles in the period in field A, and these articles exhibit a combination between volume, impact and quality that place university X among the best in the world.

The Report includes an Appendix with the list of universities in the top 10% and top 30% for each of the fields examined, offering an unprecedented level of granularity. This will allow universities to examine their position in a highly disaggregated way, pointing to areas of excellence much beyond the simplistic mono-dimensional perspective offered by university rankings.

Universities may also build up their own research profile and identify their peers (= universities with a similar disciplinary profile) by accessing to the GRBS website and entering into the benchmarking system.

Finally, universities are described by the number of fields (out of 251) in which they find themselves in the top 10% and 30%, respectively. A leading research university is a university which is in the top 10% in many of the fields in which is active. Leading universities may be generalist (i.e. active in a large number of fields in research) or specialist (i.e. active in a small number) or even niche players (i.e. active in a very small number of fields), with a minimum number of fields equal to one.

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<sup>4</sup>The universities within each band are displayed in alphabetical order. Banding is used in the data set rather than ranking since the exact place in a rank can be highly sensitive to minute differences in indicator values and tends to not be very meaningful in terms of judging performance. In the excel sheet we have applied all weights equal to compute the bands.

## 2.2 Weighting schemes

However, simply counting the number of fields in which universities excel means that the fields themselves are considered of equal size. This is not true, since some fields are much larger than others, simply because the number of researchers at world level is greater. In these fields being in the top tier is made more difficult by the fierce competition among thousands of scientists worldwide. Table A and B offer a snapshot of the differences across fields. There are around 30 fields with less than 1.000 publications in total in the period.

One solution is then weighting the number of fields with a coefficient which is directly proportional to the size of the field at world level, as measured by the share of publications and citations in the field out of the respective total across all fields. This procedure is followed in the tables discussed in the Executive Summary. Note that this weighting suffers from a distortion of different type. Citation levels differ across fields and do not necessarily reflect differences in quality or importance. It is well known that the average number of papers published, and hence of citations received, is much larger for researchers in medical sciences and life sciences, then in physics, than in other discipline, for example mathematics and engineering. Weighting according the number of publications and citations means giving more importance to universities specialized in medicine and life sciences. To the extent that US, as well as United Kingdom in Europe, are more specialized in these areas this distortion may increase the share of these countries. As for Asian countries, the overall impact of the distortion is not obvious.

Table E Largest and smallest fields of science in the dataset per number of publications

Largest fields of science (top 10)		Smallest fields of science (bottom 10 exceeding 1.000 publications)*	
Field	Number of publications in the dataset	Field	Number of publications in the dataset
Condensed Matter Physics	376.316	Architecture	2.116
Electrical and Electronic Engineering	313.877	Engineering (miscellaneous)	2.011
Biochemistry	243.062	Geometry and Topology	1.857
Electronic, Optical and Magnetic Materials	223.535	Health Informatics	1.856
Molecular Biology	220.927	Information Systems and Management	1.765
Mechanical Engineering	196.174	Speech and Hearing	1.666
Computer Science Applications	173.185	Ageing	1.574
Materials Chemistry	155.631	Anatomy	1.373
Applied Mathematics	154.205	Family Practice	1.366
Cell Biology	141.829	Developmental Neuroscience	1.164

\*There are 32 fields of science with less than 1.000 publications in the dataset.

Table F Largest and smallest fields of science in the dataset per number of citations

Largest fields of science (top 10)		Smallest fields of science (bottom 10 exceeding 1.000 citations)*	
Field	Number of citations in the dataset	Field	Number of citations in the dataset
Molecular Biology	1.319.035	Algebra and Number Theory	2.527
Biochemistry	1.273.017	Gerontology	2.093
Cell Biology	1.044.956	Discrete Mathematics and Combinatorics	1.884
Genetics	951.462	Geometry and Topology	1.861
Condensed Matter Physics	756.929	Equine	1.691
Immunology	618.426	Small Animals	1.679
Cancer Research	570.898	Agricultural and Biological Sciences (miscellaneous)	1.510
Electrical and Electronic Engineering	568.277	Numerical Analysis	1.331
Oncology	557.918	Psychiatric Mental Health	1.061
Cardiology and Cardiovascular Medicine	524.202	Computers in Earth Sciences	1.049

\*There are 23 fields of science with less than 1.000 citations in the dataset.

To address this issue in the analysis of individual universities in the top 30% we also use a normalized weighting scheme, allowing for inter-sectoral differences in the citation patterns (see the Section on top 30% for details). The normalization has been created by correcting the share of citations in the given field by the average number of citations per paper in the same field, using comparable Scopus data for the same period (2007-2010). In practice, if a university is in top 30% in larger than average fields it gets scores larger than one in the sum of fields, but if those fields have a larger number of citations per paper than average the score is discounted accordingly. Using this approach the relative position of universities having different specialization patterns becomes comparable.

Data on the number of fields in which universities are leading are then aggregated at country level and regional level (Europe, North America, Asia), with the goal of providing a picture of global competitiveness of universities in excellent research.

Note finally that this analysis cannot be interpreted as indicating differences in productivity of different systems of research. In fact our data do not provide any clue on:

- number of active researchers
- level of funding.

Further research is needed to compare universities in various regions of the world with respect to the research output per unit of academic staff (active researcher) and per euro invested.

### 2.3 Limitations of the analysis

There are several severe limitations of this analysis. It should not be considered for any reason a complete and comprehensive representation of scientific production.

First, the data **only cover scientific and technological fields** and a limited section of social sciences (economics and statistics). This means that they do not capture the overall performance of universities and should not be considered as representing European science in its integrity. This is a severe limitation, since humanities, arts and social sciences are an essential part of academic activity, and areas where European universities have old traditions, cultural leadership and global attractiveness. Having said that, it is important that scientific communities in HSS understand the importance of working towards better visibility and comparability of information on their activity.

Second, **small but excellent institutions** (e.g. Ecole Normale in France, or Scuola Normale Superiore in Italy, or similar institutions) **will not be represented**. This is due to the presence in the composite indicator of two size-dependent indicators (number of publications and h-index), as well as the presence of a threshold defined in absolute terms (50 publications). Therefore the list discussed in the Report should not be considered a comprehensive description of excellence, but a representation of the subset of excellent science that combines volume and quality.

Third, **data only come from universities**. The GRBS is considering the publication of similar data for Public Research Organizations around the world. For the time being, working on universities only means ignoring the contribution to European science of large non-university research organisations, such as CNRS, INSERM and INRA in France, Max Planck, Leibniz and Helmholtz in Germany, CSIC in Spain, and CNR or INFN in Italy. Since most of these institutes are active in scientific and technological fields covered by this analysis, the overall picture could be severely modified by the inclusion of these organizations.

At the same time, there is a lively debate on the relative role of universities and PROs in advanced countries, with opposite views. We hope that the data presented in this Report will help to ground the debate on good empirical bases, at least for the university sector.

Fourth, great care has been placed in attributing publications to universities on the basis of all possible affiliation names present in Scopus. This has been done manually by a large group of national experts in all countries covered by the Global Research Benchmarking System.<sup>5</sup>As for Europe, all affiliation names found in the Scopus database have been included in an exercise of systematic analysis that has covered all abbreviations, synonyms, acronyms and variations, and has attributed to universities institutions with different names, such as hospitals or laboratories, on the basis of first hand knowledge of the underlying relation. Having said that, **it is still possible that some researchers affiliated to universities do not use the name of their university in the affiliations declared in articles**. This is possibly true if they are also affiliated to other institutions, as it happens in French large Public Research Organisations (PROs). While the magnitude of this lack of information is not known, it must be kept in mind when examining specific country cases.

Fifth, our **definition of excellence is severe**. The composite indicator on which the classification of universities in bands is based combines volume (number of publications), impact (number of citations) and quality (share of publications and citations in top journals). This means that to be in band 1 a university must be excellent in quality but also relatively strong in quantity. While the number of niches examined is still very large, it is possible that universities are excellent in fields that are defined at a finer degree of resolution or do not achieve the volume needed to compete at world level. Furthermore, focusing on band

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<sup>5</sup> A large number of experts contributed to the disambiguation and identification of affiliations of European universities. Their names are listed in the GRBS website. We thank all of them here.

1 means adopting the kind of definition of excellence which is commonly accepted in research evaluation of individuals (e.g. top 5% or 10%, or highly cited scientists, or similar top ranking exercises).

Finally, as in any bibliometric exercise, the interpretation of results is dependent on the adoption of **assumptions**. To name a few examples, we ignore journals in national language (although Scopus has some coverage, particularly in German, French and Spanish languages), we assume that the number of citations is an indicator of impact, or we adopt the SNIP definition of quality of journals.

### 3. Scientific excellence as defined by the top 10%

#### 3.1 Scientific excellence by field

As explained above, the top 10% definition of excellence is a very demanding one, since it requires the combination of volume and impact at the level of individual universities. Keeping this definition in mind, it is instructive to examine which universities in the world are able to show up in the top decile across scientific fields.

Because the top 10% definition is so restrictive, we focus only on the unweighted measure, i.e. we implicitly assume that all fields have the same size and importance. On the contrary, in the top 30% definition we will compare unweighted, weighted and weighted-normalized definitions of excellence of universities.

Appendix A shows the list of universities in band 1 across all 251 scientific fields. By inspecting these data it is possible to get an impression of those fields in which European universities are able to compete, as well as which are the competitors.

Let us start from areas where we do not see many European universities at the top. Few European universities are at the top in fundamental science in biology, biochemistry, molecular biology and biotechnology, that is, in the fields in life sciences that have promoted the most dramatic scientific revolution in XX century. The tables of the Appendix are impressive: in Molecular biology, Molecular medicine, Genetics, Endocrinology, Developmental Biology, Clinical biochemistry, as well as in Cancer research and Biotechnology the whole European academic science lags behind a single American university, Harvard.

European universities do better in more downstream disciplines in Medical sciences, many of which have a clinical nature.

Another impressive finding is that we do not find any European university in the top 10% in all fields of Computer science: neither in the theoretical foundations (Computational Theory and Mathematics; Artificial Intelligence), nor in the hardware (Signal Processing; Hardware and Architecture), or software (Software; Information Systems), or in more recent developments such as Human-Computer Interaction; Computer Vision and Pattern Recognition; Computer Networks and Communications; and Computer Graphics and Computer-Aided Design. These areas are those from which the most pervasive changes in technology have been originated in the last half century.

Interestingly, European universities do better in scientific fields in which the experimental or laboratory approach is combined with naturalistic observation or quasi-experimental design, such as those in environmental sciences, plant and animal sciences, agricultural sciences.

European universities do a better job in fundamental sciences such as Mathematics and Chemistry, although traditional positions are increasingly eroded by Asian universities.

In Engineering and Materials Sciences there are several areas of excellence (e.g. Mechanical, Chemical and Aerospace Engineering; Metals and Alloys), although the more fast moving fields see a weaker presence.

The specialization pattern of European universities that compete in top 10% is discussed below.



### 3.2 Scientific excellence by university

The hot debate on university rankings, which has been at the origin of several initiatives of Member States and the European Commission, is based on the assumption that universities are unified organizations, similar to firms, that compete in the market for reputation and prestige. Universities have a strategy, defined as a positioning in the multidimensional space of outputs, or dimensions of performance. Rankings are for universities what market shares, or market value, are for companies: they constitute a reliable indicator of their relative position with respect to competitors. While there may be elements of truth in this representation, it is not adequate to capture the research activities of universities, particularly in Europe.

An alternative vision is that universities are loosely connected collections of departments and research teams, under an administrative umbrella that provide access to services and academic identity and affiliation. In this view the university has little influence on the conditions for research production at team level. The only long term influence is given by recruitment decisions. If these decisions, however, are taken by academic communities and then accepted by universities, then the central university organization has, again, little influence in determining the desired level of research quality across fields.

In this representation there is no reason to expect that the various disciplines covered by a university have the same or similar level of research quality. There may be large variability across scientific fields, due to historical reasons, legacy of established research schools, or contingent events of recruitment.

This is what our data show for Europe. There are 63 universities able to reach the top 10% tier in at least one scientific field. There are a few global players, as defined by universities which are in top 10% for at least 10 scientific fields. These are actually only three: University College London in the UK, Wageningen University and Research Centre in the Netherlands, and the Federal Institute of Technology in Zurich, Switzerland. On the contrary, there are many niche players ( $n=42$ ), as defined by universities which are in the top 10% for less than 3 fields.

Remember that in this analysis all fields are considered equal. This means that in some cases the presence in the upper tail would be an overestimation of the overall importance. This point will be clarified in the analysis of the top 30%, in which the presence in the tier will be weighted by importance in terms of publications and citations.

In the top 10% definition it is quite clear that European excellence in science is largely made of a sea of small players, with a few islands of global players.

**Table 1 List of European universities by number of fields in top 10% research excellence**

University College London	United Kingdom	17
Wageningen University and Research Centre	Netherlands	17
Federal Institute of Technology Zurich	Switzerland	12
The University of Cambridge	United Kingdom	9
Utrecht University	Netherlands	9
The University of Oxford	United Kingdom	7
Karolinska Institute	Sweden	6
Delft University of Technology	Netherlands	5
The University of Bristol	United Kingdom	4
Technical University of Denmark	Denmark	4
Erasmus University Rotterdam	Netherlands	4
University of Copenhagen	Denmark	4
The University of Manchester	United Kingdom	4
Swedish University of Agricultural Sciences	Sweden	3
Katholieke Universiteit Leuven	Belgium	3
King's College London	United Kingdom	3
University of Amsterdam	Netherlands	3
University of Durham	United Kingdom	3
University of Bern	Switzerland	3
Lund University	Sweden	3
Imperial College	United Kingdom	2
The Royal Veterinary College	United Kingdom	2
Humboldt-Universität zu Berlin	Germany	2
Ghent University	Belgium	2
Maastricht University	Netherlands	2
London School of Hygiene and Tropical Medicine	United Kingdom	2
The University of Edinburgh	United Kingdom	2
Eindhoven University of Technology	Netherlands	2
VU University Amsterdam	Netherlands	2
Universite Pierre et Marie Curie	France	2
The University of Southampton	United Kingdom	2
The University of York	United Kingdom	2
Freie Universität Berlin	Germany	2
Universität Bremen	Germany	2
Federal Institute of Technology Lausanne	Switzerland	1
Leiden University	Netherlands	1
Göteborg University	Sweden	1
Heidelberg University	Germany	1
University of Torino	Italy	1
University of Bayreuth	Germany	1
University of Bergen	Norway	1

University of Bonn	Germany	1
University of Firenze	Italy	1
University of Hamburg	Germany	1
University of Helsinki	Finland	1
The University of Glasgow	United Kingdom	1
Universite Strasbourg	France	1
University of Wuppertal	Germany	1
The Norwegian University of Science and Technology	Norway	1
Norwegian School of Sport Sciences	Norway	1
Stockholm University	Sweden	1
University Hospital Leuven	Belgium	1
University "La Sapienza"	Italy	1
The University of Liverpool	United Kingdom	1
The University of Nottingham	United Kingdom	1
The University of Sheffield	United Kingdom	1
The University of St Andrews	United Kingdom	1
Universidad de Valencia	Spain	1
Universite Claude Bernard Lyon 1	France	1
Universite Paris-Sud XI	France	1
Universite Poitiers	France	1
Loughborough University	United Kingdom	1
Technical University of Lisbon	Portugal	1

This situation contrasts sharply with the picture we can obtain for the United States. The number of universities in Table 2 is 69, of which 7 in Canada. Hence the total number of universities in the top list for US only is perfectly comparable to the European one.

