The Category Normalized Journal Impact Factor: A More Meaningful Way of Assessing Journal Impact Across Subject Categories

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I propose a modified version of the Journal Impact Factor score that provides a direct assessment of a journal's impact relative to other journals in its subject category. This measure is also normalized in a way that makes comparisons across subject categories possible.

Journal impact factor scores (JIFs) are a way of measuring the impact of different journals on scientific thinking. They are calculated for each journal as

$$\text{JIF}_t = \frac{\text{citations}_t}{\text{citable items}_n}$$

where t is the year that the JIF is being calculated for, citable items$_n$ is the number of articles, research notes, reviews, etc. that a journal published during the n years prior to year t, and citations$_t$ is the number of times that those citable items were cited in year t. The standard JIF reported in the Journal Citation Report (JCR) uses an n of 2, and the 5-year impact factor uses an n of 5. A JIF can be (roughly) interpreted as the average number of times a recent article (research note, etc.) from a particular journal was cited during a given year.

Critics have pointed out a number of problems with JIFs, but they remain in wide use. I think the reason is that they give concrete form to a reality that scholars learn early on and experience on an ongoing basis– journals vary in prestige, and publishing in top-tier journals does far more for your career than publishing in less prestigious outlets. JIFs are not a direct measure of prestige, but the two tend to be highly correlated.

JIF scores (and related measures) fill a useful role for scholars with limited time and attention. Most scholars know the top journals in their field and their areas of research, but are less likely to know the relative merits of journals in other specialty areas or disciplines. This makes it difficult for them to assess the merits of other scholars' works, particularly when those scholars have an interdisciplinary bent (e.g., in hiring). It also can leave researchers at a loss when trying to find an outlet for an article they have written that doesn't quite fit the mold of the journals they are most familiar with.

Unfortunately, JIFs do not immediately provide this information. A score of 1.5, for instance, gives no sense for how much of an impact a journal has relative to others in its field. To determine relative ranking, you must lay the JIFs of all the journals from a given field side-by-side. Online listing of JIFs usually make this fairly straightforward by allowing users to specify a field (e.g., sociology) and displaying journals in the order of JIF scores. However, this approach becomes tedious when publications from many fields must be evaluated.

One attempt to address this problem is the rank-normalized impact factor (rnIF) suggested by Pudovkin and Garfield (2004). The rnIF is defined as:

$$\text{rnIF}_\text{j} = \frac{(\text{K} - \text{R}_\text{j} + 1)}{\text{K}}$$

where R_j is the rank of a journal in its JCR category (e.g., psychology), and K is the number of journals in that category. Scores can range from near 0 to 1, with the top journal receiving a score of 1. A major advantage of the rnIF is that it allows journals to be compared across sub-fields and disciplines. For example, the top Anthropology journal listed in the 2013 JCR is *Journal of Peasant Studies*, with a JIF of 5.477. The top cell biology journal is *Nature Reviews: Molecular Cell Biology*, with a JIF of 36.458. Based on JIF scores alone, it seems that *Nature Reviews* has much more of an impact than *Journal of Peasant Studies*, but this does not capture the fact that the two journals have the same status for scholars in their respective fields – both are top journals. The rnIF score provides this information directly by scoring both as 1.

While the rnIF in many respects is an improvement over the JIF, its reliance on rankings still eliminates useful information. To see this, imagine a sub-discipline that has three journals, with impact factors and rnIF scores as shown in Table 1.

Table 1

Journal Name	Rank	Journal Impact Factor (JIF)	rnIF
Journal A	1	4.5	1.00
Journal B	2	4.4	0.67
Journal C	3	2.0	0.33

If we only had the rnIF scores, we would know immediately that Journal A is at the top of its category. But what about Journal B? What does a score of 0.67 mean? Where does that place it relative to other journals? It is hard to say without knowing how other journals scored, which is exactly the same problem experienced by traditional JIFs. Furthermore, the rnIF might change even if the rank of Journal B does not. For example, imagine that a 4th journal is added to the category with a JIF of 1.0. This shifts the rnIFs as shown in Table 2.

Table 2

Journal Name	Rank	Journal Impact Factor (JIF)	rnIF
Journal A	1	4.5	1.00
Journal B	2	4.4	0.75
Journal C	3	2.0	0.50
Journal D	4	1.0	0.25

Nothing about Journal B changed – it has the same rank, and the same JIF, but its rnIF jumped from 0.67 to 0.75. This suggests that rnIF scores do not have a fixed interpretation.

I propose an alternative score that maintains the desirable properties of the rnIF (i.e., the ability to compare across disciplines and sub-fields), but whose score has a clear interpretation. The score is the category normalized journal impact factor (cnJIF), which is calculated as:

$$\text{cnJIF}_j = \frac{\text{JIF}_j}{\text{JIF}_1}$$

where JIF_1 is the JIF of the top journal in the category of the journal in question, and JIF_j is the JIF of that journal.

