Ranking of universities in Statistics: a shift towards excellence?

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Abstract: Subject rankings captivated the attention of various stakeholders. In a quest for impartial ranking methodology, significant changes have been introduced with inclusion of solely Q1 journals as the measure of quality. This paper elaborates the consequences and provide some potential remedy to the issue.

Keywords: university rankings, subject, statistics, Q1 journals, excellence

Introduction

With the expansion of university rankings (Safón, 2019) as the valid benchmark of quality, policymakers and key stakeholders – students, advocated the need for subject rankings. The rationale is rooted in overcoming the mesmerising effect of highly profiled universities (Sukoco et al., 2021), even if their reputation can heavily rely on subject areas that are not an enrolment desire of future freshmen. Consequently, a significant portion of leading university ranking methodologies launched subject rankings. Similarly to the global rankings, THE, QS and ARWU, established themselves as the leading authorities for subject rankings. The Global Ranking of Academic Subjects (ARWU, 2021) gained much of the attention, with 54 subjects presented in the 2020 edition. The major shift in methodology consisted of including solely Q1 (ranked in the first quarter according to their respective JCR category - Sorz et al., 2020) journals in the 2020 edition. Having this in mind, we wanted to provide an in-depth evaluation of the performance of leading universities in the subject of Statistics while including not only Q1 but all Q1-Q4 journals.

Methods and Data

As a case study, we obtained the data containing WoS indexed Articles (indexed journals in JCR category Statistics & Probability, year of publication 2014-2018) published by researchers from the Top 200 universities in the subject Statistics from ARWU Global Ranking of Academic Subjects (http://www.shanghairanking.com/Shanghairanking-Subject-Rankings/statistics.html). Six universities have been excluded from the analysis (*The University of Texas M. D. Anderson Cancer Center, Institut polytechnique de Paris, PSL University, University of Goettingen, University of Roma - Tor Vergata and University of Versailles Saint-Quentin-en-Yvelines*), since their names in ARWU list have not entirely matched with the name in WoS database. For each obtained article, Q1-Q4 classification is assigned according to the JCR Statistics & Probability for the observed article's publication year.

Results

In total, 33,647 papers were scrutinised. As we can see from Table 1, Harvard leads the field in the total number of papers and Q1 papers. Still, one should note a spectacular result of Princeton University with 131 Q1 articles among the total of 204 published papers (64.216%).

Table 1. Total number of published papers, number of Q1 papers, percentage of papers published in Q1-Q4 journals, ranks for total, Q1 and percentage of Q1 papers for leading universities with at least 45 Q1 papers (Statistics & Probability JCR category, sorted descending according to Number of Q1 papers)

University	Number of papers	Number of Q1 papers	Q1 %	Q2 %	Q3 %	Q4 %	Rank Total	Rank Q1	Rank Q1 %
Harvard University	581	304	52.324%	29.4%	12.9%	5.3%	1.0	1.0	14.0
Duke University	411	199	48.418%	24.3%	16.5%	10.7%	7.0	2.0	22.0