But here we can find a group of globally competitive universities, able to get excellence in several fields. This league is led, not surprisingly, by Harvard, with 58 dominated scientific fields. There are, in total, as many as 13 global players. What is shocking is that the first 7 US global players (Harvard, John Hopkins, MIT, UCSF, Pittsburgh, Stanford, Ann Arbor) account for a larger number of dominated scientific fields than all European universities combined.

**Table 2 List of North American universities by number of fields in top 10% research excellence**

Harvard University	United States	58
Johns Hopkins University	United States	32
Massachusetts Institute of Technology	United States	25
University of California - San Francisco	United States	21
University of Pittsburgh	United States	20
Stanford University	United States	18
University Michigan - Ann Arbor	United States	17
University of California - San Diego	United States	13
University of Washington - Seattle	United States	12
University of California - Los Angeles	United States	12
University of California, Berkeley	United States	11
University of Pennsylvania	United States	11
University of North Carolina at Chapel Hill	United States	10
University of California – Davis	United States	9
Columbia University in the City of New York	United States	9
University of Florida	United States	7
University of Colorado - Boulder	United States	6
University of Toronto	Canada	5
University of Waterloo	Canada	5
Oregon State University	United States	5
University of Illinois - Urbana-Champaign	United States	5
Yale University	United States	5
University of Texas - M. D. Anderson Cancer Center	United States	5
Purdue University - West Lafayette	United States	4
Georgia Institute of Technology	United States	4
Princeton University	United States	4
University of Chicago	United States	4
Northwestern University	United States	4
Duke University	United States	4
California Institute of Technology	United States	3
University of Wisconsin - Madison	United States	3
Washington University in St. Louis	United States	3
Tufts University	United States	3
University of Maryland - College Park	United States	3
University of Texas - Austin	United States	3
University of California- Santa Barbara	United States	3
The University of British Columbia	Canada	2
McGill University	Canada	2
Mount Sinai School of Medicine	United States	2
University of Minnesota - Twin Cities	United States	2
University of Arizona	United States	2

University of Alberta	Canada	2
Cornell University	United States	2
University of Tennessee - Knoxville	United States	2
University of Texas Southwestern Medical Center	United States	2
Colorado State University	United States	2
University of Utah	United States	2
University of Hawaii at Manoa	United States	2
Carnegie Mellon University	United States	2
Baylor College of Medicine	United States	1
Emory University	United States	1
Boston University	United States	1
University of California, Irvine	United States	1
University of Iowa	United States	1
University of South Carolina	United States	1
University of Victoria	Canada	1
Vanderbilt University	United States	1
Virginia Polytechnic Institute and State University	United States	1
Washington State University – Pullman	United States	1
Weill Cornell Medical College	United States	1
University of Ontario Institute of Technology	Canada	1
Michigan State University	United States	1
New York University	United States	1
Ohio State University – Columbus	United States	1
Pennsylvania State University - University Park	United States	1
Queen’s University, Kingston	Canada	1
Rutgers, The State University of New Jersey - New Brunswick	United States	1
Texas A&M University	United States	1
Arizona State University	United States	1

In addition, there is a robust layer of moderate players, or universities that are in band 1 for a number of fields between 3 and 9. It is also interesting to see the positioning of all State universities in California: San Francisco, San Diego, Los Angeles and Berkeley are all in the global player group, while Davis and Santa Barbara are in the moderate group. This is a remarkable achievement for a university system which adopted a differentiated model of higher education back in the ‘60s.

When looking at the list of universities in Asia, there are several remarkable findings. First of all, the list includes 51 universities, slightly less than Europe or United States. Among them, as many as 7 universities are global players, against 3 in Europe and 13 in USA. The list of global players is also surprising, since it is not dominated by countries with a longer tradition in science and higher education, such as Japan and Australia, but by Singapore, China, South Korea and Hong Kong. The two largest and most prestigious Japanese universities, Tokio and Kyoto, are in top 10% in 10 fields each, which is a remarkable achievement but still below the results of National University of Singapore or Tsinghua University of China.

**Table 3 List of Asian universities by number of fields in top 10% research excellence**

National University of Singapore	Singapore	24
Tsinghua University	China	18
Nanyang Technological University	Singapore	16
University of Science and Technology, Korea	South Korea	16
Hong Kong Polytechnic University	Hong Kong SAR, China	10
University of Tokyo	Japan	10
Kyoto University	Japan	10
Zhejiang University	China	9
University of Queensland	Australia	8
Southeast University	China	7
Hong Kong University of Science and Technology	Hong Kong SAR, China	6
City University of Hong Kong	Hong Kong SAR, China	5
Peking University	China	5
National Taiwan University	Taiwan, Province of China	5
University of Science and Technology of China	China	4
Seoul National University	South Korea	4
National Cheng Kung University	Taiwan, Province of China	4
Australian National University	Australia	3
Tokyo Institute of Technology	Japan	3
Graduate University of Chinese Academy of Sciences	China	3
University of Sydney	Australia	3
Shanghai Jiaotong University	China	3
Nanjing University	China	2
Shandong University	China	2
Osaka University	Japan	2
China University of Geosciences	China	2
China University of Mining Technology	China	2
Donghua University	China	2
University of Melbourne	Australia	2
University of Western Australia	Australia	2
Harbin Institute of Technology	China	2
Tohoku University	Japan	2
Tongji University	China	2
Universiti Sains Malaysia	Malaysia	2
Hohai University	China	1
Chinese University of Hong Kong	Hong Kong SAR, China	1
Ewha Womans University	South Korea	1
Curtin University of Technology, Perth	Australia	1
Indian Institute of Technology, Madras	India	1
James Cook University	Australia	1
Beijing University of Aeronautics and Astronautics	China	1

Jilin University	China	1
Feng Chia University	Taiwan, Province of China	1
Lanzhou University	China	1
University of Adelaide	Australia	1
Wuhan University	China	1
Xi'an Jiaotong University	China	1
Xidian University	China	1
Yonsei University	South Korea	1
National Chiao Tung University Taiwan	Taiwan, Province of China	1
Northeastern University China	China	1

The relative strength of world regions is also apparent if we change the focus of analysis, moving up in the disciplinary tree. Instead of looking at scientific fields (n=251) we aggregate the indicators by broad disciplines (n=15), defining the deciles accordingly. For a give university it is more difficult to be in the top 10% in the broad discipline, since it requires to be competitive in all fields, or at least in a large number of fields. Thus the aggregated analysis tell us something different on the ability of universities to compete. Table 4 summarizes the data.

The results are striking. There are 27 universities able to compete in at least one broad discipline. Of these, only five are European: University of Cambridge in United Kingdom, Federal Institute of Technology in Switzerland, Wageningen University and VU University Amsterdam in Netherlands, and Karolinska Institute in Sweden. On the other hand, 16 universities are from United States, 5 from Asia, 1 from Canada. The number of world leader in Europe is the same than in Asia. The number of broad areas for which European universities are in top 10% is 9, or 15% of the total number of fields examined in Table 4.

**Table 4 List of universities by number of broad scientific fields in top 10%**

Harvard University	United States	10
Massachusetts Institute of Technology	United States	6
Stanford University	United States	6
University of California, Berkeley	United States	6
The University of Cambridge	United Kingdom	3
National University of Singapore	Singapore	3
Federal Institute of Technology Zurich	Switzerland	2
Northwestern University	United States	2
California Institute of Technology	United States	2
University of California – Davis	United States	2
Wageningen University and Research Centre	Netherlands	2
University of Tokyo	Japan	2
University of Toronto	Canada	1
Cornell University	United States	1
VU University Amsterdam	Netherlands	1
University of Washington - Seattle	United States	1
Hong Kong University of Science and Technology	Hong Kong SAR, China	1
Johns Hopkins University	United States	1
University Michigan - Ann Arbor	United States	1
Kyoto University	Japan	1
University of California - Los Angeles	United States	1
University of Science and Technology, Korea	South Korea	1
University of Pittsburgh	United States	1
University of North Carolina at Chapel Hill	United States	1
University of Colorado - Boulder	United States	1
University of Chicago	United States	1
Karolinska Institute	Sweden	1



## 4. Scientific excellence as defined by the top 30%

### 4.1 Overall position of Europe, North America and Asia

The picture changes significantly if we move from the top 10% to the top 30% definition of excellence. As shown in the Executive Summary, in the top 30% European universities (n= 273) are able to compete at global level in as many as 2.863 scientific fields, or 32,9% of the world total. Thus European universities have a share of the global top 30% approximately equal to one third. If weight fields by number of publications and citations, the resulting picture is mixed. Europe loses ground with respect to Asia in terms of publications at the top 30% (25.3% against 29.6%), while it still leads in terms of citations (26.5% against 17.7%). In this perspective, European universities produce a volume of excellent publications roughly comparable to Asia, but receive proportionally more citations.

There are 273 European universities that have at least one field in the top 30%, as opposed to 188 in USA and Canada and 181 in Asia-Pacific. Therefore when we move down the definition of excellence we find a more diffused ability of European universities to compete. At the same time, excellence is dispersed across a large number of niche universities.

Despite the difference in the number of universities, North-American universities cover 4.064 fields, as opposed to 2.863 in Europe and 1.765 in Asia-Pacific. Out of 8.692 covered fields, assumed of the same importance, 46,7% is from USA and Canada, 32,9% from Europe, and 20,3% from Asia-Pacific.

European excellent universities, similarly to Asian ones, are half the size of North-American universities. The average size in terms of number of excellent fields per university is 21,6% in USA and Canada, 10,5 in Europe, and 9,7 in Asia-Pacific. The first 10 European universities cover 686 excellent fields, as opposed to 1.086 in USA and Canada and 524 in Asia-Pacific.

The 273 European universities are active in 15.289 fields covered by the dataset, of which 2.863 are among those in which they excel in the top 30%, or the 18,7% of the total. This pattern is similar to the one found in Asia-Pacific, in which we find 1.765 excellent fields, or 17,7% of the total number of fields in which universities are active, or 9.973. In sharp contrast in USA and Canada we see 4.064 excellent fields out of total 12.746 fields, or 31,9%.

### 4.2 Scientific excellence by university

While the aggregate data already offer much evidence for discussion, it is also useful to examine the positioning of individual universities. Since the definition of top 30% excellence makes it possible to include a larger number of universities, it is important to examine more in detail the issue of weighting of scientific fields.

We made the methodological choice to weight scientific fields by number of citations, rather than by number of publications. Citations reflect better the overall impact of scientific production, when taken at aggregate level. We then use three different measures:

- I) *unweighted indicator*: number of scientific fields in which a university is present in the top 30%
- II) *weighted indicator*: number of scientific fields in which a university is present in the top 30% weighted by the relative size of fields in terms of citations (at world level)
- III) *normalized weighted indicator*: number of scientific fields in which a university is present in the top 30% weighted by a normalized factor including the relative size of fields in terms of citations and the average number of citations per paper across scientific fields (at world level).

These indicators are illustrated in columns W1, W\_CIT and NORM\_W\_CIT, respectively. The unit of measure of W1 is the count of fields and thus has a natural meaning. In the case of W\_CIT and NORM\_W\_CIT the same number is manipulated according to the technique illustrated in the methodological section. Their meaning is less natural: each field enters the sum with a number which is larger or smaller than one (as in the unweighted ranking) depending on the fact that its size in terms of citations and normalized citations, respectively, is larger or smaller than the average field. Therefore the sum has not an immediate reading in a cardinal sense, while they show clearly the ordinal position. The overall reading of the weighted rankings is as follows: a university gets a better position in the unweighted ranking if it excels in scientific fields which are smaller with respect to the others. If the numbers of weighted and normalized weighted indicators are larger, on the contrary, this means that a university is able to compete in large fields, in which by definition there are more researchers worldwide. Weighted and normalized weighted rankings offer a more accurate picture of the relative impact of scientific production of universities.

In each column the value of the indicator is indicated. The value of the ranking is shown between brackets.

To these indicators we add a new one, called Governance Index (GI). It is simply calculated as the ratio between the number of scientific fields in which a university is in the top 30% and the total number of fields in which it is active in research. By “being active” we mean “to appear in the dataset”, that is, to pass the threshold of 50 publications in the period. This means that the number of fields in which universities are active in research may be larger than the one shown in the tables if there are smaller fields which produce less than 50 publications.

The Governance Index measures the ability of universities to support consistently excellence in research across fields. Universities with larger values of GI are able to compete at top positions worldwide across a large share of the fields in which the faculty is active in research and teaching. We assume that this is not possible by chance. Universities with larger GI values must have a governance model and a strategy aimed at requiring that most departments are found at top positions worldwide, following consistent policies of recruitment, career advancements, evaluation

and funding. In order to sustain excellence across many fields, these policies must have been followed consistently and credibly across many years, usually many decades.

Obviously, the meaning of the Governance Index must be understood against the total number of fields in which universities are active: at Norwegian University of Life Sciences and London Business School the value is 1, or 100%, because two fields are found in top 30% out of a total number of two. Compare with University College London, where the value is 0.59, since the number of fields in the top 30% is 85 out of 144: it is clear that maintaining consistent excellence across fields becomes increasingly more difficult when the number of fields gets larger and larger.

