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Extending citer analysis to journal impact evaluation

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Abstract The concept of citer analysis investigated earlier by Ajiferuke and Wolfram (In: B. Larsen, J. Leta (eds.) Proceedings of the 12th international conference of the international society for scientometrics and informetrics (ISSI) pp. 798–808, 2009, Scientometrics 83:623–638, 2010) is extended to journals where different citing units (citers, citing articles, citing journals) are compared with the journal impact factor and each other to determine if differences in ranking arise from different measures. The citer measures for the 31 high impact journals studied from information science and library science are significantly correlated, even more so than the earlier citer analysis findings, indicating that there is a close relationship among the different units of measure. Still, notable differences in rankings for the journals examined were evident for the different measures used, especially from either 5-year impact factor or number of citing articles per publication to the number of citing journals per publication. The journals that are adversely affected seem to be those whose citations are concentrated in a few journals. This informed the need to develop a journal citation concentration index, which can serve as a complementary measure to the existing journal impact indices.

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JEL Classification C4 Econometric and statistical methods and methodology · Special topics

Introduction and previous research

Academic journal standing and prestige are determined at least in part by assessment measures based on citations. The most well-known is the journal impact factor (JIF) (Garfield and Sher 1963), which has long served as a benchmark by which the significance of journals has been assessed. The stakes can be high in this assessment exercise. How journals are ranked can have consequences for journal publishers. Libraries with limited budgets may base their purchase decisions in part on the perceived prestige of journals as determined by impact factors. Similarly, authors' decisions on where to submit the outcomes of their research may be based on the standing of a given journal. The journals in which an author publishes, in turn, play a role in how the authors themselves are assessed, in particular for promotion and tenure in academe. Journal impact assessment has increasingly become a controversial topic, with greater research investigation of impact factors, particularly since the mid-1990s (Archambault and Larivière 2009). Measures developed to assess journal impact are argued to be misused (Pendlebury 2009) or have shortcomings. Glänzel and Moed (2002) note that the reproducibility of impact calculations is complicated by the lack of agreement for which citable documents to include in impact calculations. The ongoing debate is recently evident in Vanclay (2012), who calls for a major overhaul of the traditional impact factor based on an analysis of its weaknesses. He illustrates the limitations of the impact factor with explicit examples and provides recommendations for improvement. Specifically mentioned is the asymmetry of the numerator and denominator in Thomson Reuter's IF calculation: all citations are counted in the numerator, but only citable items are counted in the denominator. Table 2 in Vanclay provides an informative summary of the literature on JIF, its strengths and weaknesses. Rousseau (2012) echoes this sentiment by recognizing that improvements are needed, but with no clear solutions at present. In response to Vanclay (2012); Moed et al. (2012) address the value of journal assessment and outline several measures that may serve as complementary to the existing JIF employed by Thomson Reuters in its *Journal Citation Reports*. Other measures for assessing journal impact and quality have been proposed, as outlined by Rousseau (2002). Bollen et al. (2005), for example, outline metrics based on author/reader and frequency/structure dimensions using download counts of journal contents as well as social network metrics to rank journals as alternative measures.

The study of author impact has been equally longstanding, with equal controversy. Citation counts and indices such as the h index (Hirsch 2005) and its variants have been developed to assess and compare the influence of authors. Issues of citer motivation, self-citation, how citations are counted, to name a few, have been perennial issues discussed in citation analysis (MacRoberts and MacRoberts 1989). In previous studies, the present authors have promoted the use of citer-based measures to assess impact because citation counts on their own do not take into account the origin of the citations–aside from self-citations–and do not reflect the reach of an author or a work (Ajiferuke and Wolfram 2009,

2010; Ajiferuke et al. 2010). This idea of counting citers is not new, going back at least to the 1970s (Dieks and Chang 1976), but has not been widely studied or implemented to date. In the more recent citer analysis studies, the authors found that there is a strong correlation between citer and citation-based measures, but that some authors' rankings among their peers could vary widely using citation-based or citer-based measures. Ajiferuke and Wolfram (2009, 2010) observed that the influence of some the issues associated with citation analysis may be reduced. For example, their proposed citer-based h index (ch index) provided a means of assessing author impact or reach by excluding self-citations and recurrent citers (i.e., those who cite the same work multiple times). Franceschini et al. (2010) further explored the ch index concluding that it offered a complementary measure to the h index. Egghe (2012) noted that there is a linear relationship between the proposed citer h index and the more traditional citation-based h index.

