Interfield Comparison of Academic Output by Using Department Level Data

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Tenure decisions and university rankingsare just two examples where interfield comparison of academic output is needed. There are differences in publication performances among fields when the number of papers is used as the quantity measure and the Journal Impact Factor is used as the quality measure. For example, it is well known that the economics departments publish less than the chemistry departments and their journals have less impact factors. But there is no consensus on the magnitude of the difference and the methodology for the adjustment. Every decision maker makes his own adjustment and uses a different formula. In this paper, we quantify the publication performance differences among nine academic fields by using data from 1417 departments inthe United States. We use two quality measures. First we weigh the publications by the impact factor of the journals. Second, we only consider the publications in the journals that are in the top quartile of the subject categories. We see that there are vast interfield differences in terms of the number of publications. Moreover, we find that the interfield differencesare augmented when we consider the quality of the publications.Lastly, we rank the departments according to the quality of their graduate programs. We see that there are also huge differences among the departments with graduate programs of comparable rank.

Keywords: interfield comparison; rankings; publication evaluation

Introduction

Academic fieldsdiffer in publication performancesat many levels. A graduate student who does not publish a paper during her graduate studies is normal in economics but not acceptable in engineering. An academician in sociology may apply for tenure with just books but this is not possible in chemistry. A political scientist may be considered as competent in a subject matter for an academic project with just one paper but the psychologist may not be with five papers. A mathematics department may be top notch with fifty papers per year but a physics department may not even be considered as a research department with that performance.

There would be no need for concern for the interfield differences if the academicians in a particular field live in a nutshell. Consider the economist who graduates with no articles apply for a job at a College of Arts and Sciences. The economics professors would have no difficulty in evaluating her thesis performance. But her job approval would critically depend on how a dean from a different discipline understands the interfield differences in publication performances. Even if the deanoffers her a job, her colleagues in the coffee room may not be able to do the interfield comparison. She may work day and night to publish one or two papers per year but the physicist who publishes ten papers a year may feel like he is shouldering most of the research responsibilities of the university.

There is an increasing importance given tothe university rankings. The students become more mobile each passing day and their preferences are influenced by the rankings. The university presidents understand the importance of the rankings and device policies to climb up. The affect of the choice of having more faculty members in social sciences rather than in engineering on the rankings of the university critically depends on the formula that the ranking institutions use. The formula is not always constructed after an in depth study of interfield differences. For instance, the popular Shangai rankings weigh papers indexed in Social Science Citation Index by a “special weight” of two and adds them to papers indexed in Science Citation Index. This is a rather simplistic way to account for interfield differences.

The difficulty of interfield comparison starts at a micro level. It is not even easy to compare papers within the same journal. For instance, the empirical papers attract more citations than theoretical papers in the American Economic Review (Johnston et al. 2013). The American Economic Review isthe top journal in economics in many subjective rankings that reflect the general view of economists (Hawkins et al. 1973, Axarloglou and Theoharakis2003). However, the journal is ranked 13thamong economics journals in terms of Journal Impact Factors. To get a more sensible ranking, some studies use an alternative to the Journal Impact Factor. Journal Impact Factor treats each citation the same. The alternative method gives a higher weightto the citations fromthe source journalswhich have more citations (Liebowitz and Palmer 1984, Kalaitzidakis et al. 2003).

Many solutions are proposed to account for the interfield differences of the Journal Impact Factors. The Web of Science provides the subject categories of the journals in the Journal Citation Reports. Many institutions use the percentile rank of a journal in its subject category as a sign of the journal’s quality. The researchers offer variants of this approach. For instance, Ramirez et al. (2000) normalize the impact factor of a journal by using the median and maximum impact factors of its subject category. Sombatomspop and Markpin (2005) use the average impact factor of the subject category to do the normalization. Podlunby

(2005) notices that the ratio of the total number of citations received by different fields are constant through time. Therefore, he normalizes the citations of all fields by the number of citations in mathematics which has the least number of citations in his sample.

A candidate that may replace the Journal Impact Factor as the standard journal quality metric is the H-index for Journals. H-index is introduced by Hirsch (2005) to evaluate the individual researchers. Braun et al. (2006) adopt the H-index to journals. TheH-index of a journal (researcher) is h if it(she) has h papers which have more than h citations. There are also interfield differences in H-index of the journals. However, it is possible to normalize the H-index of the journals by the same methodologies that are used to normalize the Journal Impact Factors.