**Table 5 List of European universities by number of fields in top 30% research excellence and ranking indicators**

University	Country	Total fields	W1	GI	W_CIT	NORM_W_CIT
The University of Oxford	United Kingdom	137	94 (1)	0.686 (5)	155.5 (1)	116.8 (1)
University College London	United Kingdom	144	85 (2)	0.59 (10)	117.3 (3)	97.2 (5)
The University of Cambridge	United Kingdom	139	83 (3)	0.597 (8)	143.5 (2)	114 (2)
Federal Institute of Technology Zurich	Switzerland	120	81 (4)	0.675 (6)	98.8 (5)	103.7 (3)
Utrecht University	Netherlands	132	71 (5)	0.538 (14)	75.8 (7)	74.8 (6)
Imperial College	United Kingdom	142	70 (6)	0.493 (15)	99.9 (4)	100.3 (4)
University of Copenhagen	Denmark	122	53 (7)	0.434 (19)	51 (13)	55.4 (12)
Katholieke Universiteit Leuven	Belgium	143	50 (8)	0.35 (27)	59.1 (10)	72.9 (7)
VU University Amsterdam	Netherlands	111	50 (8)	0.45 (18)	50.5 (15)	52 (14)
University of Amsterdam	Netherlands	113	49 (10)	0.434 (20)	63.9 (9)	57.7 (11)
Erasmus University Rotterdam	Netherlands	77	48 (11)	0.623 (7)	78.1 (6)	59 (10)
Karolinska Institute	Sweden	78	46 (12)	0.59 (11)	65.5 (8)	50.2 (16)
Ghent University	Belgium	150	44 (13)	0.293 (40)	29.4 (34)	35 (34)
Universite Pierre et Marie Curie	France	123	42 (14)	0.341 (28)	48.4 (17)	51.9 (15)
The University of Manchester	United Kingdom	141	41 (15)	0.291 (43)	54.1 (11)	64.4 (8)
The University of Bristol	United Kingdom	110	41 (15)	0.373 (24)	43.4 (20)	53.6 (13)
Lund University	Sweden	128	41 (15)	0.32 (35)	42.9 (22)	49.8 (18)
Wageningen University and Research Centre	Netherlands	67	40 (18)	0.597 (9)	38.2 (25)	41.1 (26)
University of Helsinki	Finland	122	39 (19)	0.32 (36)	37.7 (26)	41.5 (25)
University of Groningen	Netherlands	112	38 (20)	0.339 (29)	50.2 (16)	50 (17)
Radboud University Nijmegen	Netherlands	98	38 (20)	0.388 (23)	41.9 (24)	43.6 (22)
Federal Institute of Technology Lausanne	Switzerland	75	35 (22)	0.467 (17)	51.6 (12)	59 (9)
Technical University of Denmark	Denmark	80	34 (23)	0.425 (21)	42.8 (23)	49.7 (19)
Freie Universität Berlin	Germany	113	33 (24)	0.292 (42)	43.2 (21)	36.4 (33)
Humboldt-Universität zu Berlin	Germany	118	32 (25)	0.271 (49)	44.1 (18)	36.5 (32)
The University of Edinburgh	United Kingdom	115	31 (26)	0.27 (50)	37.5 (27)	43.4 (23)
The University of Leeds	United Kingdom	106	31 (26)	0.292 (41)	31.3 (31)	40.1 (27)
Leiden University	Netherlands	83	30 (28)	0.361 (26)	50.8 (14)	42.5 (24)
Eindhoven University of Technology	Netherlands	59	29 (29)	0.492 (16)	44.1 (19)	47.5 (20)
Delft University of Technology	Netherlands	90	29 (29)	0.322 (34)	31.9 (30)	44.7 (21)
The University of Southampton	United Kingdom	103	28 (31)	0.272 (48)	28.5 (35)	38.2 (28)
The University of Sheffield	United Kingdom	99	27 (32)	0.273 (47)	25.5 (42)	33.1 (36)
Maastricht University	Netherlands	66	26 (33)	0.394 (22)	34.2 (29)	30.3 (40)
King's College London	United Kingdom	78	26 (33)	0.333 (30)	28.2 (38)	25.6 (44)
Ludwig-Maximilians-Universität München	Germany	119	25 (35)	0.21 (71)	36.4 (28)	37 (29)
University of Aarhus	Denmark	97	25 (35)	0.258 (52)	24 (44)	27.8 (42)
University of Padova	Italy	128	23 (37)	0.18 (85)	29.7 (33)	36.7 (30)
Göteborg University	Sweden	84	22 (38)	0.262 (51)	18.2 (50)	22.1 (46)
The University of Liverpool	United Kingdom	93	21 (39)	0.226 (62)	28 (39)	36.5 (31)
Universite Paris-Sud XI	France	97	21 (39)	0.216 (66)	21.9 (47)	18.7 (54)
Uppsala University	Sweden	116	20 (41)	0.172 (90)	28.4 (36)	28.4 (41)
Heidelberg University	Germany	95	20 (41)	0.211 (70)	27.5 (40)	30.5 (39)
The University of Nottingham	United Kingdom	112	20 (41)	0.179 (86)	27.1 (41)	31 (38)
Swedish University of Agricultural Sciences	Sweden	36	20 (41)	0.556 (13)	12.8 (72)	16.2 (68)
The University of Birmingham	United Kingdom	104	19 (45)	0.183 (82)	16 (58)	21.2 (47)
University "La Sapienza"	Italy	141	19 (45)	0.135 (115)	15.1 (63)	16.5 (65)
Universität Karlsruhe (TH)	Germany	72	18 (47)	0.25 (54)	29.7 (32)	33.8 (35)

University of Geneva	Switzerland	93	18 (47)	0.194 (80)	28.2 (37)	26.8 (43)
Vienna University of Medicine	Austria	62	18 (47)	0.29 (44)	16.6 (57)	16.4 (66)
Royal Institute of Technology	Sweden	69	17 (50)	0.246 (60)	25.2 (43)	32.2 (37)
University of Bologna	Italy	137	17 (50)	0.124 (129)	18.7 (49)	18.6 (55)
Universidad de Barcelona	Spain	110	16 (52)	0.145 (110)	15.2 (61)	17.8 (61)
University of Oslo	Norway	98	16 (52)	0.163 (99)	11.4 (75)	18 (60)
Stockholm University	Sweden	59	15 (54)	0.254 (53)	13.9 (67)	18.6 (56)
University of Durham	United Kingdom	45	14 (55)	0.311 (39)	17 (53)	20.3 (50)
Tübingen University	Germany	90	14 (55)	0.156 (103)	14.3 (65)	14.4 (76)
University of Milano	Italy	109	14 (55)	0.128 (119)	13.9 (68)	14.5 (75)
Universite PARIS V Rene Descartes	France	66	13 (58)	0.197 (76)	23.1 (45)	16.1 (69)
Universite Strasbourg	France	74	13 (58)	0.176 (88)	22.2 (46)	23.9 (45)
Technische Universität München	Germany	117	13 (58)	0.111 (143)	18.1 (51)	18.3 (58)
University of Bayreuth	Germany	41	13 (58)	0.317 (37)	17.8 (52)	19.5 (51)
University "Federico II"	Italy	118	13 (58)	0.11 (147)	10.7 (80)	12 (84)
Universidad Politécnica de Cataluña	Spain	64	13 (58)	0.203 (73)	10 (83)	16.3 (67)
University of Erlangen-Nürnberg	Germany	87	12 (64)	0.138 (114)	19.7 (48)	20.3 (49)
University of Twente	Netherlands	48	12 (64)	0.25 (54)	15.6 (59)	16.5 (64)
Aristotle University of Thessaloniki	Greece	100	12 (64)	0.12 (133)	9 (88)	13.5 (77)
Universidad Complutense de Madrid	Spain	99	12 (64)	0.121 (131)	8.8 (91)	12.4 (80)
The University of Glasgow	United Kingdom	91	11 (68)	0.121 (132)	15.3 (60)	18.3 (57)
University of Zurich	Switzerland	79	11 (68)	0.139 (113)	13.8 (69)	18.7 (53)
University of Porto	Portugal	92	11 (68)	0.12 (135)	11.3 (76)	12.7 (79)
Universite BORDEAUX I	France	44	11 (68)	0.25 (54)	11.1 (77)	15.1 (73)
The University of East Anglia	United Kingdom	35	11 (68)	0.314 (38)	9.4 (86)	12.2 (83)
Chalmers University of Technology	Sweden	51	11 (68)	0.216 (67)	9.4 (87)	10.2 (95)
University of Bern	Switzerland	75	11 (68)	0.147 (109)	7.8 (100)	11.6 (87)
The Norwegian University of Science and Technology	Norway	85	11 (68)	0.129 (118)	6 (120)	10.9 (91)
Universite Joseph Fourier	France	56	10 (76)	0.179 (86)	14.2 (66)	17 (63)
University of Münster	Germany	86	10 (76)	0.116 (139)	13.1 (71)	15.7 (70)
Umeå university	Sweden	58	10 (76)	0.172 (90)	10.1 (82)	11.9 (85)
London School of Hygiene and Tropical Medicine	United Kingdom	30	10 (76)	0.333 (30)	9.6 (85)	9.6 (101)
Georg August Göttingen University	Germany	89	10 (76)	0.112 (142)	6.2 (117)	7.7 (115)
National and Kapodistrian University of Athens	Greece	99	10 (76)	0.101 (153)	5.2 (127)	7 (120)
National Technical University of Athens	Greece	51	10 (76)	0.196 (77)	3.9 (138)	6.4 (126)
The University of Bath	United Kingdom	46	9 (83)	0.196 (78)	16.6 (56)	18.3 (59)
University of Bonn	Germany	89	9 (83)	0.101 (152)	14.3 (64)	11.3 (89)
University of Freiburg	Germany	85	9 (83)	0.106 (150)	12.2 (73)	12.3 (82)
The University of York	United Kingdom	49	9 (83)	0.184 (81)	11.6 (74)	15.3 (72)
Universite MONTPELLIER II des Sciences et Techniques du Languedoc	France	55	9 (83)	0.164 (98)	10.8 (79)	15.3 (71)
Politecnique of Torino	Italy	43	9 (83)	0.209 (72)	8.8 (90)	17.1 (62)
Cardiff University	United Kingdom	90	9 (83)	0.1 (154)	8.5 (95)	11 (90)
University of Firenze	Italy	95	9 (83)	0.095 (163)	7.7 (101)	9.4 (105)
The University of Aberdeen	United Kingdom	57	9 (83)	0.158 (100)	7.4 (107)	9.5 (103)
Universidad Autónoma Barcelona	Spain	103	9 (83)	0.087 (172)	6.2 (119)	9.5 (102)
Universidad de Zaragoza	Spain	61	9 (83)	0.148 (108)	5.4 (123)	7.3 (117)
The University of Plymouth	United Kingdom	16	9 (83)	0.563 (12)	4 (136)	6.6 (122)
The University of St Andrews	United Kingdom	35	8 (95)	0.229 (61)	16.8 (54)	19 (52)
Julius-Maximilians-Universität Würzburg	Germany	64	8 (95)	0.125 (121)	16.6 (55)	13.2 (78)
Aalto University	Finland	53	8 (95)	0.151 (106)	13.3 (70)	21.2 (48)

Aix Marseille Université	France	83	8 (95)	0.096 (160)	7.5 (105)	9.8 (100)
University of Antwerp	Belgium	60	8 (95)	0.133 (117)	7.5 (106)	8.3 (110)
The University of Newcastle-upon-Tyne	United Kingdom	81	8 (95)	0.099 (156)	6.5 (115)	9.4 (106)
Universidad Politécnica de Valencia	Spain	56	7 (101)	0.125 (121)	9.6 (84)	9.4 (104)
Johannes Gutenberg University Mainz	Germany	69	7 (101)	0.101 (151)	8.7 (93)	10.6 (92)
Politecnique of Milano	Italy	56	7 (101)	0.125 (121)	8.6 (94)	14.8 (74)
Universidad de Valencia	Spain	72	7 (101)	0.097 (157)	8.5 (96)	8 (111)
Frankfurt University	Germany	82	7 (101)	0.085 (177)	7.9 (98)	8.4 (108)
University of Aveiro	Portugal	52	7 (101)	0.135 (116)	6.7 (113)	10.4 (93)
Universidad de Sevilla	Spain	55	7 (101)	0.127 (120)	5.7 (121)	9.8 (99)
University Hospital Leuven	Belgium	36	7 (101)	0.194 (79)	5.6 (122)	7.1 (119)
University of Bergen	Norway	64	7 (101)	0.109 (148)	3.4 (146)	6.6 (121)
Universität Bremen	Germany	40	7 (101)	0.175 (89)	2.1 (169)	4.5 (147)
Technical University of Lisbon	Portugal	75	7 (101)	0.093 (164)	1.7 (178)	3.8 (156)
University of Torino	Italy	88	6 (112)	0.068 (198)	10.7 (81)	10.3 (94)
The University of Warwick	United Kingdom	65	6 (112)	0.092 (165)	8.8 (89)	12.3 (81)
University of Basle	Switzerland	75	6 (112)	0.08 (182)	8.1 (97)	8.3 (109)
Medizinische Hochschule Hannover	Germany	54	6 (112)	0.111 (143)	7.3 (108)	6.5 (124)
Universidad de Castilla-La Mancha	Spain	38	6 (112)	0.158 (100)	7.2 (109)	11.5 (88)
University of Pisa	Italy	99	6 (112)	0.061 (206)	6.7 (112)	5.8 (128)
University of Eastern Finland	Finland	62	6 (112)	0.097 (158)	4.4 (133)	5.3 (133)
Universität Kiel	Germany	63	6 (112)	0.095 (161)	3.1 (149)	5.1 (136)
Cranfield University	United Kingdom	33	6 (112)	0.182 (83)	3 (151)	3.7 (160)
Universidad de Granada	Spain	74	6 (112)	0.081 (181)	2.1 (170)	4.2 (151)
Queen Mary and Westfield College	United Kingdom	68	5 (122)	0.074 (191)	8.7 (92)	10.1 (96)
The Queen's University of Belfast	United Kingdom	58	5 (122)	0.086 (175)	7.6 (103)	7.8 (113)
Universite PARIS VII Denis Diderot	France	72	5 (122)	0.069 (197)	6.2 (118)	5.4 (132)
Aachen University	Germany	70	5 (122)	0.071 (192)	5.1 (130)	5.7 (130)
The University of Lancaster	United Kingdom	32	5 (122)	0.156 (102)	5 (131)	6.5 (123)
University College Dublin	Ireland	67	5 (122)	0.075 (189)	4.6 (132)	5.7 (129)
The University of Reading	United Kingdom	43	5 (122)	0.116 (139)	3.9 (137)	4.3 (149)
Universidad de Santiago	Spain	58	5 (122)	0.086 (175)	3.8 (139)	4 (153)
Brunel University	United Kingdom	30	5 (122)	0.167 (92)	3.8 (140)	5.3 (134)
Loughborough University	United Kingdom	41	5 (122)	0.122 (130)	2.4 (164)	4.8 (140)
Technische Universität Berlin	Germany	56	5 (122)	0.089 (171)	1.6 (183)	2.5 (181)
The University of Dundee	United Kingdom	35	4 (133)	0.114 (141)	15.1 (62)	7.2 (118)
The Institute of Cancer Research	United Kingdom	12	4 (133)	0.333 (30)	10.9 (78)	4.9 (139)
Trinity College Dublin	Ireland	61	4 (133)	0.066 (201)	7.6 (104)	9.8 (98)
The University of Exeter	United Kingdom	34	4 (133)	0.118 (136)	5.4 (124)	7.4 (116)
Universidad Rovira i Virgili	Spain	24	4 (133)	0.167 (92)	5.3 (126)	6.5 (125)
Malmö University College	Sweden	27	4 (133)	0.148 (107)	5.2 (128)	4.6 (145)
University of Hamburg	Germany	84	4 (133)	0.048 (219)	3.5 (142)	3.4 (167)
Universidad de Oviedo	Spain	37	4 (133)	0.108 (149)	3.5 (143)	4.7 (144)
University of Southern Denmark	Denmark	42	4 (133)	0.095 (161)	3.5 (144)	4.7 (143)
Universidad de Cordoba	Spain	28	4 (133)	0.143 (111)	2.7 (157)	2.8 (178)
Universidad de Vigo	Spain	32	4 (133)	0.125 (121)	2.7 (158)	2.9 (175)
Bangor University	United Kingdom	18	4 (133)	0.222 (63)	2.5 (162)	4.2 (150)
Université des Sciences et Technologies de Lille	France	75	4 (133)	0.053 (212)	2.3 (166)	3.8 (157)
University of Lisbon	Portugal	56	4 (133)	0.071 (192)	2 (171)	3.9 (154)
Royal Holloway and Bedford New College	United Kingdom	11	4 (133)	0.364 (25)	1.6 (185)	3.5 (166)
University of Glamorgan	United Kingdom	4	3 (148)	0.75 (4)	7.9 (99)	11.7 (86)
Universidad de Málaga	Spain	24	3 (148)	0.125 (121)	7.7 (102)	10 (97)
Universidad Jaume I de Castellón	Spain	14	3 (148)	0.214 (68)	7 (110)	8 (112)