Let's return to our example. The Table 3 shows the rankings, JIFs, and rnIF of the four hypothetical journals, as before, but adds cnJIF scores.

Table 3

Journal Name	Rank	Journal Impact Factor (JIF)	rnIF	cnJIF
Journal A	1	4.5	1.00	1.00
Journal B	2	4.4	0.75	0.98
Journal C	3	2.0	0.50	0.44
Journal D	4	1.0	0.25	0.22

The top journal still scores a 1 on the cnJIF, but the scores of all the other journals now reflect *their impact relative to the top journal*. For example, we see that Journal B has an cnJIF of 0.98, which means that its impact is 98% as great as that of the top journal, which Journal C has an cnJIF of 0.44, or 44% of the impact of the top journal. Because the cnJIF only depends on the top journal and the journal being assessed, it does not change as journals are added to or removed from a category, as the rnIF does.

In theory, a journal could have multiple cnJIFs to reflect its position in multiple groups. For example, the journal *Sociological Methods and Research* is both a sociological journal (JCR category: sociology), and a methods journal (JCR category: social sciences, mathematical methods). It's 2013 rnJIFs for each category are:

$cnJIF_{soc} = 0.54$
$cnJIF_{methods} = 0.65$

These scores suggest that *Sociological Methods and Research* has about 54% the impact as the top sociology journal, *American Sociological Review*, and 65% the impact of the top mathematical methods journal in the social sciences, *Econometrica*.

The cnJIF is still not a perfect measure of a journal's impact, but it does provide a more direct and immediately interpretable measure of a journal's position relative to other journals in the same category. In many cases, this is exactly the information that scholars are interested in.

References

Pudovkin, Alexander I., and Eugene Garfield. 2004. "Rank-Normalized Impact Factor: A Way to Compare Journal Performance Across Subject Categories." Pp. 507–15 in *Proceedings of the 67th Annual Meeting of the American Society for Information Science & Technology*.

Appendix: Category Normalized Journal Impact Factor Scores (cnJIFs) for Sociology

Table A gives standard (i.e. 2 year) and 5 year JIF and cnJIF scores for selected journals in JCR's sociology category. Journals are arranged in descending order by 5 year cnJIFs.