Ajiferuke and Wolfram (2009, 2010) found that there were some notable differences in the ranking of authors when comparing citation and citer-based counts. Does the same apply to citer analysis in the context of journals? With journals, there are additional measures at different levels of granularity that could be used to count impact or reach based on the number of citers, citing articles and citing journals. In this study we explore the idea of citer-based measures for the ranking of journals to determine if these measures notably change rankings by relying on a different perspective of the citing process. More specifically, this study asks:

(1) Do citer-based measures of journal impact provide alternative or complementary measures to traditional citation-based approaches such as the JIF?
(2) Does the level of granularity of the citer-based measure (citer/author, article, journal) influence journal ranking outcomes when compared with other measures and, if so, to what extent?

Method

Data were collected from Thomson Reuters Web of Science (WoS). Top journals with impact factors of >0.5 were selected from the subject category Information Science & Library Science from the 2010 Journal Citation Reports (JCR) Social Sciences Edition for this initial exploration. The impact factor of 0.5 was selected to provide a sufficient body of citations. The inclusion of lower impact journals could result in spurious outcomes for other measures. Journals associated with allied subject areas such as Management Information Systems and Medical Informatics were excluded. Thirty-one journals were included in the present study. A list of the journals and abbreviations is provided in Table 9 of Appendix. A focus on journals from a familiar field to the authors provides the opportunity to explore the feasibility and outcomes of this explored area for further study in broader areas.

Searches were conducted in WoS for the publications in these journals between 2007 and 2011. Only three types of documents were kept: articles, reviews and conference proceedings. The other document types were considered less likely to represent research contributions. Using the "Create citation report" function provided by WoS, we obtained the citing articles for each journal on the list. Although the journal sources are limited to the subject area of Information Science & Library Science, citing articles–and citers by extension–may come from any discipline. It should be noted that citing articles from the journal itself were included here as they are still considered as the citations to the journal.

Next, we used the "Analyze results" function on these citing articles to collect the citers for each journal. We relied on WoS to produce the list of citers in the study. The problem of author name disambiguation has been widely discussed in the literature (Smalheiser and Torvik 2009). To determine the impact of the ambiguous author names on our study, we implemented a simple but effective author name disambiguation algorithm proposed by Strotmann et al. (2009) and compared the results with the ones produced by WoS. Only slight differences were found between them, with no more than a few percent difference. Therefore, we decided to stick to the WoS outputs for the citer data. Impact factors and 5 years impact factors of the journals were also collected from JCR 2010 for further analysis.

Comparative analyses were conducted on the collected data using several available and derived measures including: number of publications, number of citing articles, number of citers, number of citing journals, JIF, and 5-year impact factor. Correlation analyses were carried out and differences in rankings based on each measure were tabulated for comparison.

Results

Table 10 in Appendix summarizes the number of publications indexed by WOS over the 5-year period for each journal as well as the citing figures for these journals. The number of:

- publications indexed per journal varies from 61 to 937
- citing articles ranges from 37 to 3,340
- citers varies from 74 to 5,536
- citing journals ranges from 24 to 934

Of note, the maximum values for all these variables are for the journal *JASIST* while *ARIST* has the lowest number of publications, *Online* with the minimum number of citing articles as well as the minimum number citers but *Law Library Journal* has the minimum number of citing journals. The median values for the number of indexed publications, number of citing articles, number of citers, and number of citing journals are 162, 271, 521, and 116 respectively. Given the varying number of publications indexed, the citing values needed to be normalized by the number of publications for a meaningful comparison to be made among the journals. The normalized values along with the impact factor and 5-year impact factor can be found in Table 11 of Appendix. Rankings appearing in the tables below are based on the corresponding values from this Appendix.