University of Lausanne	Switzerland	38	3 (148)	0.079 (183)	6.5 (116)	7.8 (114)
Universite Victor Segalen Bordeaux 2	France	39	3 (148)	0.077 (184)	5.4 (125)	4.8 (141)
University of Cologne	Germany	69	3 (148)	0.043 (227)	5.1 (129)	4.9 (138)
University of Wuppertal	Germany	14	3 (148)	0.214 (68)	4 (135)	5.1 (135)
The University of Strathclyde	United Kingdom	49	3 (148)	0.061 (205)	3.2 (148)	4.6 (146)
University of Siena	Italy	59	3 (148)	0.051 (217)	2.9 (154)	2.8 (177)
Swansea University	United Kingdom	25	3 (148)	0.12 (133)	2.6 (159)	5.6 (131)
Vrije Universiteit Brussel	Belgium	42	3 (148)	0.071 (192)	1.9 (174)	2.4 (186)
University of Calabria	Italy	31	3 (148)	0.097 (158)	1.7 (179)	3.3 (169)
University of Tromsø	Norway	24	3 (148)	0.125 (121)	1.6 (186)	3.2 (171)
Universidad del Pais Vasco	Spain	42	3 (148)	0.071 (192)	1.5 (188)	2.6 (180)
University of "Tor Vergata"	Italy	74	3 (148)	0.041 (231)	1.3 (196)	3.6 (163)
Universite Claude Bernard Lyon 1	France	82	3 (148)	0.037 (236)	0.4 (231)	1.1 (213)
The Royal Veterinary College	United Kingdom	12	3 (148)	0.25 (54)	0.1 (242)	0.2 (239)
Universite de Mons-Hainaut	Belgium	9	2 (165)	0.222 (63)	6.9 (111)	8.6 (107)
Université de Picardie Jules Verne	France	17	2 (165)	0.118 (136)	6.5 (114)	6.4 (127)
University of Salerno	Italy	31	2 (165)	0.065 (202)	4.2 (134)	4.8 (142)
Universite Blaise Pascal	France	27	2 (165)	0.074 (190)	3.8 (141)	4.9 (137)
Friedrich-Schiller-University of Jena	Germany	67	2 (165)	0.03 (247)	2.7 (156)	3.8 (158)
University Vita-Salute San Raffaele	Italy	17	2 (165)	0.118 (136)	2.6 (160)	2.2 (190)
University of Tuscia	Italy	11	2 (165)	0.182 (83)	2.4 (163)	3.1 (173)
University of Oulu	Finland	53	2 (165)	0.038 (234)	2.3 (165)	3.7 (161)
Dublin City University	Ireland	23	2 (165)	0.087 (173)	2.2 (167)	3.3 (170)
Universidad Autónoma Madrid	Spain	77	2 (165)	0.026 (251)	2.2 (167)	3.3 (170)
University of Tampere	Finland	35	2 (165)	0.057 (209)	2.2 (168)	3.5 (164)
Saarland University	Germany	30	2 (165)	0.067 (199)	1.9 (172)	3.2 (172)
Linköping University	Sweden	52	2 (165)	0.038 (233)	1.9 (173)	3.8 (159)
Universidad de Almeria	Spain	10	2 (165)	0.2 (74)	1.9 (175)	2 (195)
Philipps-Universität Marburg	Germany	62	2 (165)	0.032 (240)	1.8 (176)	2 (194)
Universität Stuttgart	Germany	42	2 (165)	0.048 (219)	1.7 (177)	4.1 (152)
University of Stavanger	Norway	8	2 (165)	0.25 (54)	1.7 (180)	3.6 (162)
Martin Luther University	Germany	44	2 (165)	0.045 (222)	1.7 (181)	2.1 (193)
University of Salento	Italy	22	2 (165)	0.091 (166)	1.6 (182)	3.5 (165)
Technischen Universität Dortmund	Germany	32	2 (165)	0.063 (203)	1.5 (190)	2.5 (182)
Otto von Guericke University of Magdeburg	Germany	33	2 (165)	0.061 (206)	1.4 (192)	2.8 (176)
University College Cork	Ireland	37	2 (165)	0.054 (211)	1.4 (193)	2.2 (189)
Liverpool John Moores University	United Kingdom	13	2 (165)	0.154 (104)	1.3 (194)	2.4 (185)
Norwegian School of Sport Sciences	Norway	2	2 (165)	1 (1)	1.3 (194)	2.4 (185)
The Manchester Metropolitan University	United Kingdom	7	2 (165)	0.286 (45)	1.3 (194)	2.4 (185)
University of Jyväskylä	Finland	22	2 (165)	0.091 (166)	1.3 (194)	2.4 (185)
The Open University	United Kingdom	16	2 (165)	0.125 (121)	1.3 (197)	2.5 (184)
Innsbruck University of Medicine	Austria	44	2 (165)	0.045 (222)	1.2 (198)	1.7 (202)
University of Coimbra	Portugal	59	2 (165)	0.034 (239)	1.2 (199)	2 (196)
Universidad de Islas Baleares	Spain	18	2 (165)	0.111 (143)	1 (202)	1.8 (200)
Norwegian University of Life Sciences	Norway	22	2 (165)	0.091 (166)	0.9 (203)	1.2 (209)
London Business School	United Kingdom	2	2 (165)	1 (1)	0.9 (205)	1.1 (216)
Tilburg University	Netherlands	12	2 (165)	0.167 (92)	0.9 (205)	1.1 (216)
Universite Paris Dauphine	France	7	2 (165)	0.286 (45)	0.9 (207)	1.6 (204)
Technische Universität Darmstadt	Germany	41	2 (165)	0.049 (218)	0.9 (208)	2.3 (187)
Universidad de Extremadura	Spain	23	2 (165)	0.087 (173)	0.9 (209)	1.2 (210)
Agricultural University of Athens	Greece	13	2 (165)	0.154 (104)	0.9 (211)	1 (217)
Aberystwyth University	United Kingdom	9	2 (165)	0.222 (63)	0.8 (212)	2.2 (188)
The University of Leicester	United Kingdom	53	2 (165)	0.038 (234)	0.8 (212)	2.2 (188)
Universite RENNES I	France	39	2 (165)	0.051 (216)	0.8 (212)	2.2 (188)

III University of Roma	Italy	26	2 (165)	0.077 (184)	0.7 (217)	1.1 (214)
University of Natural Resources and Applied Life Sciences, Vienna	Austria	26	2 (165)	0.077 (184)	0.7 (219)	0.6 (231)
University of Minho	Portugal	32	2 (165)	0.063 (203)	0.5 (227)	1 (219)
Charles University in Prague	Czech Republic	93	2 (165)	0.022 (256)	0.1 (243)	0.2 (240)
Universidad de Alicante	Spain	24	1 (209)	0.042 (229)	3.5 (145)	2.5 (183)
Universite NICE	France	32	1 (209)	0.031 (242)	3.2 (147)	2.7 (179)
New University of Lisbon	Portugal	12	1 (209)	0.083 (178)	3.1 (150)	3.9 (155)
The University of Hull	United Kingdom	12	1 (209)	0.083 (178)	3.1 (150)	3.9 (155)
Universite de Pau et des pays de l'Adour	France	6	1 (209)	0.167 (92)	3.1 (150)	3.9 (155)
University of Fribourg	Switzerland	11	1 (209)	0.091 (166)	3.1 (150)	3.9 (155)
University of Milano-Bicocca	Italy	43	1 (209)	0.023 (255)	3 (152)	1.9 (198)
University of Hertfordshire	United Kingdom	6	1 (209)	0.167 (92)	2.9 (153)	2.2 (191)
University of Crete	Greece	41	1 (209)	0.024 (253)	2.9 (155)	4.4 (148)
University of Pavia	Italy	65	1 (209)	0.015 (268)	2.9 (155)	4.4 (148)
University of Trieste	Italy	33	1 (209)	0.03 (245)	2.5 (161)	3 (174)
Universität Bielefeld	Germany	28	1 (209)	0.036 (237)	1.6 (184)	1.9 (197)
Hasselt University	Belgium	4	1 (209)	0.25 (54)	1.6 (187)	3.4 (168)
Universidad Pompeu Fabra	Spain	17	1 (209)	0.059 (208)	1.5 (189)	1.9 (199)
Universidad de Girona	Spain	19	1 (209)	0.053 (213)	1.4 (191)	1.2 (211)
Universidad de La Coruña	Spain	14	1 (209)	0.071 (192)	1.4 (191)	1.2 (211)
University of Ioanina	Greece	41	1 (209)	0.024 (253)	1.4 (191)	1.2 (211)
University of Duisburg-Essen	Germany	75	1 (209)	0.013 (272)	1.3 (195)	1.7 (201)
University of Regensburg	Germany	62	1 (209)	0.016 (266)	1.3 (195)	1.7 (201)
Universite MONTPELLIER I	France	22	1 (209)	0.045 (222)	1.1 (200)	1.1 (215)
University of Bari	Italy	69	1 (209)	0.014 (270)	1.1 (200)	1.1 (215)
University of Modena e Reggio Emilia	Italy	48	1 (209)	0.021 (259)	1.1 (200)	1.1 (215)
University of Parma	Italy	49	1 (209)	0.02 (260)	1.1 (200)	1.1 (215)
Paracelsus University	Austria	3	1 (209)	0.333 (30)	1.1 (201)	1.7 (203)
The University of Keele	United Kingdom	10	1 (209)	0.1 (154)	1.1 (201)	1.7 (203)
University of Udine	Italy	24	1 (209)	0.042 (229)	0.9 (204)	1.4 (208)
Ulm University	Germany	58	1 (209)	0.017 (264)	0.9 (206)	1.1 (212)
Technische Universität Dresden	Germany	72	1 (209)	0.014 (271)	0.9 (210)	2.1 (192)
Politecnique of Bari	Italy	13	1 (209)	0.077 (184)	0.8 (213)	1.4 (206)
Technische Universität Carolo-Wilhelmina zu Braunschweig	Germany	36	1 (209)	0.028 (250)	0.8 (213)	1.4 (206)
University of Kaiserslautern	Germany	22	1 (209)	0.045 (222)	0.8 (213)	1.4 (206)
Universidad de Lleida	Spain	7	1 (209)	0.143 (111)	0.8 (214)	0.8 (224)
London School of Economics and Political Science	United Kingdom	9	1 (209)	0.111 (143)	0.8 (215)	0.7 (227)
The School of Pharmacy	United Kingdom	8	1 (209)	0.125 (121)	0.7 (216)	0.9 (220)
Universite Lille 2 Droit et Sante	France	21	1 (209)	0.048 (219)	0.7 (216)	0.9 (220)
Leibniz Universität Hannover	Germany	32	1 (209)	0.031 (242)	0.7 (218)	1 (218)
Universite TOULOUSE I	France	59	1 (209)	0.017 (265)	0.7 (218)	1 (218)
Lappeenranta University of Technology	Finland	5	1 (209)	0.2 (74)	0.6 (220)	1.4 (207)
University of Palermo	Italy	67	1 (209)	0.015 (269)	0.6 (220)	1.4 (207)
University of Patras	Greece	55	1 (209)	0.018 (263)	0.6 (220)	1.4 (207)
University of Ostrava	Czech Republic	1	1 (209)	1 (1)	0.6 (221)	0.6 (229)
Universidad de Salamanca	Spain	23	1 (209)	0.043 (227)	0.6 (222)	1.5 (205)
Universite ORLEANS	France	15	1 (209)	0.067 (199)	0.6 (222)	1.5 (205)
Aalborg University	Denmark	33	1 (209)	0.03 (245)	0.6 (223)	0.9 (221)
Graz University of Medicine	Austria	31	1 (209)	0.032 (240)	0.5 (224)	0.7 (226)
Universidad Miguel Hernández de Elche	Spain	11	1 (209)	0.091 (166)	0.5 (225)	0.6 (230)



University of Brescia	Italy	40	1 (209)	0.025 (252)	0.5 (226)	0.3 (236)
University of Neuchâtel	Switzerland	13	1 (209)	0.077 (184)	0.5 (228)	0.8 (223)
Universite NANTES	France	53	1 (209)	0.019 (262)	0.5 (229)	0.9 (222)
Universite Technologique Belfort Montbéliard	France	6	1 (209)	0.167 (92)	0.5 (230)	0.5 (232)
Technical University of Crete	Greece	12	1 (209)	0.083 (178)	0.4 (232)	0.6 (231)
University of L'Aquila	Italy	29	1 (209)	0.034 (238)	0.3 (233)	0.5 (233)
Universität Hohenheim	Germany	19	1 (209)	0.053 (213)	0.2 (234)	0.3 (235)
University of Potsdam	Germany	34	1 (209)	0.029 (248)	0.2 (235)	0.8 (225)
University of Tartu	Estonia	35	1 (209)	0.029 (249)	0.2 (236)	0.4 (234)
Universidad Politécnica de Madrid	Spain	47	1 (209)	0.021 (257)	0.2 (237)	0.7 (228)
Universität Leipzig	Germany	64	1 (209)	0.016 (267)	0.1 (238)	0.2 (237)
Vienna University of Technology	Austria	47	1 (209)	0.021 (257)	0.1 (239)	0.2 (238)
Universite Paul Sabatier Toulouse III	France	52	1 (209)	0.019 (261)	0.1 (240)	0.1 (242)
Universite POITIERS	France	25	1 (209)	0.04 (232)	0.1 (241)	0.1 (243)
Babes-Bolyai University	Romania	19	1 (209)	0.053 (213)	0 (244)	0.2 (241)
University of Ljubljana	Slovenia	75	1 (209)	0.013 (272)	0 (245)	0.1 (244)
Silesian University of Technology in Gliwice	Poland	18	1 (209)	0.056 (210)	0 (246)	0 (245)
Wrocław University of Technology	Poland	32	1 (209)	0.031 (242)	0 (246)	0 (245)
Technical University of Łódź	Poland	22	1 (209)	0.045 (222)	0 (247)	0 (246)

**Table 6 List of North American universities by number of fields in top 30% research excellence and ranking indicators**

University	Country	Total fields	W1	GI	W_CIT	NORM_W_CIT
University Michigan - Ann Arbor	United States	171	127 (1)	0.743 (7)	178 (3)	143.7 (3)
Harvard University	United States	142	123 (2)	0.866 (1)	178.8 (2)	133.3 (5)
University of California - Los Angeles	United States	151	118 (3)	0.781 (4)	177.9 (4)	145.5 (2)
Stanford University	United States	154	117 (4)	0.76 (5)	188.5 (1)	149.8 (1)
University of Washington - Seattle	United States	154	117 (4)	0.76 (5)	170.1 (5)	131.6 (6)
University of Toronto	Canada	173	116 (6)	0.671 (12)	166.4 (6)	138.6 (4)
Johns Hopkins University	United States	133	94 (7)	0.707 (8)	148.9 (7)	103.5 (11)
University of California - San Diego	United States	136	94 (7)	0.691 (10)	144.7 (9)	116.9 (7)
University of California, Berkeley	United States	139	92 (9)	0.662 (13)	113.3 (16)	113.3 (8)
Columbia University in the City of New York	United States	134	88 (10)	0.657 (14)	132 (12)	110.4 (9)
Massachusetts Institute of Technology	United States	122	85 (11)	0.697 (9)	140.1 (10)	106.2 (10)
University of Pennsylvania	United States	121	83 (12)	0.686 (11)	145.9 (8)	96.6 (15)
University of Wisconsin - Madison	United States	154	78 (13)	0.506 (24)	106.8 (18)	84.2 (20)
University of California - San Francisco	United States	97	76 (14)	0.784 (3)	127.5 (13)	77.9 (24)
University of Minnesota - Twin Cities	United States	148	76 (14)	0.514 (23)	99.7 (20)	102.1 (12)
The University of British Columbia	Canada	161	76 (14)	0.472 (31)	82.1 (22)	91.9 (16)
Duke University	United States	122	75 (17)	0.615 (15)	133.8 (11)	97.3 (14)
University of Florida	United States	158	75 (17)	0.475 (29)	65.7 (28)	81.2 (22)
University of North Carolina at Chapel Hill	United States	121	69 (19)	0.57 (17)	111.2 (17)	80.2 (23)
Yale University	United States	118	65 (20)	0.551 (19)	113.6 (15)	85.3 (18)
University of Pittsburgh	United States	123	65 (20)	0.528 (21)	99.5 (21)	66.9 (27)
Northwestern University	United States	115	63 (22)	0.548 (20)	105.5 (19)	98.3 (13)
University of Illinois - Urbana-Champaign	United States	133	63 (22)	0.474 (30)	75.6 (23)	82.7 (21)
Washington University in St. Louis	United States	108	61 (24)	0.565 (18)	119.2 (14)	86 (17)
University of California - Davis	United States	153	59 (25)	0.386 (41)	47.9 (38)	57.6 (33)
McGill University	Canada	153	56 (26)	0.366 (48)	61.8 (29)	59.4 (31)
Pennsylvania State University - University Park	United States	126	55 (27)	0.437 (34)	69.8 (26)	84.5 (19)
Georgia Institute of Technology	United States	92	54 (28)	0.587 (16)	68.4 (27)	76 (25)
University of Southern California	United States	124	49 (29)	0.395 (38)	54.3 (32)	66.8 (28)
University of Alberta	Canada	148	47 (30)	0.318 (59)	52.8 (34)	65.2 (29)
Purdue University - West Lafayette	United States	121	45 (31)	0.372 (45)	46.9 (40)	58.4 (32)
University of Texas - Austin	United States	112	44 (32)	0.393 (39)	58.7 (30)	67.1 (26)
Ohio State University - Columbus	United States	151	43 (33)	0.285 (60)	55.4 (31)	62.9 (30)
Emory University	United States	85	42 (34)	0.494 (26)	72 (24)	53.2 (36)
Cornell University	United States	118	40 (35)	0.339 (54)	49.7 (36)	47 (39)
University of Chicago	United States	100	39 (36)	0.39 (40)	70.6 (25)	55 (34)
Boston University	United States	106	39 (36)	0.368 (47)	54.1 (33)	43.1 (41)
Texas A&M University	United States	131	37 (38)	0.282 (61)	37.3 (45)	46.3 (40)
University of Maryland - College Park	United States	97	35 (39)	0.361 (49)	39.6 (44)	48.7 (38)
Princeton University	United States	65	34 (40)	0.523 (22)	47.5 (39)	54.2 (35)
New York University	United States	96	34 (40)	0.354 (50)	42.3 (43)	37.1 (45)
University of Waterloo	Canada	96	31 (42)	0.323 (57)	24.9 (57)	33 (48)
University of Colorado - Boulder	United States	76	29 (43)	0.382 (43)	36.8 (46)	40.7 (43)
University of Utah	United States	115	29 (43)	0.252 (65)	31 (49)	34.6 (46)
University of California - Santa Barbara	United States	64	28 (45)	0.438 (33)	43.3 (41)	50.7 (37)