University	Number of papers	Number of Q1 papers	Q1 %	Q2 %	Q3 %	Q4 %	Rank Total	Rank Q1	Rank Q1 %
University of Michigan-Ann Arbor	469	196	41.791%	32.6%	16.2%	9.4%	4.0	3.0	55.0
Stanford University	366	192	52.459%	22.7%	15.6%	9.3%	10.0	4.0	11.0
Columbia University	435	190	43.678%	26.4%	18.4%	11.5%	5.0	5.0	43.0
University of Pennsylvania	347	182	52.450%	26.2%	15.0%	6.3%	14.0	6.0	12.0
University of Washington	417	179	42.926%	33.3%	16.8%	7.0%	6.0	7.0	46.0
University of North Carolina at Chapel Hill	472	178	37.712%	31.8%	19.7%	10.8%	3.0	8.0	80.0
University of California, Berkeley	334	176	52.695%	21.6%	16.8%	9.0%	15.0	9.0	10.0
University of Cambridge	383	175	45.692%	26.1%	20.1%	8.1%	8.0	10.0	33.0
Texas A&M University	362	171	47.238%	22.4%	16.6%	13.8%	11.0	11.0	29.0
University of Chicago	308	153	49.675%	25.0%	18.5%	6.8%	22.0	12.0	21.0
University of California, Los Angeles	282	142	50.355%	28.7%	14.2%	6.7%	26.0	13.5	15.0
National University of Singapore	327	142	43.425%	23.2%	25.1%	8.3%	18.5	13.5	44.0
Johns Hopkins University	269	135	50.186%	36.1%	10.4%	3.3%	27.0	15.0	18.0
University College London	265	133	50.189%	29.8%	12.5%	7.5%	28.5	16.5	17.0
University of Minnesota, Twin Cities	327	133	40.673%	30.9%	17.1%	11.3%	18.5	16.5	62.0
Princeton University	204	131	64.216%	19.6%	10.8%	5.4%	49.5	18.0	1.0
University of Warwick	360	130	36.111%	28.1%	23.3%	12.5%	12.0	19.0	91.0
North Carolina State University - Raleigh	328	126	38.415%	32.6%	19.5%	9.5%	17.0	20.0	72.5
University of Oxford	330	125	37.879%	27.0%	21.2%	13.9%	16.0	21.0	77.0
Paris-Saclay University	504	122	24.206%	32.1%	25.6%	18.1%	2.0	22.0	162.0
Yale University	261	120	45.977%	26.1%	19.5%	8.4%	30.0	23.0	32.0
Massachusetts Institute of Technology (MIT)	210	118	56.190%	22.4%	13.8%	7.6%	45.0	24.0	6.0
University of California, Davis	216	114	52.778%	18.5%	19.0%	9.7%	42.0	25.0	8.0
KU Leuven	315	112	35.556%	29.5%	19.0%	15.9%	21.0	26.0	94.0
University of Toronto	245	110	44.898%	31.0%	15.5%	8.6%	34.0	27.0	37.0
University of Wisconsin - Madison	289	109	37.716%	31.1%	20.8%	10.4%	24.0	28.0	79.0
University of Paris	378	103	27.249%	32.5%	25.4%	14.8%	9.0	29.0	141.0
University of Bristol	204	98	48.039%	28.4%	15.7%	7.8%	49.5	30.0	24.0
Carnegie Mellon University	197	95	48.223%	21.8%	22.8%	7.1%	55.0	31.0	23.0
Pennsylvania State University - University Park	255	91	35.686%	29.8%	26.7%	7.8%	32.5	32.0	93.0
New York University	210	90	42.857%	26.7%	18.1%	12.4%	45.0	33.0	47.0
Zhejiang University	178	89	50.000%	13.5%	11.8%	24.7%	66.5	34.0	19.5
Sorbonne University	352	88	25.000%	32.7%	26.1%	16.2%	13.0	35.0	158.0
The University of Texas at Austin	195	87	44.615%	29.7%	14.9%	10.8%	58.0	36.5	39.0
ETH Zurich	221	87	39.367%	23.1%	26.7%	10.9%	39.0	36.5	68.0
University of Florida	206	85	41.262%	26.7%	18.4%	13.6%	47.0	38.0	56.0
University of British Columbia	205	84	40.976%	23.9%	18.5%	16.6%	48.0	39.0	59.0
McGill University	181	81	44.751%	26.5%	16.0%	12.7%	64.5	41.0	38.0
London School of Economics and Political Science	193	81	41.969%	28.0%	20.7%	9.3%	59.0	41.0	52.0
University of Copenhagen	199	81	40.704%	32.2%	22.1%	5.0%	51.5	41.0	61.0
The Ohio State University - Columbus	228	80	35.088%	28.1%	21.1%	15.8%	37.0	43.0	95.0
Cornell University	198	79	39.899%	26.3%	22.2%	11.6%	53.5	44.5	67.0
Imperial College London	232	79	34.052%	30.2%	21.1%	14.7%	35.5	44.5	104.0
Northwestern University	155	78	50.323%	20.0%	18.7%	11.0%	90.0	46.0	16.0
Lancaster University	196	77	39.286%	35.2%	15.3%	10.2%	56.5	47.0	69.0
University of Waterloo	288	74	25.694%	34.4%	26.4%	13.5%	25.0	48.0	154.0
Sapienza University of Rome	232	73	31.466%	27.2%	22.0%	19.4%	36.5	49.0	118.0
University of Illinois at Urbana-Champaign	184	71	38.587%	25.0%	27.2%	9.2%	61.5	50.5	71.0
University of Southampton	210	71	33.810%	34.8%	16.2%	15.2%	45.0	50.5	105.0
University of Southern California	174	70	40.230%	23.6%	23.0%	13.2%	70.0	52.5	65.0