The normalization of the journal quality is a necessary but not a sufficient solution to achieve the right interfield comparison of the academic output. The best political science journal is given the same weight as the best chemistry journal via normalization but it does not mean that the typical political scientist can publish the same number of papers as the typical chemist. There are studies that address this issue. Lopez-Illescaset al. (2011) analyze the data for fifty Spanish universities. They find huge interfield differences in publication performances among fields within the same university. Claro and Costa (2011) find the top researchers who have the maximum publication performance in each journal. Then, they normalize the other researchers' publication performances by the top publication performances. Batista et al (2006) and Harzing et al. (2014) show that there are no interfield differences among H-indices of the individual researchers if one adjusts for the number of co-authors in the publications. Raddichi et al. (2008) normalize the citations of the journal by the citations in its subject category before they compute the H-index.

Despite the considerable efforts by researchers to account for interfield differences, no "field-blind" metric has become the standard. The standard tool is still "field-conscious" Journal Impact Factor. Of course, the institutions account for the differences. Otherwise, no sociologist in the world would get a tenure if he is subjected to the same standards as chemists. Every institution devices its own formula. At each meeting where the formula is decided, the academicians from the disadvantageous fields have to make their own case. The academicians from the advantageous fields may feel like they are patronizing the other fields because they let them have a higher weight for their meager number of papers. We think that it is unfair to see academicians as handicapped researchers just because they are not performing well on a metric that is not designed to be used for interfield comparison.

In this paper, we use the standard measures for quantity and quality for publication performances and show the magnitude of interfield differences by using the department level data. It is well known that the chemistry departments produce more articles than the economics departments. The chemistry journals are also known to have higher impact factors than the economics journals. Therefore the economists publish less than the chemists in all measures. But the answer to the question "how much less?"is highly relevant in guiding us through making the right interfield comparison.

We use data from US universitiesin order to measure the interfield differences in academic output. We pick nine distinct academic fields and consider all 1417 departments with graduate programs. We take the publication data from Web of Science. We use journal quality measures from Journal Citation Reports. We handpick the number of core faculty from the web pages of the departments. Lastly, we use US News rankings to determine the quality of their graduate programs.

We find huge interfield differences in our analysis. For example, an average chemistry department publishes 5.6times more than an average economics department. The fields are also disparate in the capacities of the journals. On average, there are 193 papers in the economics journals whereas the capacity is 1310 papers in the chemistry journals. The number of contributors to the publication performance also differ among fields. In economics, the number of authors contributing to yearly output is half of the size of the faculty whereas chemistry departments have 4.8 contributing authors per faculty.

The interfield differences persist and become more excessive when we adjust for the standard quality measures. It is true that considering the percentile rank of the journals is better than just considering the absolute impact factors. But it is far from accounting for the interfield differences.

Lastly, we use the rankings of the graduate programs in order to analyze the departments with comparable quality. We find that the interfield differences exist at every quality level.

Yuret (2014) is a predecessor to this paper. In that paper,we ask similar questions by using a macro level data. We use data from Bureau of Labor Statistics to attain the number of academicians. Then we compute the publication performanceaverages of the US academicians from each field. We also find huge interfield differences at the macro level.

Data

We only consider the departments that have graduate programs. Having a graduate program can be taken as a sign of research orientedness so it is fair to judge these departments by their academic output. The complete list of the graduate programs is taken from the popular US News rankings web site. We include a department if we are able to match the department one to one to a graduate program. However, we cannot do the matching in all cases. For instance, Harvard University does not have separate engineering departments. We try to exclude as few departments as possible so we sometimes include departments that do not perfectly match one to one to a graduate program. For instance, we include the combined chemistry and chemical engineering departments which offer both chemistry and chemical engineering graduate programs.

We exclude some important and relevant fields for various reasons. Many fields are excluded because we cannot match most of the departments to the graduate programs in the field. For example, biological sciences are not included because the biology graduate programs are not generally offered by a single department but are offered by a wide range of disciplines. Other reasons for exclusion are the lack of enough graduate programs in the field (e.g. finance), emphasis on conference proceedings rather than articles for research output (e.g. computer science), emphasis on teaching rather than research (e.g. business schools). At the end, we have 1417 departments in nine fields. Table 1 shows the number of departments in each field.