University of Arizona	United States	120	27 (46)	0.225 (74)	31 (50)	34.3 (47)
Carnegie Mellon University	United States	56	27 (46)	0.482 (27)	30.7 (51)	41.1 (42)
Baylor College of Medicine	United States	61	26 (48)	0.426 (36)	34 (48)	29.8 (51)
California Institute of Technology	United States	51	24 (49)	0.471 (32)	42.9 (42)	37.9 (44)
University of Colorado - Denver and Health Sciences Center	United States	63	24 (49)	0.381 (44)	34.2 (47)	29.9 (50)
Arizona State University	United States	85	23 (51)	0.271 (62)	19.8 (65)	29.6 (52)
University of Cincinnati	United States	83	22 (52)	0.265 (64)	29.2 (53)	27.9 (55)
University of Texas Southwestern Medical Center	United States	55	21 (53)	0.382 (42)	50.8 (35)	26.9 (56)
University of Texas - M. D. Anderson Cancer Center	United States	42	20 (54)	0.476 (28)	49.4 (37)	28 (54)
Case Western Reserve University	United States	84	20 (54)	0.238 (70)	29.3 (52)	32.8 (49)
University of California, Irvine	United States	109	20 (54)	0.183 (91)	23.3 (58)	25.9 (58)
McMaster University	Canada	105	20 (54)	0.19 (84)	23 (60)	25.9 (57)
Mount Sinai School of Medicine	United States	58	19 (58)	0.328 (56)	28.6 (55)	22.7 (62)
Oregon Health & Science University	United States	59	19 (58)	0.322 (58)	22.6 (62)	22.3 (63)
Michigan State University	United States	114	19 (58)	0.167 (101)	18.1 (71)	19.6 (69)
Oregon State University	United States	56	19 (58)	0.339 (53)	16.2 (75)	20.6 (65)
Brown University	United States	87	18 (62)	0.207 (79)	22.7 (61)	29.4 (53)
University of Iowa	United States	95	18 (62)	0.189 (87)	18.8 (68)	20.6 (67)
University of Virginia	United States	95	17 (64)	0.179 (96)	19.1 (67)	20.1 (68)
Virginia Polytechnic Institute and State University	United States	98	17 (64)	0.173 (100)	12.9 (81)	22.8 (61)
Colorado State University	United States	70	17 (64)	0.243 (68)	10.5 (93)	13.7 (84)
Tufts University	United States	70	16 (67)	0.229 (73)	25.5 (56)	20.8 (64)
Vanderbilt University	United States	88	16 (67)	0.182 (92)	23.2 (59)	25.6 (59)
University of Georgia	United States	79	16 (67)	0.203 (81)	12.3 (86)	15.2 (79)
North Carolina State University	United States	89	16 (67)	0.18 (95)	7.6 (104)	10.9 (95)
University of Massachusetts - Amherst	United States	61	15 (71)	0.246 (67)	21.1 (64)	23.9 (60)
University of Alabama at Birmingham	United States	67	15 (71)	0.224 (75)	19.2 (66)	15.1 (81)
University of Maryland - Baltimore	United States	79	15 (71)	0.19 (85)	16.8 (73)	16.7 (76)
Université de Montréal	Canada	99	14 (74)	0.141 (113)	18.6 (69)	18.3 (72)
University of Rochester	United States	83	13 (75)	0.157 (108)	21.3 (63)	20.6 (66)
Weill Cornell Medical College	United States	54	13 (75)	0.241 (69)	15.8 (77)	16.2 (77)
University of Calgary	Canada	115	13 (75)	0.113 (125)	13.8 (80)	15.2 (80)
University of California - Santa Cruz	United States	34	12 (78)	0.353 (51)	17.7 (72)	19.3 (70)
University of Hawaii at Manoa	United States	61	12 (78)	0.197 (83)	16.6 (74)	18.6 (71)
Indiana University-Purdue University - Indianapolis	United States	59	12 (78)	0.203 (80)	16.2 (76)	14.9 (82)
University of California - Riverside	United States	56	12 (78)	0.214 (78)	15.7 (78)	14.2 (83)
University of Miami	United States	79	12 (78)	0.152 (110)	8 (100)	12 (93)
University of Texas Health Science Center at Houston	United States	58	11 (83)	0.19 (86)	18.5 (70)	13.2 (87)
The University of Western Ontario	Canada	103	11 (83)	0.107 (127)	12.6 (84)	12.8 (89)
University of Illinois - Chicago	United States	92	11 (83)	0.12 (120)	12 (88)	12.6 (90)
Wake Forest University	United States	51	11 (83)	0.216 (77)	11.8 (90)	10.4 (97)
University of South Carolina	United States	48	11 (83)	0.229 (72)	11.1 (91)	17.7 (73)
Iowa State University	United States	85	11 (83)	0.129 (116)	8.9 (96)	10.7 (96)
Virginia Commonwealth University	United States	67	10 (89)	0.149 (111)	12.7 (83)	13.6 (85)
University of Delaware	United States	62	10 (89)	0.161 (106)	10.7 (92)	12.1 (92)
Rutgers, The State University of New Jersey - New Brunswick	United States	96	10 (89)	0.104 (129)	10.4 (94)	16.8 (75)
UMDNJ New Jersey Medical School	United States	57	9 (92)	0.158 (107)	12.5 (85)	12.4 (91)
Louisiana State University - Baton Rouge	United States	88	9 (92)	0.102 (130)	7.3 (105)	9.3 (101)

Université Simon Fraser	Canada	48	9 (92)	0.188 (88)	3.7 (125)	5.8 (118)
University of Victoria	Canada	45	8 (95)	0.178 (98)	14.5 (79)	13.3 (86)
University of Texas Health Science Center at San Antonio	United States	43	8 (95)	0.186 (89)	12.8 (82)	9.2 (102)
Rice University	United States	43	8 (95)	0.186 (89)	12.2 (87)	16.8 (74)
Université Laval	Canada	86	8 (95)	0.093 (140)	9.8 (95)	9.4 (100)
Queen's University, Kingston	Canada	80	8 (95)	0.1 (131)	7.7 (102)	10.1 (98)
Indiana University - Bloomington	United States	84	8 (95)	0.095 (136)	7.6 (103)	9.7 (99)
University of Alaska - Fairbanks	United States	20	8 (95)	0.4 (37)	6 (114)	8 (108)
University of Ottawa	Canada	98	8 (95)	0.082 (149)	5.7 (116)	8.3 (106)
Dalhousie University	Canada	70	7 (103)	0.1 (131)	8.2 (99)	11.5 (94)
University of Kentucky	United States	87	7 (103)	0.08 (150)	6 (113)	7.2 (114)
University of New Hampshire - Durham	United States	19	7 (103)	0.368 (46)	5.6 (118)	7.8 (110)
Rockefeller University	United States	17	6 (106)	0.353 (51)	28.7 (54)	8.9 (103)
University of Tennessee - Knoxville	United States	64	6 (106)	0.094 (139)	7.9 (101)	8.7 (105)
Medical University of South Carolina	United States	43	6 (106)	0.14 (114)	7.2 (107)	7.2 (113)
Dartmouth College	United States	53	6 (106)	0.113 (124)	6.9 (109)	8.3 (107)
Wayne State University	United States	77	6 (106)	0.078 (153)	6.7 (110)	7.6 (111)
University of Connecticut Storrs	United States	72	6 (106)	0.083 (145)	3.6 (127)	5.1 (123)
Kansas State University	United States	36	6 (106)	0.167 (101)	2.8 (138)	3.8 (134)
University of Nebraska - Lincoln	United States	57	6 (106)	0.105 (128)	2.2 (144)	4.2 (130)
University of Ontario Institute of Technology	Canada	6	5 (114)	0.833 (2)	11.8 (89)	16 (78)
Thomas Jefferson University	United States	42	5 (114)	0.119 (121)	8.3 (98)	8.8 (104)
University at Buffalo	United States	83	5 (114)	0.06 (163)	6.2 (111)	6.5 (116)
University of Missouri - Columbia	United States	64	5 (114)	0.078 (152)	6.1 (112)	5.8 (119)
Stonybrook University	United States	63	5 (114)	0.079 (151)	5.9 (115)	7.3 (112)
Medical College of Wisconsin	United States	39	5 (114)	0.128 (118)	5.7 (117)	5.7 (120)
Université du Québec à Montréal	Canada	28	5 (114)	0.179 (97)	3.4 (130)	5.9 (117)
University of Central Florida	United States	41	5 (114)	0.122 (119)	3.3 (131)	4.9 (125)
Washington State University - Pullman	United States	54	5 (114)	0.093 (141)	3 (133)	3.7 (135)
University of Oklahoma - Norman	United States	50	5 (114)	0.1 (131)	2.9 (134)	4.4 (128)
Florida State University	United States	46	5 (114)	0.109 (126)	2.8 (137)	4 (131)
Yeshiva University	United States	48	4 (125)	0.083 (145)	8.6 (97)	7 (115)
Rush University	United States	31	4 (125)	0.129 (117)	7.2 (106)	7.9 (109)
Illinois Institute of Technology	United States	15	4 (125)	0.267 (63)	7.2 (108)	13 (88)
New Jersey Institute of Technology	United States	17	4 (125)	0.235 (71)	3.8 (124)	5.3 (121)
Rensselaer Polytechnic Institute	United States	34	4 (125)	0.118 (122)	3.7 (126)	4.6 (127)
University of Kansas - Lawrence	United States	40	4 (125)	0.1 (131)	3.3 (132)	4.8 (126)
University of Texas Medical Branch	United States	42	4 (125)	0.095 (136)	2.9 (135)	2.8 (144)
University of Guelph	Canada	52	4 (125)	0.077 (154)	1.8 (150)	2.1 (153)
University of Saskatchewan	Canada	81	4 (125)	0.049 (165)	1.2 (162)	1.5 (161)
University of South Florida - Tampa	United States	71	3 (134)	0.042 (168)	4 (120)	4.3 (129)
Georgia State University	United States	26	3 (134)	0.115 (123)	3.8 (123)	3.5 (137)
Montana State University - Bozeman	United States	22	3 (134)	0.136 (115)	2.6 (140)	3.4 (138)
University of Massachusetts - Medical School	United States	35	3 (134)	0.086 (144)	2.4 (143)	1.7 (159)
University of New Mexico	United States	71	3 (134)	0.042 (168)	2.2 (145)	3.4 (140)
University of Mississippi - Oxford	United States	17	3 (134)	0.176 (99)	1.9 (149)	2.1 (154)
Mississippi State University	United States	33	3 (134)	0.091 (142)	1.7 (155)	2.8 (143)
Northern Arizona University	United States	7	3 (134)	0.429 (35)	1.6 (157)	2.7 (145)
University of Southern Mississippi	United States	8	2 (142)	0.25 (66)	4 (119)	5.1 (124)
Northeastern University	United States	33	2 (142)	0.061 (162)	4 (121)	3.7 (136)
Colorado School of Mines	United States	23	2 (142)	0.087 (143)	3.9 (122)	3.3 (141)
Clarkson University	United States	10	2 (142)	0.2 (82)	3.4 (129)	5.1 (122)

San Diego State University	United States	24	2 (142)	0.083 (145)	2.9 (136)	3.8 (132)
University of Louisville	United States	49	2 (142)	0.041 (172)	2.6 (141)	3.8 (133)
Drexel University	United States	51	2 (142)	0.039 (175)	2.5 (142)	3.2 (142)
University of Kansas Medical Center	United States	21	2 (142)	0.095 (136)	2 (146)	2.4 (150)
Memorial University of Newfoundland	Canada	30	2 (142)	0.067 (159)	2 (147)	2.7 (146)
University of Manitoba	Canada	71	2 (142)	0.028 (185)	1.8 (151)	2.4 (151)
University of Texas at Arlington	United States	31	2 (142)	0.065 (161)	1.7 (152)	1.7 (160)
University of Maryland - Baltimore County	United States	11	2 (142)	0.182 (92)	1.7 (154)	1.8 (157)
Loyola University Chicago	United States	26	2 (142)	0.077 (154)	1.6 (158)	2.1 (155)
University of Montana Missoula	United States	9	2 (142)	0.222 (76)	1.5 (159)	2.4 (149)
University of Maine	United States	14	2 (142)	0.143 (112)	1.3 (160)	2.6 (147)
Clemson University	United States	49	2 (142)	0.041 (172)	1.1 (165)	1.4 (162)
College of William and Mary	United States	11	2 (142)	0.182 (92)	1 (166)	1.8 (158)
Old Dominion University	United States	13	2 (142)	0.154 (109)	1 (166)	1.8 (158)
University of Rhode Island	United States	12	2 (142)	0.167 (101)	1 (166)	1.8 (158)
Medical College of Georgia	United States	30	2 (142)	0.067 (159)	1 (167)	1.4 (163)
Oklahoma State University - Stillwater	United States	35	2 (142)	0.057 (164)	0.7 (171)	1.8 (156)
University of Idaho	United States	20	2 (142)	0.1 (131)	0.7 (174)	1.3 (164)
West Virginia University	United States	41	1 (164)	0.024 (186)	3.5 (128)	2.5 (148)
Boston College	United States	12	1 (164)	0.083 (145)	2.7 (139)	1 (168)
University of Windsor	Canada	23	1 (164)	0.043 (167)	1.9 (148)	2.2 (152)
Pennsylvania State University College of Medicine	United States	32	1 (164)	0.031 (178)	1.7 (153)	1 (167)
Saint Xavier University	United States	2	1 (164)	0.5 (25)	1.6 (156)	3.4 (139)
Uniformed Services University of the Health Sciences	United States	22	1 (164)	0.045 (166)	1.3 (161)	1 (169)
Carleton University	Canada	32	1 (164)	0.031 (178)	1.2 (163)	1.1 (166)
Trent University	Canada	6	1 (164)	0.167 (101)	1.2 (163)	1.1 (166)
University at Albany	United States	24	1 (164)	0.042 (170)	1.2 (163)	1.1 (166)
University of Houston	United States	48	1 (164)	0.021 (187)	1.1 (164)	0.9 (172)
University of Akron	United States	14	1 (164)	0.071 (157)	0.9 (168)	1.1 (165)
University of Alabama - Tuscaloosa	United States	51	1 (164)	0.02 (188)	0.8 (169)	0.7 (174)
Florida International University	United States	25	1 (164)	0.04 (174)	0.8 (170)	1.4 (162)
University of Nebraska Medical Center	United States	31	1 (164)	0.032 (176)	0.7 (172)	0.9 (170)
University of Connecticut Health Center	United States	24	1 (164)	0.042 (170)	0.7 (173)	0.6 (175)
Albany Medical College	United States	6	1 (164)	0.167 (101)	0.6 (175)	0.9 (171)
York University Canada	Canada	34	1 (164)	0.029 (181)	0.5 (176)	0.6 (177)
University of Arkansas for Medical Sciences	United States	34	1 (164)	0.029 (181)	0.3 (177)	0.6 (176)
Eastern Virginia Medical School	United States	3	1 (164)	0.333 (55)	0.3 (178)	0.5 (178)
University of Nevada - Reno	United States	32	1 (164)	0.031 (178)	0.2 (179)	0.4 (179)
Utah State University	United States	31	1 (164)	0.032 (176)	0.2 (179)	0.4 (179)
Concordia Université	Canada	34	1 (164)	0.029 (181)	0.2 (180)	0.7 (173)
Université de Sherbrooke	Canada	34	1 (164)	0.029 (181)	0.1 (181)	0.3 (180)
University of Regina	Canada	14	1 (164)	0.071 (157)	0 (182)	0.1 (181)
University of Memphis	United States	13	1 (164)	0.077 (154)	0 (183)	0.1 (182)