University	Number of papers	Number of Q1 papers	Q1 %	Q2 %	Q3 %	Q4 %	Rank Total	Rank Q1	Rank Q1 %
The University of Hong Kong	255	70	27.451%	32.9%	20.8%	18.8%	33.5	52.5	140.0
Central South University	114	68	59.649%	7.0%	14.0%	19.3%	134.0	55.0	2.0
University of Pittsburgh	147	68	46.259%	23.8%	17.0%	12.9%	97.0	55.0	31.0
Purdue University - West Lafayette	198	68	34.343%	30.3%	25.3%	10.1%	53.5	55.0	99.0
University of Granada	148	66	44.595%	20.3%	16.9%	18.2%	96.0	57.5	40.0
The University of New South Wales	225	66	29.333%	32.0%	28.9%	9.8%	38.0	57.5	129.0
City University of Hong Kong	164	63	38.415%	20.7%	23.8%	17.1%	82.0	60.0	72.5
Peking University	171	63	36.842%	19.9%	27.5%	15.8%	72.0	60.0	86.0
The University of Melbourne	219	63	28.767%	27.9%	22.4%	21.0%	40.0	60.0	132.0
Wuhan University	166	62	37.349%	19.9%	18.7%	24.1%	79.5	62.5	85.0
The Chinese University of Hong Kong	169	62	36.686%	29.0%	20.7%	13.6%	74.0	62.5	88.0
Boston University	149	61	40.940%	24.2%	23.5%	11.4%	94.5	64.5	60.0
University of Iowa	160	61	38.125%	28.8%	20.6%	12.5%	84.5	64.5	76.0
Ghent University	107	59	55.140%	15.0%	14.0%	15.9%	145.0	66.0	7.0
Erasmus University Rotterdam	124	58	46.774%	36.3%	8.1%	8.9%	121.5	67.5	30.0
University of Alberta	127	58	45.669%	18.9%	17.3%	18.1%	115.0	67.5	34.0
University of Zurich	149	57	38.255%	24.8%	26.8%	10.1%	94.5	69.0	75.0
The University of Texas Health Science Center at Houston	123	56	45.528%	27.6%	8.9%	17.9%	125.0	71.5	35.0
Florida State University	126	56	44.444%	34.1%	12.7%	8.7%	116.0	71.5	41.0
Leiden University	139	56	40.288%	23.7%	23.0%	12.9%	107.0	71.5	64.0
University of South Carolina - Columbia	153	56	36.601%	28.8%	19.6%	15.0%	91.0	71.5	89.0
London School of Hygiene & Tropical Medicine	97	55	56.701%	28.9%	10.3%	4.1%	159.0	74.5	5.0
Seoul National University	216	55	25.463%	24.1%	27.8%	22.7%	42.0	74.5	156.0
University of California, San Diego	143	54	37.762%	28.0%	28.7%	5.6%	103.0	76.5	78.0
University of Amsterdam	190	54	28.421%	32.6%	20.0%	18.9%	60.0	76.5	136.0
University of Maryland, College Park	129	53	41.085%	25.6%	19.4%	14.0%	114.0	78.0	58.0
Emory University	124	52	41.935%	37.1%	12.9%	8.1%	121.5	80.0	53.0
Michigan State University	170	52	30.588%	30.0%	23.5%	15.9%	73.0	80.0	120.0
University of Padua	184	52	28.261%	28.8%	19.0%	23.9%	61.5	80.0	137.0
University of Missouri - Columbia	167	51	30.539%	32.3%	23.4%	13.8%	77.5	83.5	121.0
Georgia Institute of Technology	168	51	30.357%	31.5%	22.6%	15.5%	75.5	83.5	123.0
University of Munich	168	51	30.357%	34.5%	22.0%	13.1%	75.5	83.5	124.0
Hasselt University	178	51	28.652%	33.1%	22.5%	15.7%	66.5	83.5	134.0
Carlos III University of Madrid	135	49	36.296%	25.2%	24.4%	14.1%	111.0	87.5	90.0
Humboldt University of Berlin	145	49	33.793%	32.4%	22.8%	11.0%	98.5	87.5	106.0
The University of Tokyo	165	49	29.697%	22.4%	32.1%	15.8%	81.0	87.5	127.0
Iowa State University	199	49	24.623%	32.7%	27.6%	15.1%	51.5	87.5	160.0
Newcastle University	91	48	52.747%	20.9%	15.4%	11.0%	173.0	91.0	9.0
Brown University	96	48	50.000%	26.0%	15.6%	8.3%	164.5	91.0	19.5
Fudan University	138	48	34.783%	23.2%	17.4%	24.6%	108.5	91.0	97.0
Monash University	125	47	37.600%	34.4%	17.6%	10.4%	118.0	95.5	82.0
The University of Edinburgh	125	47	37.600%	26.4%	22.4%	13.6%	118.0	95.5	83.0
Aix Marseille University	142	47	33.099%	21.8%	28.2%	16.9%	105.0	95.5	110.0
University of Milano-Bicocca	143	47	32.867%	28.0%	28.0%	11.2%	103.0	95.5	111.0
Virginia Polytechnic Institute and State University	157	47	29.936%	36.3%	19.7%	14.0%	86.5	95.5	126.0
Rutgers, The State University of New Jersey - New Brunswick	167	47	28.144%	26.3%	31.7%	13.8%	77.5	95.5	138.0
National Taiwan University	96	46	47.917%	19.8%	16.7%	15.6%	164.5	100.5	25.0
Utrecht University	96	46	47.917%	21.9%	15.6%	14.6%	164.5	100.5	26.0