We next examined the correlation between the three citing indices and the two popular journal impact indices. The correlation coefficients are shown in Table 1. (Note: Although not strictly a random sample, the data collected by WoS do represent subsets of the overall population.) Looking at the correlation coefficients between any of the citing indices and either of the journal impact indices, we observed that the highest correlation exists between the 5-year impact factor and the number of citing articles per publication; this is not surprising given that the definitions for both are quite similar except that one value was calculated from our data while the other was obtained from JCR. It is also observed that the lowest correlation that exists between each of the journal impact indices and the three citing indices is with the number citing of journals per publication.

Although the correlations are quite high, a comparison of the change in a journal's ranking between the 5-year impact factor and each of the citer-based measures reveals that

Table 1 Spearman correlation coefficients between citing indices and popular journal impact indices

	Impact factor	5-year impact factor	# of citing articles per publication	# of citers per publication	# of citing journals per publication
# of citing articles per publication	0.818 (0.000)*	0.910 (0.000)	–	0.957 (0.000)	0.875 (0.000)
# of citers per publication	0.734 (0.000)	0.860 (0.000)	0.957 (0.000)	–	0.890 (0.000)
# of citing journals per publication	0.652 (0.000)	0.764 (0.000)	0.875 (0.000)	0.890 (0.000)	–

* Significance level in parentheses

there can be sizeable differences between the ranks (Table 2). Three journals experience a difference of more than five places for citing articles per publication, four for number of citers per publication, and twelve for number of citing journals per publication. In the case of the number of citing journals per publication, *Information Research*, *Portal: Libraries and the Academy*, and *Scientometrics* saw the largest drop in their rankings, indicating that the number of citing journals was relatively smaller than for other journals with lower impact factors. Conversely, *Health Library and Information Journal*, *Library Collections Acquisitions & Technical Services* and *Social Science Information* showed the greatest gain, indicating that although they receive relatively fewer citations, they are cited proportionately by a larger number of journals.

We next used the number of citing articles per publication as the usual journal impact index, and then correlated it with the other two citing indices. The correlation between the number of citing articles per publication and the number of citers per publication is very high (see Table 1; Fig. 1), and in fact if we examine the change in journal ranks from one index to another, we noticed that 22 out of the 31 journals (i.e. about 71 %) either did not change position or moved only one place up or down (see Table 3). There were fewer more dramatic changes than observed for the impact factor comparison in Table 2 above. What this means is that for most of these journals neither were there many citers responsible for a lot of the citations nor was the overlap in the authors of the citing articles very limited. The first scenario is observed with *Scientometrics.* As with the number of citing journals per publication, it is one of the two journals with the largest drop in rank (see Table 4) while the second scenario applies to the *Journal of the Medical Library Association* that has the highest rise in rank.

The correlation between the number of citing articles per publication and the number of citing journals per publication is also very high (see Table 1 and Fig. 2), though not as high as for the number of citers per publication. The change in ranks from the number of citing articles per publication to the number of citing journals per publication is also more varied (see Table 5). Here, we have *Social Science Information* moving up 11 places in rank while *College & Research Libraries* moved down 10 places. *Social Science Information* ranked much higher in terms of the number of citing journals because most of the citations received were not concentrated in a few journals while *College & Research Libraries* ranked much lower because about 50 % of its citations came from seven journals (see Table 6).

Large differences in rankings when comparing either 5-year impact factor or citing articles per publication and citing journals per publication seem to be dependent on the

Table 2 Change in journal rank based on 5-year JIF and citer measures

# of citing articles per publication		# of citers per publication		# of citing journals per publication	
Change in rank*	# of Journals	Change in rank	# of journals	Change in rank	# of journals
+5	1	+12	1	+10	3
+4	5	+5	2	+8	1
+3	3	+4	4	+6	2
+2	4	+3	3	+5	2
+1	5	+2	2	+4	2
−1	4	+1	3	+3	2
−2	2	0	3	+2	2
−3	2	−1	3	+1	2
−4	2	−2	2	−2	5
−6	1	−3	4	−3	3
−7	1	−5	1	−5	1
−12	1	−6	1	−6	1
		−12	2	−8	2
				−10	1
				−11	1
				−13	1