**Table 7 List of Asian universities by number of fields in top 30% research excellence and ranking indicators**

University	Country	Total fields	W1	GI	W_CIT	NORM_W_CIT
University of Tokyo	Japan	163	68 (1)	0.417 (10)	121.2 (1)	97.2 (1)
National University of Singapore	Singapore	131	65 (2)	0.496 (7)	81.5 (2)	80.8 (3)
Tsinghua University	China	105	56 (3)	0.533 (3)	55.9 (5)	70 (4)
University of Melbourne	Australia	146	55 (4)	0.377 (15)	72.3 (3)	81.2 (2)
University of Sydney	Australia	146	52 (5)	0.356 (17)	50.5 (10)	58.8 (8)
National Taiwan University	Taiwan	154	51 (6)	0.331 (23)	52.7 (8)	64.9 (7)
Nanyang Technological University	Singapore	80	50 (7)	0.625 (1)	54.4 (6)	67.4 (5)
Seoul National University	South Korea	154	44 (8)	0.286 (25)	54.3 (7)	65.3 (6)
University of Queensland	Australia	142	43 (9)	0.303 (24)	41.4 (15)	51.2 (15)
Zhejiang University	China	143	40 (10)	0.28 (29)	48.1 (11)	57.5 (10)
Shanghai Jiaotong University	China	144	40 (10)	0.278 (30)	44.6 (12)	58.5 (9)
City University of Hong Kong	Hong Kong SAR	64	40 (10)	0.625 (1)	37.8 (19)	52.2 (14)
University of Science and Technology, Korea	South Korea	95	38 (13)	0.4 (11)	44.6 (13)	55.4 (11)
Kyoto University	Japan	149	36 (14)	0.242 (34)	60 (4)	48.5 (17)
Southeast University	China	103	35 (15)	0.34 (19)	37.9 (18)	50.5 (16)
National Cheng Kung University	Taiwan	105	35 (15)	0.333 (20)	34.8 (25)	48.1 (18)
University of New South Wales	Australia	134	32 (17)	0.239 (36)	25.2 (30)	32.6 (29)
Harbin Institute of Technology	China	73	31 (18)	0.425 (9)	42.4 (14)	53.9 (12)
Korea Advanced Institute of Science and Technology	South Korea	71	31 (18)	0.437 (8)	41.3 (16)	52.7 (13)
Hong Kong University of Science and Technology	Hong Kong SAR	60	31 (18)	0.517 (4)	35.2 (24)	46.7 (19)
Monash University	Australia	131	29 (21)	0.221 (39)	36.4 (22)	43.4 (22)
Peking University	China	143	28 (22)	0.196 (45)	39.6 (17)	39.6 (25)
Hong Kong Polytechnic University	Hong Kong SAR	66	25 (23)	0.379 (14)	19.1 (38)	29.5 (31)
National Tsing Hua University	Taiwan	62	24 (24)	0.387 (12)	37 (21)	43.5 (21)
Osaka University	Japan	118	23 (25)	0.195 (46)	52.1 (9)	41 (23)
Tohoku University	Japan	126	22 (26)	0.175 (53)	37.2 (20)	40.5 (24)
University of Science and Technology of China	China	80	22 (26)	0.275 (31)	30.7 (27)	32.7 (28)
National Chiao Tung University Taiwan	Taiwan	57	22 (26)	0.386 (13)	30 (28)	39.2 (27)
Chinese University of Hong Kong	Hong Kong SAR	96	21 (29)	0.219 (40)	21.9 (34)	31.2 (30)
Graduate University of Chinese Academy of Sciences	China	102	20 (30)	0.196 (44)	24.1 (31)	24.6 (37)
Pohang University of Science and Technology	South Korea	52	19 (31)	0.365 (16)	35.3 (23)	43.8 (20)
Yonsei University	South Korea	117	19 (31)	0.162 (60)	32.7 (26)	39.3 (26)
The University of Hong Kong	Hong Kong SAR	105	19 (31)	0.181 (49)	16.6 (42)	27.7 (32)
Fudan University	China	111	18 (34)	0.162 (61)	26.1 (29)	24.3 (38)
Nanjing University	China	99	17 (35)	0.172 (55)	22.3 (33)	24.7 (36)
Australian National University	Australia	76	16 (36)	0.211 (41)	18.3 (40)	19.8 (40)
University of Western Australia	Australia	91	16 (36)	0.176 (52)	12 (50)	16.1 (47)

Tokyo Institute of Technology	Japan	74	14 (38)	0.189 (48)	21.6 (35)	23.4 (39)
Korea University	South Korea	105	14 (38)	0.133 (75)	21.2 (36)	27.7 (33)
Hokkaido University	Japan	119	13 (40)	0.109 (97)	14 (45)	17 (46)
Wuhan University	China	95	13 (40)	0.137 (74)	13.7 (46)	16 (48)
Jilin University	China	75	12 (42)	0.16 (63)	22.3 (32)	25 (35)
Shandong University	China	99	12 (42)	0.121 (88)	12.9 (48)	15.4 (49)
Indian Institute of Science	India	58	11 (44)	0.19 (47)	21.1 (37)	26 (34)
Nankai University	China	62	11 (44)	0.177 (50)	16.3 (43)	18.7 (42)
Indian Institute of Technology, Kharagpur	India	48	11 (44)	0.229 (38)	11.6 (51)	14.6 (50)
Nagoya University	Japan	110	10 (47)	0.091 (106)	18.6 (39)	17.2 (45)
Hanyang University	South Korea	79	10 (47)	0.127 (80)	15.1 (44)	18.2 (43)
Xi'an Jiaotong University	China	84	10 (47)	0.119 (91)	3.7 (82)	6.2 (76)
Tongji University	China	78	10 (47)	0.128 (79)	2.9 (87)	5.8 (77)
Kyushu University	Japan	116	9 (51)	0.078 (118)	17.4 (41)	18 (44)
Indian Institute of Technology, Madras	India	39	9 (51)	0.231 (37)	11 (53)	13.8 (51)
University of Adelaide	Australia	78	9 (51)	0.115 (93)	8.2 (56)	9.9 (60)
University of Auckland	New Zealand	83	9 (51)	0.108 (98)	6.4 (66)	9.7 (62)
National Chung Hsing University	Taiwan	64	9 (51)	0.141 (72)	5.8 (69)	8.2 (67)
Sun Yat-Sen University	China	103	8 (56)	0.078 (117)	7.7 (58)	8.7 (65)
China Agricultural University	China	54	8 (56)	0.148 (69)	5.3 (73)	6.9 (73)
Universiti Sains Malaysia	Malaysia	47	8 (56)	0.17 (57)	3.7 (83)	4.6 (82)
University of Wollongong	Australia	41	7 (59)	0.171 (56)	13.6 (47)	18.9 (41)
Feng Chia University	Taiwan	25	7 (59)	0.28 (28)	5.5 (71)	7.1 (72)
East China University of Science and Technology	China	46	6 (61)	0.13 (78)	12.9 (49)	12.4 (55)
Xiamen University	China	63	6 (61)	0.095 (104)	11.5 (52)	13.2 (53)
Xidian University	China	29	6 (61)	0.207 (43)	7.4 (61)	11.6 (58)
Huazhong University of Science and Technology	China	103	6 (61)	0.058 (134)	6.9 (63)	12.3 (56)
China University of Mining Technology	China	25	6 (61)	0.24 (35)	6.4 (65)	12.4 (54)
Hunan University	China	56	6 (61)	0.107 (99)	6.3 (67)	6.3 (75)
Sungkyunkwan University	South Korea	88	6 (61)	0.068 (127)	5.6 (70)	7.9 (70)
Northeastern University China	China	37	6 (61)	0.162 (61)	4.3 (79)	5 (79)
King Mongkuts University of Technology Thonburi	Thailand	17	6 (61)	0.353 (18)	2.7 (89)	4.3 (86)
China University of Geosciences	China	34	6 (61)	0.176 (51)	2.3 (99)	4.9 (80)
Tianjin University	China	66	6 (61)	0.091 (106)	1.6 (108)	2.3 (109)
Ewha Womans University	South Korea	32	5 (72)	0.156 (64)	10.5 (54)	13.6 (52)
Beijing University of Chemical Technology	China	35	5 (72)	0.143 (70)	7.6 (60)	9.9 (59)
James Cook University	Australia	19	5 (72)	0.263 (32)	6.5 (64)	9.1 (64)
South China University of Technology	China	65	5 (72)	0.077 (119)	2.6 (91)	3.4 (96)
Chulalongkorn University	Thailand	56	5 (72)	0.089 (109)	2.1 (100)	3.6 (93)
Northeast Normal University	China	24	4 (77)	0.167 (58)	7.6 (59)	9.7 (61)
Gwangju Institute of Science and Technology	South Korea	32	4 (77)	0.125 (81)	7.2 (62)	8.2 (68)
Yuan Ze University	Taiwan	19	4 (77)	0.211 (41)	5.5 (72)	5.4 (78)

Sichuan University	China	98	4 (77)	0.041 (149)	4 (80)	2.9 (101)
Chang Gung University	Taiwan	72	4 (77)	0.056 (135)	2.7 (88)	3.7 (91)
University of South Australia	Australia	30	4 (77)	0.133 (75)	2.6 (92)	3.1 (100)
University of Tasmania	Australia	26	4 (77)	0.154 (65)	2.6 (93)	3.4 (97)
Deakin University	Australia	32	4 (77)	0.125 (81)	2.4 (96)	4.4 (84)
University of Otago	New Zealand	65	4 (77)	0.062 (131)	2.3 (98)	3.4 (94)
Central South University China	China	87	4 (77)	0.046 (142)	2 (101)	4.4 (85)
Indian Institute of Technology, Delhi	India	44	4 (77)	0.091 (106)	1.4 (113)	2.8 (103)
Hohai University	China	23	4 (77)	0.174 (54)	1.3 (117)	3.2 (99)
Donghua University	China	29	4 (77)	0.138 (73)	1 (127)	1.8 (125)
China University of Petroleum - Beijing	China	32	4 (77)	0.125 (81)	1 (128)	2.4 (108)
Chongqing University	China	58	4 (77)	0.069 (126)	0.7 (135)	2.3 (111)
Huazhong Normal University	China	20	3 (92)	0.15 (67)	9.1 (55)	9.3 (63)
North China Electric Power University	China	20	3 (92)	0.15 (67)	7.9 (57)	11.7 (57)
Hong Kong Baptist University	Hong Kong SAR	27	3 (92)	0.111 (94)	5.8 (68)	7.2 (71)
Queensland University of Technology	Australia	45	3 (92)	0.067 (128)	5 (74)	6.8 (74)
Ehime University	Japan	36	3 (92)	0.083 (112)	4.6 (76)	4 (89)
National Chung Cheng University	Taiwan	25	3 (92)	0.12 (89)	3.1 (84)	3.9 (90)
Curtin University of Technology, Perth	Australia	40	3 (92)	0.075 (122)	2.6 (90)	3.7 (92)
Jiangnan University	China	32	3 (92)	0.094 (105)	2.6 (94)	2.5 (105)
National Taiwan University of Science and Technology	Taiwan	31	3 (92)	0.097 (102)	2.3 (97)	3.4 (95)
Lanzhou University	China	69	3 (92)	0.043 (146)	1.9 (102)	4.3 (87)
China Medical University Taichung	Taiwan	40	3 (92)	0.075 (122)	1.8 (104)	2.2 (115)
Chung Yuan Christian University	Taiwan	25	3 (92)	0.12 (89)	1.8 (106)	2.8 (102)
Banaras Hindu University	India	49	3 (92)	0.061 (132)	1.4 (112)	2.3 (112)
Indian Institute of Technology, Kanpur	India	30	3 (92)	0.1 (100)	1.4 (114)	3.3 (98)
Indian Institute of Technology Roorkee	India	31	3 (92)	0.097 (102)	1.3 (119)	1.8 (126)
University of Science and Technology Beijing	China	37	3 (92)	0.081 (116)	1.3 (121)	2 (122)
National University of Tainan Taiwan	Taiwan	7	2 (108)	0.286 (25)	4.9 (75)	8.3 (66)
Tokyo University of Science	Japan	50	2 (108)	0.04 (150)	4.3 (78)	4.6 (83)
Mahidol University	Thailand	55	2 (108)	0.036 (156)	3 (85)	1.8 (124)
China Pharmaceutical University	China	16	2 (108)	0.125 (81)	2.5 (95)	2.3 (110)
Shenyang Pharmaceutical University	China	15	2 (108)	0.133 (75)	1.8 (105)	2 (121)
The University of Newcastle, Australia	Australia	36	2 (108)	0.056 (135)	1.8 (107)	4.1 (88)
Kanazawa University	Japan	60	2 (108)	0.033 (158)	1.6 (110)	2 (120)
University of Electro-Communications	Japan	23	2 (108)	0.087 (110)	1.4 (111)	1.4 (131)
University of Malaya	Malaysia	36	2 (108)	0.056 (135)	1.4 (111)	1.4 (131)
Auckland University of Technology	New Zealand	4	2 (108)	0.5 (5)	1.3 (116)	2.4 (107)
Edith Cowan University	Australia	6	2 (108)	0.333 (20)	1.3 (116)	2.4 (107)
Macquarie University	Australia	28	2 (108)	0.071 (124)	1.3 (120)	2.5 (106)
Victoria University of Wellington	New Zealand	16	2 (108)	0.125 (81)	1.3 (120)	2.5 (106)