We download the publication data from Web of Science for the year 2012. We include all articles indexed in Social Science Citation Index, Science Citation Index and Arts &

Humanities Citation index. We restrict our analysis to articles so we exclude all other publications such as conference proceedings or letters. We assign publications to the departments by using the address information. Unfortunately, the address information is not uniform. For instance, some addresses include “dept econ”, some others include “econ dept”. The university abbreviations also differ. To overcome these problems, we use the data mining program PERL and search for patterns. It is not easy to locate all the publications of the department. For instance, some researchers have dual responsibilities in the department and research centers such as laboratories. We search the web sites of these research centers and see whether they are formed under the departments. If most of the members of the research center are also members of a department, we assign the publications to the department. Otherwise, we are unable to take them into account. Some addresses lack most of the relevant information and have simply the university address. We are unable to take these publications into account as well. Although we do our best to assign as many publications as possible to the departments, our findings should be viewed with caution because of the omissions that we are unable to refrain.

We face the problem of data limitations when we try to compute the publication performance per researcher in a department. We take the publication performances of all researchers for the academic output because the aforementioned Web of Science data do not provide the academic titles of the authors. When we compute the number of researchers, we cannot include all types of researchers because the web pages of the departments usually do not list all of its researchers. An easy solution would be to take the number of contributors to the department’s yearly output as the number of researchers. However, all the researchers are not able to publish in a given year. Even if they did, it would simply be wrong to add up the researchers with different status. A full professor is not equal to a research assistant in herability to publish. Therefore, we decide to divide the total number of publications to the number of core faculty members to find the publication performance per researcher in a department. This way, we put the core faculty at the center. This is a valid procedure if the core faculty is primarily responsible for the research performance of the department.

We handpick the number of core faculty members from the web sites of the departments. The difficulty of interfield comparison arises when we try to have a common definition of core faculty. For example, some fields consider the emeritus faculty as a part of the core faculty while others list them separately. We use the following classification. We exclude emeritus faculty, adjunct professors, postdocs, research assistants, visiting members and instructors. Research professors are also excluded if they do not hold a tenure-track position. We look up the Handbook of Academic Titles written by Michael Samosin order to understand the status of many different academic titles. When we are in doubt, we check the job postings of the positions to see whether the position is tenure-track or not. There are departments which do not offer tenure-track positions. In that case, we rely on common sense to determine who is in the core faculty. The fieldaverages of core faculty numbers aregiven in Table 1.

Table 1: Number of Faculty Members

	Number of Departments	Average Core Faculty
Economics	124	25.30
Sociology	112	20.55
Political Science	113	26.12
Psychology	229	27.98
Mathematics	172	31.85
Chemistry	195	25.40
Physics	172	29.12
Civil Engn	137	21.17
Mechanical Engn	163	25.52

We take our journal quality measures from Journal Citation Reports which is available at the Web of Science. We simply use the Journal Impact Factors for the first quality measure. We need the journals in the top quartile for the second quality measure. Many journals belong to more than one subject category so they have multiple quartiles in the Journal Citation Reports. For instance, a journal may be in the first quartile in a given subject, and the second quartile in another subject. We compute the rankings of the journals in all of its subjects and take the average. Then we assign the journal to the top quartile if the journal's average percentile is higher than seventy five percent.

The US News provides the subjective rankings of the graduate programs. The surveys are sent to universities and their opinions are aggregated. The details about their methodology and most of the ranking outcomes are freely available from their web page. A small fee is required to download the engineering rankings.

Interfield Comparison: Average Publication Performances

We compare the average publication performances in nineacademic fields. We have one quantity measure (co-author adjusted) and two quality measures (impact factor weighted and first quartile only). We find the fraction of the papers that each department publishes in order to compute the co-author adjusted number of publications. For instance, if three authors are from department X in a paper with twelve authors, we attribute 3/12 of the paper to department X. The quality measures are also co-author adjusted. We weigh the publications with the Journal Impact Factors in the first quality measure. Weonly consider the journals in the top quartile of the subject categories in the second quality measure. For all measures, we divide the performance of the department by the number of the core faculty members. The average publication performance in a field is computed by taking the average performance of all departments in that field.