* 5-year JIF rank−Citing measure rank

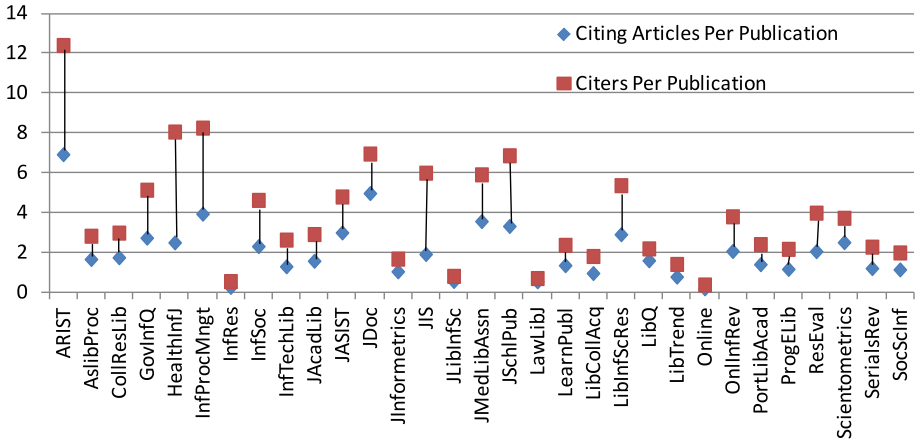

Fig. 1 Comparison of number of citing articles per publication and number of citers per publication

degree to which most citations received by a journal are concentrated in a few number of journals. It thus seems that a journal citation concentration index may be a useful complementary measure to the existing journal impact indices. Journal concentration measures are not new. They have been proposed over time to measure concentration for different contexts or in relation to journal productivity. Pratt (1977), for example, proposed measures for concentration and relative concentration (or dispersion) for items across

Table 3 Change in journal rank between number of citing articles per publication and number of citers per publication

Change*	Number of journals
+8	1
+7	1
+3	1
+2	1
+1	4
0	13
−1	5
−2	1
−3	1
−4	1
−5	2

* Number of citing articles per publication rank−Number of citers per publication Rank

Table 4 Citer concentration for Scientometrics

Number of citer occurrences	Number of citers	Number of citer occurrences	Number of citers
47	1	15	3
42	1	14	2
41	1	13	5
40	1	12	6
32	1	11	6
30	2	10	8
29	1	9	18
28	1	8	21
27	1	7	8
23	1	6	21
21	1	5	42
19	3	4	70
18	2	3	142
17	1	2	430
16	4	1	2513

categories in a general context, which could be applied to journals. Zitt and Bassecoulard (1998) assessed concentration in the specific context of internationality of groups of journals based on authoring and citing countries as a complementary measure to journal impact. They noted that the relationship between journal impact and their internationalization index was moderate. More recently, Ioannidis (2006) examined the concentration of the most highly cited papers in 21 scientific fields, noting that the most highly cited papers are very concentrated in a small number of journals. What we propose for the present study is a simple journal concentration measure based on the number of citing journals and the number of citations received by a given journal.

The Journal Citation Concentration Index (JCCI) for a particular journal over a given time period, may be defined as:

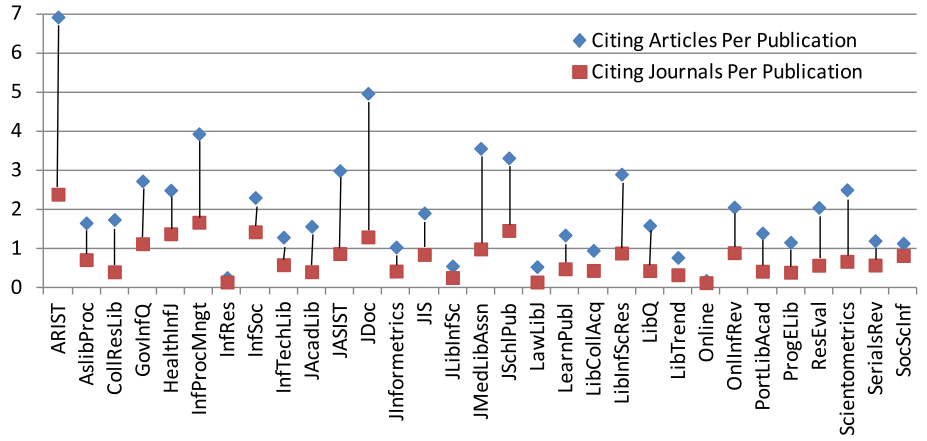

Fig. 2 Comparison of number of citing articles per publication and number of citing journals per publication

Table 5 Change in journal rank between number of citing articles per publication and number of citing journals per publication

Change*	Number of journals
+11	1
+7	1
+6	1
+5	3
+3	2
+2	3
+1	4
0	4
−1	1
−2	0
−3	2
−4	4
−5	2
−6	2
−10	1

* Number of citing articles per publication rank minus Number of citing journals per publication rank

$$\text{JCCI} = 1 - \frac{\#\text{ of unique citing journals}}{\#\text{ of citations received by the journal}} \quad (1)$$

where $0 <= \text{JCCI} < 1$ with values towards zero indicating little or no concentration while values towards 1 indicate a high degree of concentration. Note that the number of citations received by a journal must be greater than zero. Using the above formula and values in Table 11 of Appendix, the JCCI values obtained for the 31 journals are shown in Table 7 for the time period studied. From these values, we could see that the top three most concentrated journals are *College & Research Libraries*, *Journal of Documentation*, and *Journal of Academic Librarianship*. On the other hand, the least concentrated journals are

Table 6 Citing journal concentration for College and Research Libraries

Number of citing journal occurrences	Number of citing journals
38	1
31	1
20	1
16	1
15	1
11	1
9	1
8	1
6	4
5	2
4	8
3	4
2	7
1	31

Social Science Information, *Online*, and *Information Society*. The distribution of JCCI is found to be slightly skewed; hence we obtained the Spearman's rank correlation coefficient between it and each of the journal impact indices and citer-based measures. The coefficients shown in Table 8 indicate that JCCI exhibits moderate correlation with either JIF, 5-year JIF or number of citing articles per publication but little or no correlation with either number of citers per publication or number of citing journals per publication. A scatter plot of 5-year JIF and JCCI values for the journals appears in Fig. 3. Observe that the five journals with the highest 5-year JIF values also have relatively high JCCI values, indicating a higher concentration of citing journals.

Discussion

Our findings show that the two commonly used journal impact indices exhibit high correlations with the citer-based measures for journals, though the lowest correlations are with the number of journals per publication. However, unlike the citer analysis measures for authors discussed earlier where a few non-significant correlations were found between selected measures, citer-based measures for journals are even more highly correlated, whether examined at level of citer, article or journal level. Despite the high correlations, notable differences in the ranking of journals can be found for citer-based measures. The observed large differences in ranks between the 5-year JIF and number of citing journals per publication demonstrate that some journals may attract a more modest number of citations than other journals, but those citations represent a broader array of journals. The range of 5-year impact factor values for those journals with large ranking differences between the impact factor and citing journals per publication indicates that these differences for specific journals are not tied to whether a journal is highly cited or not. The number of citing journals per publication, surely, also represents a measure of the reach of a cited journal that may not be evident in the number of citers alone or other singular

Table 7 Journal citation concentration index values

Journal	JCCI
ARIST	0.654
AslibProc	0.565
CollResLib	0.764
GovInfQ	0.587
HealthInfJ	0.446
InfProcMngt	0.574
InfRes	0.427
InfSoc	0.379
InfTechLib	0.542
JAcadLib	0.737
JASIST	0.707
JDoc	0.738
JInformetrics	0.587
JIS	0.553
JLibInfSc	0.525
JMedLibAss	0.720
JSchlPub	0.558
LawLibJ	0.721
LearnPubl	0.638
LibCollAcq	0.534
LibInfScRes	0.693
LibQ	0.723
LibTrend	0.567
Online	0.297
OnlInfRev	0.564
PortLibAcad	0.695
ProgELib	0.656
ResEval	0.718
Scientometrics	0.729
SerialsRev	0.516
SocScInf	0.275