Victoria University Melbourne	Australia	7	2 (108)	0.286 (25)	1.2 (122)	2.1 (118)
Inha University	South Korea	41	2 (108)	0.049 (141)	1.2 (123)	2.8 (104)
National Central University Taiwan	Taiwan	50	2 (108)	0.04 (150)	1.1 (126)	1.5 (129)
National Sun Yat-Sen University Taiwan	Taiwan	50	2 (108)	0.04 (150)	0.9 (129)	2.3 (113)
Liaoning Technical University	China	8	2 (108)	0.25 (33)	0.8 (132)	1.6 (128)
China Three Gorges University	China	13	2 (108)	0.154 (65)	0.7 (137)	2.2 (114)
Taiyuan University of Technology	China	20	2 (108)	0.1 (100)	0.7 (137)	2.2 (114)
La Trobe University	Australia	26	2 (108)	0.077 (119)	0.5 (141)	1.2 (133)
Southwest Jiaotong University	China	31	2 (108)	0.065 (130)	0.4 (144)	1.1 (139)
Shandong University of Science and Technology	China	17	2 (108)	0.118 (92)	0.4 (147)	1.2 (134)
Kaohsiung Medical University	Taiwan	39	2 (108)	0.051 (140)	0.1 (153)	0.3 (152)
South China Normal University	China	23	2 (108)	0.087 (110)	0 (158)	0.2 (156)
University of Electronic Science and Technology of China	China	34	1 (133)	0.029 (161)	4.5 (77)	7.9 (69)
Nagasaki University	Japan	45	1 (133)	0.022 (170)	3.8 (81)	4.6 (81)
Shanghai Normal University	China	14	1 (133)	0.071 (124)	3.8 (81)	4.6 (81)
Swinburne University of Technology	Australia	12	1 (133)	0.083 (112)	2.9 (86)	2.2 (116)
Chiba University	Japan	68	1 (133)	0.015 (177)	1.9 (103)	2.2 (117)
Nara Institute of Science and Technology	Japan	27	1 (133)	0.037 (153)	1.6 (109)	1.9 (123)
Prince of Songkla University	Thailand	13	1 (133)	0.077 (119)	1.4 (115)	1.2 (135)
Soonchunhyang University	South Korea	12	1 (133)	0.083 (112)	1.3 (118)	1.7 (127)
University of Ulsan	South Korea	45	1 (133)	0.022 (170)	1.3 (118)	1.7 (127)
Kyoto Institute of Technology	Japan	17	1 (133)	0.059 (133)	1.1 (124)	0.9 (141)
National Institute of Pharmaceutical Education and Research India	India	6	1 (133)	0.167 (58)	1.1 (125)	1.1 (137)
East China Normal University	China	44	1 (133)	0.023 (169)	0.9 (130)	2.1 (119)
Kyung Hee University	South Korea	61	1 (133)	0.016 (176)	0.9 (130)	2.1 (119)
University of Tsukuba	Japan	94	1 (133)	0.011 (181)	0.9 (130)	2.1 (119)
Niigata University	Japan	39	1 (133)	0.026 (165)	0.8 (131)	1.1 (136)
National Taiwan Ocean University	Taiwan	22	1 (133)	0.045 (143)	0.8 (133)	1.4 (132)
Pusan National University	South Korea	60	1 (133)	0.017 (175)	0.8 (133)	1.4 (132)
Massey University	New Zealand	30	1 (133)	0.033 (158)	0.8 (134)	0.8 (143)
Griffith University	Australia	38	1 (133)	0.026 (163)	0.7 (136)	1.1 (138)
Hoshi University	Japan	8	1 (133)	0.125 (81)	0.7 (138)	0.9 (140)
Okayama University	Japan	80	1 (133)	0.013 (179)	0.6 (139)	0.2 (153)
University of Tokushima	Japan	41	1 (133)	0.024 (167)	0.6 (139)	0.2 (153)
Yanshan University	China	23	1 (133)	0.043 (146)	0.6 (139)	0.2 (153)
Hiroshima University	Japan	81	1 (133)	0.012 (180)	0.6 (140)	1.5 (130)
Kochi University	Japan	12	1 (133)	0.083 (112)	0.6 (140)	1.5 (130)
University of Canterbury	New Zealand	29	1 (133)	0.034 (157)	0.6 (140)	1.5 (130)
Flinders University of South Australia	Australia	22	1 (133)	0.045 (143)	0.5 (142)	0.8 (142)
Nanjing University of Technology	China	35	1 (133)	0.029 (162)	0.4 (143)	0.4 (151)
National Pingtung University of Science and Technology	Taiwan	9	1 (133)	0.111 (94)	0.4 (145)	0.6 (148)
Chengdu University of Technology	China	7	1 (133)	0.143 (70)	0.4 (146)	0.7 (147)
National Yang Ming University	Taiwan	49	1 (133)	0.02 (173)	0.3 (148)	0.4 (150)

Charles Sturt University	Australia	8	1 (133)	0.125 (81)	0.3 (149)	0.8 (144)
University of Ballarat	Australia	3	1 (133)	0.333 (20)	0.3 (149)	0.8 (144)
Anhui University of Science and Technology	China	9	1 (133)	0.111 (94)	0.2 (150)	0.5 (149)
Henan Polytechnic University	China	15	1 (133)	0.067 (128)	0.2 (150)	0.5 (149)
Beijing Jiaotong Daxue	China	38	1 (133)	0.026 (163)	0.2 (151)	0.7 (145)
Hefei University of Technology	China	32	1 (133)	0.031 (160)	0.2 (151)	0.7 (145)
Nanjing Hydraulic Research Institute	China	2	1 (133)	0.5 (5)	0.2 (151)	0.7 (145)
PLA University of Science and Technology	China	18	1 (133)	0.056 (135)	0.2 (151)	0.7 (145)
Xi'an University of Technology	China	22	1 (133)	0.045 (143)	0.2 (151)	0.7 (145)
Beijing University of Aeronautics and Astronautics	China	46	1 (133)	0.022 (172)	0.2 (152)	0.7 (146)
Nanjing University of Aeronautics and Astronautics	China	39	1 (133)	0.026 (165)	0.2 (152)	0.7 (146)
Anna University	India	27	1 (133)	0.037 (153)	0.1 (154)	0.1 (158)
Huazhong Agricultural University	China	23	1 (133)	0.043 (146)	0.1 (155)	0.2 (154)
Nanjing Agricultural University	China	27	1 (133)	0.037 (153)	0.1 (155)	0.2 (154)
The Fourth Military Medical University	China	41	1 (133)	0.024 (167)	0.1 (156)	0.2 (155)
Beijing Institute of Technology	China	68	1 (133)	0.015 (177)	0 (157)	0.2 (157)
Chang'an University	China	18	1 (133)	0.056 (135)	0 (159)	0.1 (159)
Beijing Normal University	China	54	1 (133)	0.019 (174)	0 (160)	0 (160)

With respect to the definition of excellence based on top 10%, we see, as expected, a much larger participation of universities. This is particularly true in Europe. An impressive number of institutions show up with one or two excellent fields, which represent less than 5% of their overall offering profile, as measured by the Governance Index. We then see a large participation to excellence, but at the same time what might be defined as fragmentation of excellence.

The impact of governance is also visible on top of the list. European universities at the top of the list never exceed 100 excellent fields. Their Governance Index is at top levels only for highly specialised institutions (in addition to the ones already mentioned, Norwegian University of Life Sciences and London Business School there are also University of Ostrawa and University of Glamorgan). After these cases, the top Governance Index is found at University of Oxford, at 0,686, meaning that 94 out of 137 fields are in the top 30%. The next case is ETH at 0,675, meaning that 81 fields out of 120 are in the top 30%. Overall, only three universities exceed a value of GI of 0,60 (the third one is Erasmus University at 0,623). The best European universities are a small group of institutions that fight to support excellence in slightly more than 50% of the fields they are active in.

Compare these values with top universities in the USA and Canada. Here the largest value of GI is found, not surprisingly, at Harvard, with 0,866. We then find the small University of Ontario Institute of Technology (five fields) and after it three large Californian universities (UCSF at 0,784, UCLA at 0,781, Stanford at 0,76). Three others exceed 70% (University of Washington at Seattle, University of Michigan at Ann Arbor, Johns Hopkins University). There are 15 universities that exceed 60% and 25 that exceed 50%. The best US and Canadian universities are a large group of institutions that support excellence in 60-70% of the fields they are active in.

The pattern of participation of top Asian universities seem to be closer to European ones. The largest GI value is found at City University of Hong Kong, with 0,625.

Combining the data from the three world regions we obtain an overall list. We publish here the top 200 list, which are at the top 30% in more than 10 fields. Additional information is available in Appendix C. In the table we omit the absolute value of W\_CIT and NORM\_W\_CIT and only show the ranking.

**Table 8 Global list of universities by number of fields in top 30% research excellence and ranking indicators. Top 200**

University	Country	Total fields	W1	IG	R2	R3
University Michigan - Ann Arbor	United States	171	127 (1)	0.743 (11)	3	3
Harvard University	United States	142	123 (2)	0.866 (4)	2	5
University of California - Los Angeles	United States	151	118 (3)	0.781 (7)	4	2
Stanford University	United States	154	117 (4)	0.76 (8)	1	1
University of Washington - Seattle	United States	154	117 (4)	0.76 (8)	5	6
University of Toronto	Canada	173	116 (6)	0.671 (18)	6	4
The University of Oxford	United Kingdom	137	94 (7)	0.686 (15)	7	8
Johns Hopkins University	United States	133	94 (7)	0.707 (12)	8	14
University of California - San Diego	United States	136	94 (7)	0.691 (14)	10	7
University of California, Berkeley	United States	139	92 (10)	0.662 (19)	20	10
Columbia University in the City of New York	United States	134	88 (11)	0.657 (20)	14	11
University College London	United Kingdom	144	85 (12)	0.59 (27)	18	20
Massachusetts Institute of Technology	United States	122	85 (12)	0.697 (13)	12	12
The University of Cambridge	United Kingdom	139	83 (14)	0.597 (25)	11	9
University of Pennsylvania	United States	121	83 (14)	0.686 (16)	9	21
Federal Institute of Technology Zurich	Switzerland	120	81 (16)	0.675 (17)	27	13
University of Wisconsin - Madison	United States	154	78 (17)	0.506 (42)	22	26
University of California - San Francisco	United States	97	76 (18)	0.784 (6)	15	32
University of Minnesota - Twin Cities	United States	148	76 (18)	0.514 (41)	25	15
The University of British Columbia	Canada	161	76 (18)	0.472 (54)	28	22
Duke University	United States	122	75 (21)	0.615 (24)	13	18
University of Florida	United States	158	75 (21)	0.475 (52)	38	28
Utrecht University	Netherlands	132	71 (23)	0.538 (36)	31	34
Imperial College	United Kingdom	142	70 (24)	0.493 (48)	24	16
University of North Carolina at Chapel Hill	United States	121	69 (25)	0.57 (30)	21	31
University of Tokyo	Japan	163	68 (26)	0.417 (67)	16	19
National University of Singapore	Singapore	131	65 (27)	0.496 (46)	29	30
Yale University	United States	118	65 (27)	0.551 (34)	19	24
University of Pittsburgh	United States	123	65 (27)	0.528 (38)	26	39
Northwestern University	United States	115	63 (30)	0.548 (35)	23	17
University of Illinois - Urbana-Champaign	United States	133	63 (30)	0.474 (53)	32	27
Washington University in St. Louis	United States	108	61 (32)	0.565 (31)	17	23
University of California - Davis	United States	153	59 (33)	0.386 (77)	66	53
Tsinghua University	China	105	56 (34)	0.533 (37)	45	36
McGill University	Canada	153	56 (34)	0.366 (87)	41	46
University of Melbourne	Australia	146	55 (36)	0.377 (82)	33	29
Pennsylvania State University - University Park	United States	126	55 (36)	0.437 (60)	36	25
Georgia Institute of Technology	United States	92	54 (38)	0.587 (29)	37	33
University of Copenhagen	Denmark	122	53 (39)	0.434 (61)	56	56
University of Sydney	Australia	146	52 (40)	0.356 (92)	59	49
National Taiwan University	Taiwan	154	51 (41)	0.331 (111)	53	43
Nanyang Technological University	Singapore	80	50 (42)	0.625 (21)	47	37

Katholieke Universiteit Leuven	Belgium	143	50 (42)	0.35 (97)	43	35
VU University Amsterdam	Netherlands	111	50 (42)	0.45 (57)	60	64
University of Amsterdam	Netherlands	113	49 (45)	0.434 (62)	40	52
University of Southern California	United States	124	49 (45)	0.395 (70)	48	40
Erasmus University Rotterdam	Netherlands	77	48 (47)	0.623 (23)	30	48
University of Alberta	Canada	148	47 (48)	0.318 (118)	52	42
Karolinska Institute	Sweden	78	46 (49)	0.59 (28)	39	69
Purdue University - West Lafayette	United States	121	45 (50)	0.372 (84)	68	51
Seoul National University	South Korea	154	44 (51)	0.286 (128)	49	41
Ghent University	Belgium	150	44 (51)	0.293 (123)	113	106
University of Texas - Austin	United States	112	44 (51)	0.393 (72)	44	38
University of Queensland	Australia	142	43 (54)	0.303 (122)	82	66
Ohio State University - Columbus	United States	151	43 (54)	0.285 (133)	46	45
Universite Pierre et Marie Curie	France	123	42 (56)	0.341 (98)	64	65
Emory University	United States	85	42 (56)	0.494 (47)	34	61
The University of Manchester	United Kingdom	141	41 (58)	0.291 (126)	51	44
The University of Bristol	United Kingdom	110	41 (58)	0.373 (83)	73	60
Lund University	Sweden	128	41 (58)	0.32 (116)	77	71
Zhejiang University	China	143	40 (61)	0.28 (136)	65	54
Shanghai Jiaotong University	China	144	40 (61)	0.278 (137)	69	50
City University of Hong Kong	Hong Kong SAR	64	40 (61)	0.625 (21)	88	63
Wageningen University and Research Centre	Netherlands	67	40 (61)	0.597 (26)	86	89
Cornell University	United States	118	40 (61)	0.339 (102)	62	77
University of Helsinki	Finland	122	39 (66)	0.32 (117)	89	88
University of Chicago	United States	100	39 (66)	0.39 (73)	35	57
Boston University	United States	106	39 (66)	0.368 (86)	50	86
University of Science and Technology, Korea	South Korea	95	38 (69)	0.4 (68)	70	55
University of Groningen	Netherlands	112	38 (69)	0.339 (100)	61	70
Radboud University Nijmegen	Netherlands	98	38 (69)	0.388 (74)	81	82
Texas A&M University	United States	131	37 (72)	0.282 (134)	91	79
Kyoto University	Japan	149	36 (73)	0.242 (162)	42	74
Southeast University	China	103	35 (74)	0.34 (99)	87	68
National Cheng Kung University	Taiwan	105	35 (74)	0.333 (103)	99	75
Federal Institute of Technology Lausanne	Switzerland	75	35 (74)	0.467 (56)	55	47
University of Maryland - College Park	United States	97	35 (74)	0.361 (91)	85	73
Technical University of Denmark	Denmark	80	34 (78)	0.425 (65)	78	72
Princeton University	United States	65	34 (78)	0.523 (39)	67	58
New York University	United States	96	34 (78)	0.354 (93)	80	100
Freie Universität Berlin	Germany	113	33 (81)	0.292 (125)	75	105
University of New South Wales	Australia	134	32 (82)	0.239 (165)	128	114
Humboldt-Universität zu Berlin	Germany	118	32 (82)	0.271 (141)	71	104
Harbin Institute of Technology	China	73	31 (84)	0.425 (66)	79	59
Korea Advanced Institute of Science and Technology	South Korea	71	31 (84)	0.437 (59)	83	62
Hong Kong University of Science and Technology	Hong Kong SAR	60	31 (84)	0.517 (40)	98	78
The University of Edinburgh	United Kingdom	115	31 (84)	0.27 (143)	90	85
The University of Leeds	United Kingdom	106	31 (84)	0.292 (124)	105	94