We give the average publication performances of fields in Table 2A. In the first column, we have co-author adjusted number of publications. We see that the three social science fields especially perform poorly. The political scientists and sociologists can get away with poor performance by declaring that they also do other forms of publications such as writing books. Unfortunately, this is not possible for economists because they give article publication the utmost importance. Chemistry and physics perform much better than the other fields. The mechanical and civil engineering, psychology and mathematics are in the middle.

The crude classification we do for the quantity measure is also valid for the quality measures. The three social sciences perform poorly, chemistry and physics excel and other fields are in-between. However the positions within the groups change. For instance, mathematics is especially poor in terms of the quality measures. The mathematics departments publish more than the civil engineering departments but their performance in terms of impact factor weighted publications is almost half of the civil engineering departments. When we consider the publications in the first quartile, the advantage of civil engineering departments decreases but does not diminish.

We normalize economics to one in Table 2B to make interfield comparison easier. From this table, we can easily see that the interfield differences are augmented when we weigh the journals by their impact factors.For instance, the chemistry departments publish 5.6 times more than economics departments but they have 18.9 times more impact factor weighted publications. When we consider the first quartile journals, the interfield differences are less pronounced.

To sum up, we see that the average publication performances among fields are huge so it would be a fatal error to do interfield comparison without adjustment. We can also see that the necessary adjustment tool is not the quality adjusted measures. The fields which produce more papers are also more likely to publish in journals with highimpact factors. Considering the top quartile of journals does not account for the interfield differences because the advantageous fields also have more papers in their top journals.

Table 2A: Average Publication Performances of Fields

	Average Publication Per Faculty		
	Co-Author Adjusted	Impact Factor Weighted	First Quartile Only
Economics	0.31	0.48	0.11
Sociology	0.35	0.58	0.14
Political Science	0.18	0.24	0.08
Psychology	0.69	2.02	0.30
Mathematics	0.71	0.91	0.28
Chemistry	1.73	9.06	1.21
Physics	1.22	5.36	0.83
Civil Engn	0.70	1.59	0.35
Mechanical Engn	0.91	2.42	0.50

Table 2B: Average Publication Performances

(Economics normalized to 1)

	Average Publication Per Faculty		
	Co-Author Adjusted	Impact Factor Weighted	First Quartile Only
Economics	1.00	1.00	1.00
Sociology	1.13	1.21	1.27
Political Science	0.58	0.50	0.73
Psychology	2.23	4.21	2.73
Mathematics	2.29	1.90	2.55
Chemistry	5.58	18.88	11.00
Physics	3.94	11.17	7.55
Civil Engn	2.26	3.31	3.18
Mechanical Engn	2.94	5.04	4.55

Interfield Comparison: Publication Characteristics

We analyze threemeasures of publication characteristics. The first measure is the annual number of papers in the journal that the publication takes place. The other two measures are the number of authors and the number of pages in the publication. We adjust for the number of co-authors in all three measures. For example, a publication which have all authors from department X has two times more weight than a publication which have half of the authors from department X. After we compile data at the department level, we compute the field averages.

The results are given in Table 3. The interfield differences are stark. For instance, there are only 86 papers in the journals that the political scientists publish whereas there are 1982 papers in the journals that the physicists publish. It is true that physicist have also more competitors. There are more physicists in the world and academicians from other fields are also publishing to physics journals. Despite this, the limited space in the journals can be taken as a reason of why the academicians from some fields have difficulty in publishing.

Although we account for the number of co-authors in calculating the publication performances of the departments in the previous section, the number of co-authors is an important factor for the individual researcher. We see from Table 3 that the economics papers have 2.10 authors whereas physics papers have 16.05 authors. Even if an economist and a physicist contribute the same number of co-author adjusted publications, the physicist's CV will be around eight times more crowded than an economist's. Besides the bragging rights, long CV is good for many reasons. For instance, some NSF project proposals ask researchers to submit ten most related papers to the project. Many economists get tenure in prestigious universities with less than ten papers so it is hard for them to find the ten most related papers to any project proposal.

The total number of pages in the paper may be related to the difficulties in the publishing process. From Table 3 we see that high performers such as physics and chemistry have shorter papers. However, mathematics has the longest papers although their publication performance is much better than the social sciences. We think that the number of pages has at most a minor role in explaining the interfield differences in publication performances.