Table 8 Spearman's rank correlation between JCCI and the other measures

Measure	Correlation coefficient
Impact factor	0.468 (0.008)*
5-year impact factor	0.366 (0.043)
# of citing articles per publication	0.376 (0.037)
# of citers per publication	0.244 (0.186)
# of citing journals per publication	−0.053 (0.778)

* Significance level in parentheses

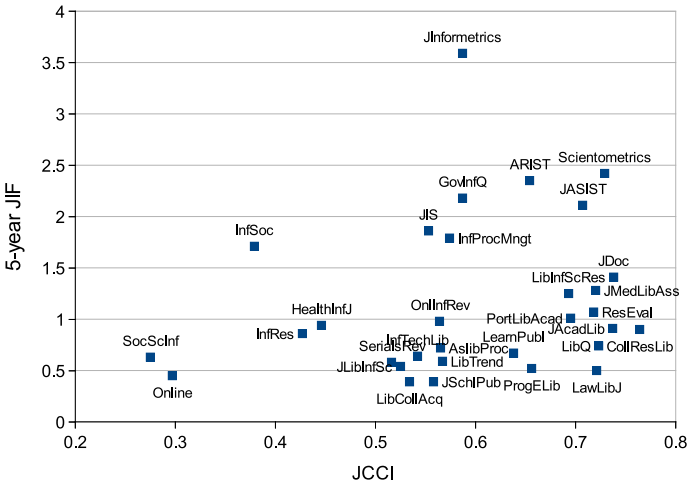

Fig. 3 Scatter plot of 5-year JIF and JCCI values

measure of impact. Just as citer tallies take into account the origin of the citations and do not provide additional credit for repeated citations by the same individual (Ajiferuke et al. 2011), examining citer patterns at the journal level can provide a higher level and less granular indication of the reach of a journal. The purpose of the current research was not to compare the citer outcomes with these newer measures–because they assess journals in different ways–but to look at how a different perspective on traditional citations may provide additional insights into journal impact or reach.

The proposed JCCI measure presents another avenue for assessing journal impact. Given its low correlation with the journal impact indices, the JCCI serves as a complementary measure to the journal impact indices. The observation for the studied journals that some may have low or high impact, as assessed by traditional measures such as JIF, and have a low or high JCCI value allows us to categorize journals in a two by two matrix of low/high JIF and low/high JCCI values.

1. Journals with low JIF and low JCCI values have weak influence but relatively broad reach
2. Journals with low JIF and high JCCI values have weak influence and limited reach
3. Journals with high JIF and low JCCI values have strong influence and broad reach
4. Journals with high JIF and high JCCI values have strong influence but limited reach

Journals in category 3 provide the greatest impact, whereas those in category 2 provide the least impact. While it is relatively easy to choose a cut off point for the JCCI (for example, <0.4 representing low concentration), it is more difficult to do so for the JIF because it has no upper bound; the cut off point between low and high JIF values will be discipline dependent.

The assessment of journal impact or reach is a multi-dimensional concept with relative points of view for assessment. This is demonstrated by other measures gaining popularity for journal assessment such as the Eigenfactor (Bergstrom et al. 2008) or SJR indicator (Gonzalez-Pereira et al. 2010). One limitation of the present study arises from the focus on a single discipline. As an exploratory study, it's natural to focus on a subject area of

expertise. Results for library and information science would indicate that there is not much difference between citer-based and more traditional journal assessment measures, and therefore may not be worth further study. Data could also be collected for other disciplines where levels of co-authorship may vary and, which could then influence individual citer outcomes but may not influence the number of citing articles or citing journals. Differences in the levels of co-authorship by the citing articles can influence journal ranks. If a given journal attracts citations from disciplines where high levels of collaboration take place than another journal with possibly more citations but lower levels of co-authorship, the former journal may receive a more advantageous rank based on citers. A previous study on citer-based author impact for multiple disciplines suggested that fields with higher levels of co-authorship, such as life sciences and space sciences, have a greater number of citers than fields with lower levels of co-authorship, such as social sciences and mathematics (Ajiferuke et al. 2010). However, this would not be the case for citing journals, which are not influenced by co-authorship.