University	Number of papers	Number of Q1 papers	Q1 %	Q2 %	Q3 %	Q4 %	Rank Total	Rank Q1	Rank Q1 %
University of Technology Sydney	97	46	47.423%	23.7%	12.4%	16.5%	159.0	100.5	28.0
The George Washington University	172	46	26.744%	22.7%	35.5%	15.1%	71.0	100.5	145.0
Karolinska Institute	78	45	57.692%	23.1%	9.0%	10.3%	186.0	105.5	4.0
Queensland University of Technology	86	45	52.326%	32.6%	8.1%	7.0%	182.0	105.5	13.0
Indiana University Bloomington	120	45	37.500%	23.3%	24.2%	15.0%	128.0	105.5	84.0
University of Sydney	134	45	33.582%	29.1%	19.4%	17.9%	112.0	105.5	107.0
University of Connecticut	183	45	24.590%	28.4%	25.1%	21.9%	63.0	105.5	161.0
The University of Manchester	294	45	15.306%	24.1%	19.4%	41.2%	23.0	105.5	185.0

With ARWU ranking being limited to Q1 journals, the universities' vast amount of performance insights is wholly ignored. For instance, the University of North Carolina at Chapel Hill and the University of California Berkeley are closely ranked with 178 and 176 Q1 articles. However, the University of North Carolina at Chapel Hill has a total number of articles 472, while the University of California Berkeley has a total number of articles 334. Results point out the need to include not solely the Q1 papers but consider the entire performance of the observed universities.

Although Chinese universities (Gao & Li, 2020) continue to surge in the number of papers published in JCR Q1 journals (in 2018, exceeding 51,000 – an increase of about 18.6% over the year 2017), for subject Statistics, their results are beyond expectations. Also, Brazilian universities are underachieving, with a considerable percentage of papers being published in Q4 journals that is aligned with the previous study (Mcmanus et al., 2020). The same can be concluded for the University of Belgrade (not surpassing the limit of 45 Q1 papers), with most of the papers from UB researchers being published in low-tier journals (Pilčević et al., 2018, 2019).

Conclusion

Limiting ARWU subject ranking methodology to Q1 journals has not triggered much of the changes in the ranks for world-class universities. However, it has a profound consequence for lower-tier universities such as the University of Belgrade. One of the potential improvements of ARWU methodology might be to weight articles in Q1-Q4, including an entire performance of universities with particular weight being given to the articles published in better-ranked journals. Still, the current ARWU approach might catalyse change and shift attention to researchers with admirable Q1 performance. Finally, to provide better support for their scientific endeavours and contributing to the growing need to map excellence within the academic staff (Ioannidis et al., 2020).

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