Table 3: Publication Characteristics

	Average Number of		
	Papers in the Journal	Authors	Pages
Economics	193.43	2.10	17.74
Sociology	173.51	1.94	17.15
Political Science	86.72	1.75	18.75
Psychology	415.21	3.53	11.41
Mathematics	321.79	2.24	18.95
Chemistry	1310.62	4.64	8.00
Physics	1982.09	16.05	9.84
Civil Engn	424.59	3.21	10.87
Mechanical Engn	691.14	3.49	9.93

Interfield Comparison: The Number of Contributors

There are interfield differences in the number of researchers who contribute to the publication process. In economics, the primary objective of the graduate students is to prepare a single job market paper which is usually single authored and published after the graduation. The professors seldom co-author papers with the graduate students. The advisors are usually satisfied with a thank you note in the acknowledgements of the PhD thesis. In this respect, the economics culture is very different from science and engineering. An administrator who does not understand the interfield differences will be surprised to see that almost no publications come out of the economics graduate programs.

We are able to count the number of distinct authors who publish from a certain department. After compiling data at the department level, we take their averages to find the field performances. Table 4 lays out the results. The first column is the average number of contributing authors. The second column is the contributing authors divided by the size of the faculty. We see that there are half asmany contributors as faculty in economics whereas the ratio is 4.8 in chemistry. Generally speaking, the number of contributing authors is less than one in three social science fields. In other words, there are research faculty who do not contribute to the publication process in a given year in these fields. The ratio is more than one in the other fields which reflect the fact that the core faculty gets help from graduate students and auxiliary faculty members to improve the publication performance of their departments.

Table 4: Contribution

	Average Number of	
	Contributing Authors	Contributing Authors Per Faculty
Economics	13.40	0.49
Sociology	11.01	0.52
Political Science	7.18	0.26
Psychology	53.21	1.76
Mathematics	36.44	1.07
Chemistry	135.09	4.80
Physics	126.31	3.91
Civil Engn	38.55	1.59
Mechanical Engn	63.38	2.18

Interfield Comparison: Departments with Graduate Programs of Comparable Rank

In this paper, we focus on the departments with graduate programs because we think that having a graduate program is a signal for research interest. However, the signal is imperfect especially when we analyze departments in different fields. For instance, there are twice as many departments in psychology than in economics which offer graduate programs. This difference probably reflects a higher demand for the graduate programs in psychology rather than the higher number of psychology departments with research interest.

We rank departments according to their graduate programs in order to attain departments of comparable quality. It is true that the ranking of the graduate programs depend on other factors than the departments' research output. For instance, a graduate program with more scholarship opportunities may attract better students and have a better subjective ranking despite its poor faculty quality. However, we think that the graduate program rankings can give us a good approximation to the quality of the research done in the department.

In Table 5A, we have the average publications of the departments in different ranking brackets. In each of the fields, the publication performances decrease steadily in terms of the quantity measure. Despite this, the best departments in social science fields publish less than the worst departments in science and engineering. For instance, the top ten economics departments publish about half of the chemistry departments that rank below 125.

In Table 5B,we normalize economics to one in order to facilitate the interfield comparison. To do the normalization, we divide the publication performance of the departments from all fields within a certain ranking bracket by the publication performance of departments from economics within that ranking bracket. We see that the interfield performance of fields compared to the economics change a lot depending on the ranking of the departments. For instance, top ten civil engineering departments publish 2.39 times more than top ten economics departments whereas the difference decreases to 1.42 when we consider the departments ranked between 75 to 125. The normalized values of all fields increase first and then decrease as the rankings go down. This shows that the intrafield publication performances are more similar in economics than the other fields.

Table 5A: Publication Per Faculty Adjusted for the Number of Co-Authors

	Econ	Sociol	Political	Psychol	Math	Chem	Phys	Civil Engn	Mech Engn
Top 10	0.55	0.52	0.27	1.57	1.61	3.89	2.16	1.32	1.90
10-25	0.39	0.49	0.26	1.25	1.01	2.76	1.84	1.16	1.51
25-50	0.28	0.37	0.21	1.12	0.87	2.49	1.49	1.00	1.27
50-75	0.30	0.33	0.18	0.92	0.78	2.05	1.36	0.65	0.77
75-125	0.27	0.24	0.11	0.70	0.53	1.52	1.01	0.38	0.76
125-175				0.46	0.53	1.01	0.83		0.45
Below 175				0.26					