Also, the observed relationships among the different citation and citer assessment measures may change over time. This study examined a recent snapshot of publications. With the growth in the number of journals and researchers contributing to those journals, the currently observed differences based on citers and journals may only grow, much in the same way that JIFs continue to rise over time (Althouse et al. 2008). The exploration of the JCCI offers a more promising avenue for investigation.

Conclusion

The ongoing debates over journal impact measures will undoubtedly continue. The present study has investigated a potential complementary method for comparing journal impact based on citer analysis. The stakes for recognition can be high from an academic perspective, where editors vie to attract the best research to increase the impact of their journals, and authors compete to be published in the most prestigious journals in their fields. Citer-based measures for journals may not offer substantial differences than more traditional citation-based measures, but they can provide complementary assessment outcomes or confirmatory measures that strengthen the journal assessment process. In particular, we recommend the combined use of the 5-year JIF and the proposed JCCI. The moderate correlations observed between the JCCI and other citer and citation-based measures warrant further investigation with a broader range of journals and across disciplines. Also, in Ajiferuke and Wolfram (2009, 2010), a citer-based complement to the h index was developed; an author's ch-index of value x corresponds to x publications with at least x citers. In the same vein, we could obtain an h index based on the citing journals. In this study, a journal's cjh index (i.e. citing journal h index) of value y would correspond to y publications with at least y citing journals. To obtain this index for each journal, the number of citing journals for each of the cited journal's publications would need to be collected, with the number of citing journals ranked in decreasing order. A future study could be conducted that examines how the proposed cjh index correlates with the JCCI.

Acknowledgments This study represents an expanded version of a paper presented at the 14th International Society for Scientometrics and Informetrics Conference held in Vienna in July 2013.

Appendix

See Tables 9, 10, and 11.

Table 9 List of journals studied

Journal abbreviation	Journal name
ARIST	Annual Review of Information Science and Technology (ARIST)
AslibProc	Aslib Proceedings
CollResLib	College and research libraries
GovInfQ	Government information quarterly
HealthInfJ	Health library and information journal
InfProcMngt	Information processing and management
InfRes	Information research
InfSoc	Information society
InfTechLib	Information technology and libraries
JAcadLib	Journal of academic librarianship
JASIST	Journal of the American society for information science and technology (JASIST)
JDoc	Journal of documentation
JInformetrics	Journal of informetrics
JIS	Journal of information science
JLibInfSc	Journal of library and information science
JMedLibAssn	Journal of the medical library association
JSchlPub	Journal of scholarly publishing
LawLibJ	Law library journal
LearnPubl	Learned publishing
LibCollAcq	Library collections acquisitions and technical services
LibInfScRes	Library and information science research
LibQ	Library quarterly
LibTrend	Library trends
Online	Online
OnlInfRev	Online information review
PortLibAcad	Portal: libraries and the academy
ProgELib	Program-electronic library and information systems
ResEval	Research evaluation
Scientometrics	Scientometrics
SerialsRev	Serials review
SocScInf	Social science information