University of Waterloo	Canada	96	31 (84)	0.323 (113)	130	111
Leiden University	Netherlands	83	30 (90)	0.361 (90)	57	87
Monash University	Australia	131	29 (91)	0.221 (180)	95	84
Eindhoven University of Technology	Netherlands	59	29 (91)	0.492 (49)	72	76
Delft University of Technology	Netherlands	90	29 (91)	0.322 (114)	104	80
University of Colorado - Boulder	United States	76	29 (91)	0.382 (79)	94	92
University of Utah	United States	115	29 (91)	0.252 (150)	106	107
Peking University	China	143	28 (96)	0.196 (205)	84	95
The University of Southampton	United Kingdom	103	28 (96)	0.272 (140)	118	98
University of California - Santa Barbara	United States	64	28 (96)	0.438 (58)	74	67
The University of Sheffield	United Kingdom	99	27 (99)	0.273 (139)	127	110
University of Arizona	United States	120	27 (99)	0.225 (174)	107	108
Carnegie Mellon University	United States	56	27 (99)	0.482 (50)	109	90
Maastricht University	Netherlands	66	26 (102)	0.394 (71)	101	119
King's College London	United Kingdom	78	26 (102)	0.333 (103)	121	136
Baylor College of Medicine	United States	61	26 (102)	0.426 (64)	102	121
Hong Kong Polytechnic University	Hong Kong SAR	66	25 (105)	0.379 (81)	153	123
Ludwig-Maximilians-Universität München	Germany	119	25 (105)	0.21 (191)	96	101
University of Aarhus	Denmark	97	25 (105)	0.258 (148)	132	128
National Tsing Hua University	Taiwan	62	24 (108)	0.387 (75)	93	83
California Institute of Technology	United States	51	24 (108)	0.471 (55)	76	99
University of Colorado - Denver and Health Sciences Center	United States	63	24 (108)	0.381 (80)	100	120
Osaka University	Japan	118	23 (111)	0.195 (207)	54	91
University of Padova	Italy	128	23 (111)	0.18 (229)	112	102
Arizona State University	United States	85	23 (111)	0.271 (142)	149	122
Tohoku University	Japan	126	22 (114)	0.175 (241)	92	93
University of Science and Technology of China	China	80	22 (114)	0.275 (138)	108	113
National Chiao Tung University Taiwan	Taiwan	57	22 (114)	0.386 (76)	110	97
Göteborg University	Sweden	84	22 (114)	0.262 (147)	160	148
University of Cincinnati	United States	83	22 (114)	0.265 (145)	115	127
Chinese University of Hong Kong	Hong Kong SAR	96	21 (119)	0.219 (181)	143	116
The University of Liverpool	United Kingdom	93	21 (119)	0.226 (173)	122	103
Universite Paris-Sud XI	France	97	21 (119)	0.216 (182)	142	166
University of Texas Southwestern Medical Center	United States	55	21 (119)	0.382 (78)	58	131
Graduate University of Chinese Academy of Sciences	China	102	20 (123)	0.196 (203)	131	140
Uppsala University	Sweden	116	20 (123)	0.172 (244)	119	125
Heidelberg University	Germany	95	20 (123)	0.211 (188)	123	118
The University of Nottingham	United Kingdom	112	20 (123)	0.179 (231)	124	117
Swedish University of Agricultural Sciences	Sweden	36	20 (123)	0.556 (33)	203	191
University of Texas - M. D. Anderson Cancer Center	United States	42	20 (123)	0.476 (51)	63	126
Case Western Reserve University	United States	84	20 (123)	0.238 (166)	114	112
University of California, Irvine	United States	109	20 (123)	0.183 (220)	133	135
McMaster University	Canada	105	20 (123)	0.19 (210)	136	134
Pohang University of Science and Technology	South Korea	52	19 (132)	0.365 (88)	97	81
Yonsei University	South Korea	117	19 (132)	0.162 (264)	103	96

The University of Hong Kong	Hong Kong SAR	105	19 (132)	0.181 (227)	169	129
The University of Birmingham	United Kingdom	104	19 (132)	0.183 (221)	177	149
University "La Sapienza"	Italy	141	19 (132)	0.135 (304)	185	187
Mount Sinai School of Medicine	United States	58	19 (132)	0.328 (112)	117	146
Oregon Health & Science University	United States	59	19 (132)	0.322 (115)	138	147
Michigan State University	United States	114	19 (132)	0.167 (249)	161	159
Oregon State University	United States	56	19 (132)	0.339 (100)	175	152
Fudan University	China	111	18 (141)	0.162 (265)	125	141
Universität Karlsruhe (TH)	Germany	72	18 (141)	0.25 (151)	111	109
University of Geneva	Switzerland	93	18 (141)	0.194 (209)	120	132
Vienna University of Medicine	Austria	62	18 (141)	0.29 (127)	173	188
Brown University	United States	87	18 (141)	0.207 (193)	137	124
University of Iowa	United States	95	18 (141)	0.189 (214)	154	154
Nanjing University	China	99	17 (147)	0.172 (246)	140	139
Royal Institute of Technology	Sweden	69	17 (147)	0.246 (159)	129	115
University of Bologna	Italy	137	17 (147)	0.124 (334)	155	167
University of Virginia	United States	95	17 (147)	0.179 (230)	152	157
Virginia Polytechnic Institute and State University	United States	98	17 (147)	0.173 (243)	199	145
Colorado State University	United States	70	17 (147)	0.243 (161)	227	211
Australian National University	Australia	76	16 (153)	0.211 (188)	159	158
University of Western Australia	Australia	91	16 (153)	0.176 (238)	210	193
Universidad de Barcelona	Spain	110	16 (153)	0.145 (290)	182	177
University of Oslo	Norway	98	16 (153)	0.163 (263)	217	175
Tufts University	United States	70	16 (153)	0.229 (171)	126	151
Vanderbilt University	United States	88	16 (153)	0.182 (222)	134	137
University of Georgia	United States	79	16 (153)	0.203 (197)	207	200
North Carolina State University	United States	89	16 (153)	0.18 (228)	268	244
Stockholm University	Sweden	59	15 (161)	0.254 (149)	191	168
University of Massachusetts - Amherst	United States	61	15 (161)	0.246 (160)	148	142
University of Alabama at Birmingham	United States	67	15 (161)	0.224 (175)	151	203
University of Maryland - Baltimore	United States	79	15 (161)	0.19 (211)	167	185
Tokyo Institute of Technology	Japan	74	14 (165)	0.189 (215)	144	144
Korea University	South Korea	105	14 (165)	0.133 (306)	146	130
University of Durham	United Kingdom	45	14 (165)	0.311 (121)	166	156
Tübingen University	Germany	90	14 (165)	0.156 (275)	188	208
University of Milano	Italy	109	14 (165)	0.128 (314)	192	207
Université de Montréal	Canada	99	14 (165)	0.141 (296)	156	171
Hokkaido University	Japan	119	13 (171)	0.109 (370)	190	182
Wuhan University	China	95	13 (171)	0.137 (302)	195	195
Universite PARIS V Rene Descartes	France	66	13 (171)	0.197 (201)	135	192
Universite Strasbourg	France	74	13 (171)	0.176 (239)	141	143
Technische Universität München	Germany	117	13 (171)	0.111 (361)	162	172
University of Bayreuth	Germany	41	13 (171)	0.317 (119)	163	160
University "Federico II"	Italy	118	13 (171)	0.11 (368)	224	233
Universidad Politécnica de Cataluña	Spain	64	13 (171)	0.203 (196)	231	189
University of Rochester	United States	83	13 (171)	0.157 (272)	145	153
Weill Cornell Medical College	United States	54	13 (171)	0.241 (163)	178	190

University of Calgary	Canada	115	13 (171)	0.113 (359)	193	201
Jilin University	China	75	12 (182)	0.16 (268)	139	138
Shandong University	China	99	12 (182)	0.121 (337)	200	197
University of Erlangen-Nürnberg	Germany	87	12 (182)	0.138 (300)	150	155
University of Twente	Netherlands	48	12 (182)	0.25 (151)	180	186
Aristotle University of Thessaloniki	Greece	100	12 (182)	0.12 (340)	238	214
Universidad Complutense de Madrid	Spain	99	12 (182)	0.121 (337)	242	223
University of California - Santa Cruz	United States	34	12 (182)	0.353 (94)	164	161
University of Hawaii at Manoa	United States	61	12 (182)	0.197 (202)	171	169
Indiana University-Purdue University - Indianapolis	United States	59	12 (182)	0.203 (195)	176	204
University of California - Riverside	United States	56	12 (182)	0.214 (185)	179	209
University of Miami	United States	79	12 (182)	0.152 (281)	253	232
Indian Institute of Science	India	58	11 (193)	0.19 (212)	147	133
Nankai University	China	62	11 (193)	0.177 (235)	174	165
Indian Institute of Technology, Kharagpur	India	48	11 (193)	0.229 (169)	214	206
The University of Glasgow	United Kingdom	91	11 (193)	0.121 (339)	181	170
University of Zurich	Switzerland	79	11 (193)	0.139 (299)	194	164
University of Porto	Portugal	92	11 (193)	0.12 (344)	218	221
Universite BORDEAUX I	France	44	11 (193)	0.25 (151)	219	202
The University of East Anglia	United Kingdom	35	11 (193)	0.314 (120)	235	230
Chalmers University of Technology	Sweden	51	11 (193)	0.216(183)	236	250
University of Bern	Switzerland	75	11 (193)	0.147(289)	258	238
The Norwegian University of Science and Technology	Norway	85	11(193)	0.129(311)	301	243
University of Texas Health Science Center at Houston	United States	58	11 (193)	0.19(212)	158	217
The University of Western Ontario	Canada	103	11 (193)	0.107(375)	205	220
University of Illinois - Chicago	United States	92	11 (193)	0.12(344)	211	222
Wake Forest University	United States	51	11 (193)	0.216(183)	213	247
University of South Carolina	United States	48	11 (193)	0.229(169)	220	178
Iowa State University	United States	85	11 (193)	0.129(311)	239	245



#### 4.4 Methodological notes

Rankings of universities have been criticized repeatedly in the literature. The exercise we have proposed addresses some of the limitations of existing rankings, as follows:

- it is based on transparent bibliometric information;
- information is not combined with either historically persistent data (e.g. Nobel prizes), or non controllable data (e.g. surveys of respondents), all subject to methodological criticism;
- it is deliberately limited to a subset of scientific fields, those for which international comparability based on journal publications and citations is methodologically tenable;
- it is based on a composite indicator which combines size-dependent and size-independent measures, avoiding a well grounded criticism to existing rankings (i.e. they give a privilege to large, established, generalist universities with old tradition in research);
- it may give visibility also to universities that excel only in a few fields, provided their production exceeds a reasonable threshold in terms of volume and impact;
- is based on the aggregation of scientific fields for which disaggregated information is available, making the overall outcome transparent and helping universities to understand the underlying rationale;
- adopts two different definitions of excellence (top 10% and top 30%), from which it is possible to choose;
- offers a range of ranking measures, from which it is possible to extract the ones better suited to the problem at hand;
- offers a new ranking based on the share of excellent fields out of the total number of fields (Governance Index), allowing fine-grained analysis of strategic decisions.

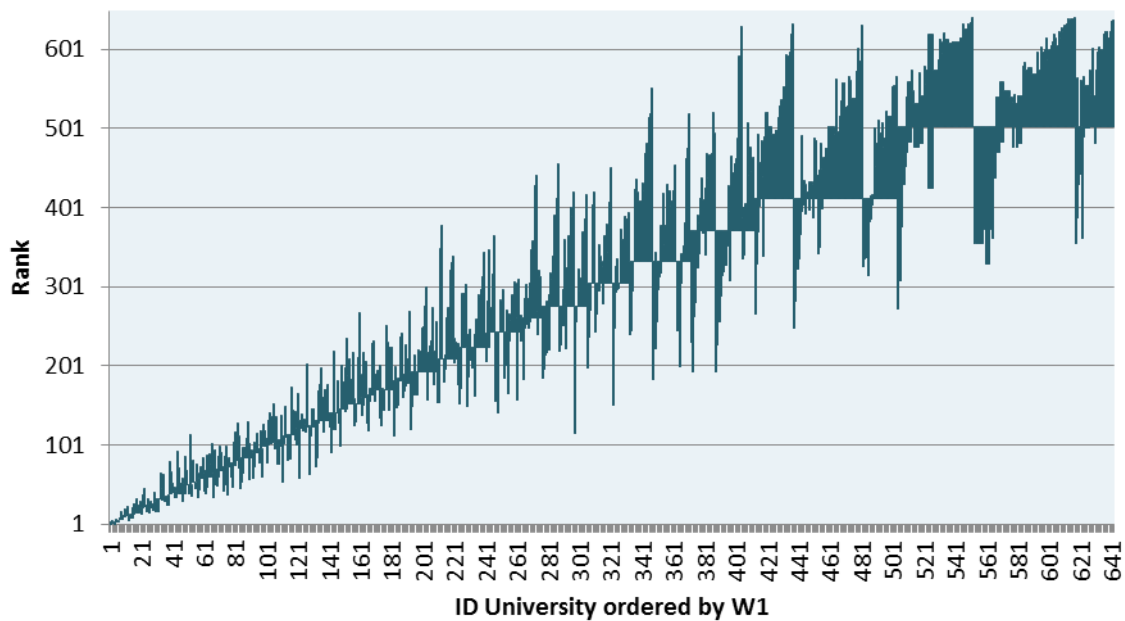
It is useful to investigate whether the various ranking measures are correlated and offer consistent information at aggregate level, while still allowing individual variability. Table 9 shows the Spearman rank correlation among various measures. The unweighted measure correlates strongly with two weighted measure: the one based on publications, not used for the rankings (0.931) and the one based on citations (0.933). It also correlates with the normalized weighted measure (0.949). These findings confirm the overall robustness of the indicators.

Table 9 Rank correlation between indicators used to build rankings

	IG	W_PUBB	W_CIT	NORM_W_CIT
W1	+0.769	+0.931	+0.933	+0.949
IG	-	+0.747	+0.739	+0.755
W_PUBB		-	+0.981	+0.988
W_CIT			-	+0.983
NORM_W_CIT				-

This is confirmed by a more detailed examination of the differences between different rankings. Figure 1 plots universities in descending order of the indicator W1 and examines the variability between the minimum and maximum indicators of ranking. It is confirmed that the variability is small for universities with a larger share of excellent scientific fields, found at the left of the panel. Variability is much larger moving to the right, where universities with one or two scientific fields are found. In these cases the ranking by W1 is fixed for many cases, while the weighted and normalized rankings may change, inducing volatility.

Figure 1 Variability of rankings across universities. Range of rankings



We get a better idea of this problem by calculating the mobile average of indicators, that is, smoothing the individual variability and detecting the trend. In Figure 2 the minimum and maximum value of the ranking indicators has been considered, using W1, W\_CIT and NORM\_W\_CIT. The Governance Index has not been included in the analysis.

The distance between the minimum and maximum value is represented by the vertical distance between the two curves. It is clear that the distance is negligible approximately for the first 200 universities, while it get larger moving down the list. This is contrary to what happens in existing rankings, in which the volatility of rankings for universities below a certain line (typically, below 100 or 200) is large but unexplained by the underlying indicators. This results in measures below the line being completely unreliable. In this case, on the contrary, the volatility of rankings is entirely explained and measured by the weight of disciplines in which universities excel. Given that those that are found below the line have a smaller number of fields (smaller than 11 when moving below the 200 universities line), their volatility is larger by definition.

Figure 2 Variability of rankings across universities. Mobile average