Table 5B: Publication Per Faculty Adjusted for the Number of Co-Authors

(Economics is Normalized to 1)

	Econ	Sociol	Political	Psychol	Math	Chem	Phys	Civil Engn	Mech Engn
Top 10	1.00	0.95	0.49	2.84	2.91	7.04	3.92	2.39	3.45
10-25	1.00	1.24	0.66	3.17	2.57	7.02	4.68	2.94	3.84
25-50	1.00	1.29	0.73	3.93	3.07	8.79	5.24	3.53	4.49
50-75	1.00	1.12	0.60	3.10	2.65	6.94	4.61	2.18	2.59
75-125	1.00	0.90	0.40	2.60	1.97	5.65	3.76	1.42	2.81

Table 6 shows the impact factor adjusted publication performances of departments of comparable ranking. We see that the top ten economics departments can publish around 1/3 of the chemistry departments that rank below 125. This is larger than what we observe in Table 5A. Therefore, the adjustment by the Journal Impact Factor enlarges the interfield differences among departments of comparable quality. In this respect, Journal Impact Factor as a quality metric is highly problematic.

Table 6: Average Publication Per Core Faculty Weighted by Journal Impact Factors

	Econ	Sociol	Political	Psychol	Math	Chem	Phys	Civil Engn	Mech Engn
Top 10	1.30	1.17	0.56	6.35	2.35	30.23	12.32	3.91	6.20
10-25	0.68	0.95	0.36	4.51	1.39	17.40	9.17	2.68	4.14
25-50	0.42	0.63	0.27	3.81	1.17	14.21	6.91	2.50	4.20
50-75	0.45	0.50	0.22	2.73	1.02	11.23	6.21	1.23	1.71
75-125	0.29	0.33	0.12	1.74	0.65	6.47	4.24	0.77	1.72
125-175				1.00	0.63	3.95	2.74		0.90
Below 175				0.53					

Table 7 shows that the second quality measure also fail to give similar results for departments with comparable ranking. For instance, the top ten chemistry departments have ten times more papers in the top quartile of the journals than the top ten economics departments. The categorization of journals into different subject categories is far from accounting for the interfield differences of departments with comparable ranking.

Table 7: Average Publication Per Faculty in Journals in the First Quartile

	Econ	Sociol	Political	Psychol	Math	Chem	Phys	Civil Engn	Mech Engn
Top 10	0.32	0.30	0.16	0.95	0.85	3.36	1.59	0.84	1.18
10-25	0.19	0.26	0.13	0.70	0.46	2.20	1.32	0.62	0.87
25-50	0.11	0.15	0.10	0.61	0.38	1.88	1.06	0.56	0.79
50-75	0.10	0.12	0.07	0.43	0.27	1.54	0.95	0.26	0.39
75-125	0.06	0.06	0.03	0.27	0.20	0.97	0.69	0.16	0.38
125-175				0.13	0.17	0.57	0.50		0.20
Below 175				0.06					

Conclusion

We do not device a tool for normalizing the interfield differences. One cannot simply normalize the publication performance of the departments in a certain field by simply using theaverages we give in our tables. There are too few departments when we restrict our analysis to the departments of comparable quality within a field. There are large quality differences if we consider all departments within a field. In both cases, the standard deviations of publication performances are high. Therefore, we cannot say how much a typical department in a field differ from the others within a confidence interval.

We cannot say anything against the feeling that the social scientists do not accomplish much. To do this, one should check how hard to write one paper in one field than in the other. The properties of the publication process are important. Our finding about the interfield differences in the capacities of the journals is suggestive. Other properties such as rejection rates would complement our point but would not solve the problem. We may end up with a chicken and egg problem. It is possible that the social scientists do not publish a lot because there is no room in their journals or there is no room in their journals because they do not write good papers.

Our contribution is modest. It is to give a sense of how much the differences can be and how prevalent they are. If an economics department is found to be less productive than a chemistry department then it may be relaxing to know that the problem of interfield differences of large magnitudes is endemic.

We believe that not much can be done within a university about the interfield differences. A field-blind measure should replace the Journal Impact Factors as the standard measure. Otherwise, one should change the publication culture of the whole fields to make them more compatible with each other.

Data Sources

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