Table 10 Journal citing indices

Journal	# of publications	# of citing articles	# of citers	# of citing journals
ARIST	61	422	756	146
AslibProc	184	306	521	133
CollResLib	155	271	463	64
GovInfQ	247	675	1269	279
HealthInfJ	183	457	1474	253
InfProcMngt	394	1551	3251	661
InfRes	282	75	157	43
InfSoc	113	261	523	162
InfTechLib	91	118	240	54
JAcadLib	294	463	857	122
JASIST	937	3340	5536	934
JDoc	213	638	1022	187
JInformetrics	224	1113	1557	292
JIS	250	830	1716	367
JLibInfSc	88	92	148	38
JMedLibAss	236	452	1414	202
JSchlPub	105	59	86	28
LawLibJ	158	86	112	24
LearnPubl	139	188	330	68
LibCollAcq	76	73	138	34
LibInfScRes	148	430	794	132
LibQ	97	155	213	43
LibTrend	228	178	323	77
Online	192	37	74	26
OnlInfRev	260	537	989	234
PortLibAcad	124	174	299	53
ProgELib	132	154	287	53
ResEval	162	333	646	94
Scientometrics	889	2229	3317	605
SerialsRev	106	128	242	62
SocScInf	140	160	279	116

Table 11 Impact factor, 5-year impact factor, and normalized citing values

Journal	Impact factor		5-year impact factor		# of citing articles per publication		# of citers per publication		# of citing journals per publication	
	Num.	Rank	Num.	Rank	Num.	Rank	Num.	Rank	Num.	Rank
ARIST	2.00	3	2.35	3	6.92	1	12.39	1	2.39	1
AslibProc	0.60	25	0.72	20	1.66	16	2.83	17	0.72	14
CollResLib	0.68	21	0.90	17	1.75	15	2.99	15	0.41	25
GovInfQ	1.88	5	2.18	4	2.73	8	5.14	9	1.13	7

Table 11 continued

Journal	Impact factor		5-year impact factor		# of citing articles per publication		# of citers per publication		# of citing journals per publication	
	Num.	Rank	Num.	Rank	Num.	Rank	Num.	Rank	Num.	Rank
HealthInfJ	0.76	19	0.94	15	2.50	10	8.05	3	1.38	5
InfProcMngt	1.67	6	1.79	7	3.94	3	8.25	2	1.68	2
InfRes	0.82	18	0.86	18	0.27	30	0.56	30	0.15	29
InfSoc	1.24	10	1.71	8	2.31	11	4.63	11	1.43	4
InfTechLib	0.53	29	0.64	22	1.30	21	2.64	18	0.59	16
JAcadLib	0.87	15	0.91	16	1.57	18	2.91	16	0.41	24
JASIST	2.14	2	2.11	5	3.56	4	5.91	7	1.00	8
JDoc	1.45	7	1.41	9	3.00	6	4.80	10	0.88	11
JInformetrics	3.12	1	3.59	1	4.97	2	6.95	4	1.30	6
JIS	1.41	8	1.86	6	3.32	5	6.86	5	1.47	3
JLibInfSc	0.64	24	0.54	26	1.05	25	1.68	26	0.43	22
JMedLibAss	0.84	17	1.28	10	1.92	14	5.99	6	0.86	12
JSchlPub	0.52	31	0.39	31	0.56	28	0.82	28	0.27	28
LawLibJ	0.90	14	0.50	28	0.54	29	0.71	29	0.15	30
LearnPubl	1.04	11	0.67	21	1.35	20	2.37	20	0.49	19
LibCollAcq	0.53	28	0.39	30	0.96	26	1.82	25	0.45	20
LibInfScRes	1.36	9	1.25	11	2.91	7	5.36	8	0.89	10
LibQ	0.65	23	0.74	19	1.60	17	2.20	22	0.44	21
LibTrend	0.67	22	0.59	24	0.78	27	1.42	27	0.34	27
Online	0.52	30	0.45	29	0.19	31	0.39	31	0.14	31
OnlInfRev	0.99	12	0.98	14	2.07	12	3.80	13	0.90	9
PortLibAcad	0.87	16	1.01	13	1.40	19	2.41	19	0.43	23
ProgELib	0.60	26	0.52	27	1.17	23	2.17	23	0.40	26
ResEval	0.94	13	1.07	12	2.06	13	3.99	12	0.58	18
Scientometrics	1.91	4	2.42	2	2.51	9	3.73	14	0.68	15
SerialsRev	0.71	20	0.58	25	1.21	22	2.28	21	0.58	17
SocScInf	0.55	27	0.63	23	1.14	24	1.99	24	0.83	13

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