Table A: Journal Impact Scores for Sociology Journals

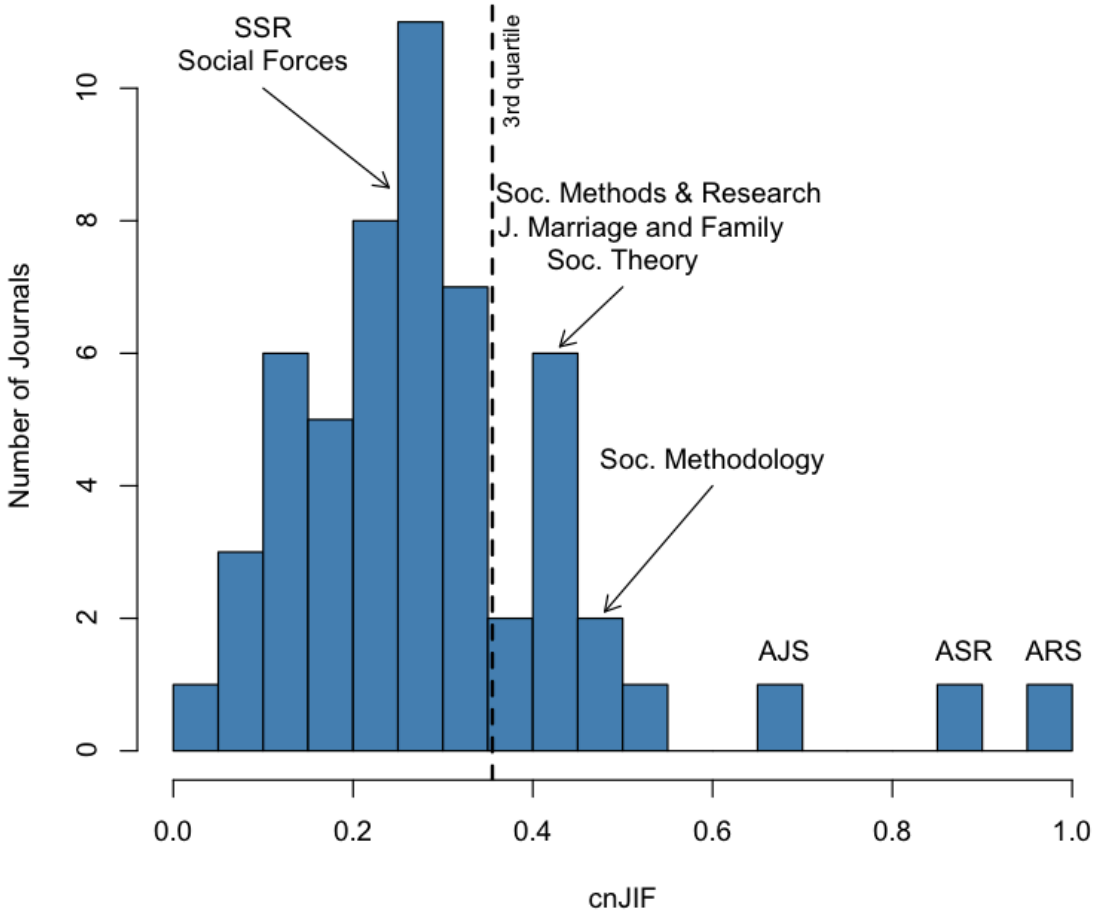
Journal	JIF	5 year JIF	cnJIF	5 year cnJIF
Annual Review of Sociology	3.630	7.047	2.11	1.00
American Sociological Review	4.266	6.097	2.48	0.87
American Journal of Sociology	4.045	4.912	2.36	0.70
Social Networks	2.138	3.851	1.25	0.55
Sociological Methodology	1.500	3.358	0.87	0.48
Annals of Tourism Research	2.795	3.216	1.63	0.46
Sociological Theory	2.586	3.048	1.51	0.43
Journal of Marriage and Family	1.899	3.021	1.11	0.43
European Sociological Review	1.990	2.978	1.16	0.42
Sociology of Education	2.270	2.941	1.32	0.42
Sociological Methods & Research	2.292	2.864	1.33	0.41
Population and Development Review	2.306	2.856	1.34	0.41
Journal of Consumer Culture	1.969	2.653	1.15	0.38
Sociology of Health & Illness	2.014	2.620	1.17	0.37
Economy and Society	1.436	2.402	0.84	0.34
Gender & Society	1.200	2.361	0.70	0.34
Social Problems	1.360	2.355	0.79	0.33
Global Networks	1.255	2.244	0.73	0.32
Politics & Society	1.268	2.189	0.74	0.31
Qualitative Research	1.416	2.171	0.82	0.31
British Journal of Sociology	1.013	2.170	0.59	0.31
Social Science Research	1.515	2.121	0.88	0.30
Social Forces	1.095	2.079	0.64	0.30
Sociology	1.348	2.022	0.79	0.29
Rural Sociology	1.163	2.009	0.68	0.29
Work and Occupations	1.853	1.943	1.08	0.28
Sociologia Ruralis	1.359	1.926	0.79	0.27
Agriculture and Human Values	1.359	1.926	0.79	0.27
Social Indicators Research	1.452	1.877	0.85	0.27
International Political Sociology	1.500	1.848	0.87	0.26
Law & Society Review	1.310	1.825	0.76	0.26
Poetics	1.661	1.818	0.97	0.26
Sociological Quarterly	1.690	1.796	0.98	0.25
Journal for the Scientific Study of Religion	1.153	1.726	0.67	0.24

Social Justice Research	0.905	1.724	0.53	0.24
Sociology of Religion	1.667	1.678	0.97	0.24
Theory and Society	0.980	1.583	0.57	0.22
Annual Review of Law and Social Science	1.357	1.556	0.79	0.22
Ethnic and Racial Studies	0.888	1.499	0.52	0.21
Journal of Sociology	1.455	1.463	0.85	0.21
Social Science Quarterly	0.741	1.390	0.43	0.20
Sociological Forum	0.988	1.309	0.58	0.19
International Sociology	1.000	1.261	0.58	0.18
Act Sociologica	0.977	1.165	0.57	0.17
Cultural Sociology	1.000	1.163	0.58	0.17
Sociological Inquiry	0.558	1.090	0.32	0.15
Current Sociology	1.154	1.009	0.67	0.14
Sociological Perspectives	0.770	1.000	0.45	0.14
Journal of Mathematical Sociology	1.000	0.983	0.58	0.14
Rationality and Society	0.571	0.955	0.33	0.14
Race & Class	0.936	0.759	0.55	0.11
Symbolic Interaction	0.519	0.652	0.30	0.09
Contemporary Sociology	0.737	0.569	0.43	0.08
Review of Religious Research	0.500	0.493	0.29	0.07
Social Compass	0.162	0.281	0.09	0.04
Socio-Economic Review	1.717	---	1.00	---
Information Communication & Society	1.283	---	0.75	---

Note: Bold line located at the 3rd quartile of 5 year cnJIF scores.

Figure A displays the 5 year cnJIFs graphically, with the positions of several well-known journals indicated.

Figure A: Relative 5-year Impact of Sociology Journals (2013)



Note: ARS = Annual Review of Sociology, ASR = American Sociological Review, AJS = American Journal of Sociology, SSR = Social Science Research