Grading Journals in Economics: The ABCs of the ABDC

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Abstract:

The Australian Business Deans Council (ABDC) have graded journals in the fields of Economics and Statistics to evaluate the quality of research. This paper examines the consistency of these grades with 44 bibliometric indicators of journal quality and measures of interrater agreement.

First, we categorise the bibliometrics employing a unique cluster analysis based on an interrater agreement statistic. Then, we determine which journals have been assigned ABDC grades that do not reflect the rank of the bibliometrics. These cases provide an indication of the extent to which the ABDC journal grades are determined by non-bibliometric factors.

Key words: Hirsch index, citation count, impact factor, downloads, Euclidian citation score, Altmetrics, interrater agreement statistics, cluster analysis, heatmaps.

JEL Codes: C49, O30, Y10

1. Introduction

The Australian Business Dean's Council (ABDC) has graded over 760 journals in the Field of Research categories of Statistics, Economics Theory, Applied Economics, Econometrics and Other Economics.[1] These journals have been graded to classify the research conducted by the academic members of their institutions. Each journal is given a grade according to a four-interval scale defined as: A*, A, B, and C. These scales have been proposed to be used to evaluate research within the institution and across institutions and have gone through a series of public discussions as documented at the ABDC web-site.

The genesis of this list is the now defunct Excellence in Research for Australia (ERA) rankings list that was discontinued in 2010 due to "…*feedback from Research Evaluation Committees that they relied on their own expert knowledge of the quality of research outlets relevant to their discipline* …" rather than using a ranking list.[2] Other criticisms of this list was the uneven nature of the grading across disciplines and the lack of a direct relationship between these grades and bibliometric indicators.

The purpose of this paper is to examine the grades to journals assigned by the ABDC by comparing them to the rankings implied by a series of bibliometrics designed for the comparison of journals based on citations, abstract views and downloads. The bibliometrics we use have been generated by several different organisations and they include the Scopus CiteScore metrics[3], the SCImagojr Journal ranks[4] that are available for a general set of scientific journals, the Clarivate Analytics' InCites metrics[5], the IDEAS/RePEc citation indices[6], the LogEc access measures[7] that are mainly collected for scientific publications in the field of economics and related areas and the emerging set of Altmetrics[8] based on measures of interest as measured by activity on the internet.

This paper proceeds as follows: First, we provide a background for the ABDC list and the bibliometric measures we use. Second, we detail the methodology we employ to evaluate the ABDC categorisation as it compares with various measures for journal rankings formalising the analysis employed by Zainuba and Rahal (2015) (henceforth referred to as ZR) as a measure of interrater agreement. We then compute this measure for a sample of journals for which we can match the ABDC rankings to 44 journal metrics. Then we consider the interrater agreement of these measures with each other. We also consider an alternative ranking proposed by the UK Chartered Association of Business School's *Academic Journal Quality Guide* (AJG)[9] to establish how the ABDC compares to this ranking. Finally, we demonstrate the consistency of the ABDC with the various

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[1] This list can be found at http://www.abdc.edu.au/master-journal-list.php . The Fields of Research (FoR) are defined by the Australian Bureau of Statistics in 1297.0 - Australian and New Zealand Standard Research Classification (ANZSRC), 2008 .

[2] From the Australian Research Council website on 30/07/2018 : http://www.arc.gov.au/excellence-research-australia

[3] Scopus CiteScore data and details can be downloaded at https://journalmetrics.scopus.com/ .

[4] The SCImagojr data and details can be found at http://www.scimagojr.com/journalrank.php .

[5] The InCites data can be found at https://clarivate.com/products/incites/.

[6] The IDEAS/RePEc rankings and details can be found at https://ideas.repec.org/top/top.journals.all.html .

[7] The LogEc data and details can be found from at: https://logec.repec.org/about.htm .

[8] The Altmetrics are available from https://www.altmetric.com/ .

[9] This list can be located at: https://charteredabs.org/academic-journal-guide-2018/

metrics that have been proposed and list those journals for which there exists the greatest evidence of over classification and under classification by the ABDC ranking.

2. The ABDC list and other Journal Quality Metrics.

2.1 The ABDC list

The Australian Business Deans Council represents 39 Australian university business faculties and schools. The ABDC publishes a ranking list of journals in most of the fields under which research is performed in these institutions. This list has been based on the grading of journals that was created under the Excellence in Research Australia (ERA) project conducted by the Australian Government's Australian Research Council.[10] Although this list was widely used when it was created it has since been removed from public web-sites with the explanation that there was: "*.. feedback from Research Evaluation Committees that they relied on their own expert knowledge of the quality of research outlets relevant to their discipline ..* "[11] rather than the reliance on lists. Moosa (2011) examined the ARC gradings in the fields of accounting and finance journals and concluded that when re-grading these journals by citation indices he found many miscategorized journals.

	Field of Research (FoR code)					
ABDC grade	***Statistics (0104)***	***Economic Theory (1401***	***Applied Economics (1402)***	***Econometrics (1403)***	***Other Economics (1499)***	***Total***
C	**24***	**8**	**221**	**14**	**75**	**342**
	3.16**	1.05	29.08	1.84	9.87	45.00
	7.02†	2.34	64.62	4.09	21.93	100.00
	28.57‡	26.67	43.76	41.18	70.09	
B	**26**	**9**	**166**	**6**	**27**	**234**
	3.42	1.18	21.84	0.79	3.55	30.79
	11.11	3.85	70.94	2.56	11.54	100.00
	30.95	30.00	32.87	17.65	25.23	
A	**23**	**9**	**82**	**8**	**5**	**127**
	3.03	1.18	10.79	1.05	0.66	16.71
	18.11	7.09	64.57	6.3	3.94	100.00
	27.38	30.00	16.24	23.53	4.67	
A*	**11**	**4**	**36**	**6**	**0**	**57**
	1.45	0.53	4.74	0.79	0.00	7.50
	19.30	7.02	63.16	10.53	0.00	100.00
	13.10	13.33	7.13	17.65	0.00	
Total	**84**	**30**	**505**	**34**	**107**	**760**
	11.05	3.95	66.45	4.47	14.08	100.00
	100.00	100.00	100.00	100.00	100.00	

* Number in cell, ** % in cell, † % with the same ABDC grade, ‡ % in the same FoR.

Table 2.1, The distribution of journals by their ABDC grades and Field of Research.

[10] This can be found at: https://www.righttoknow.org.au/request/616/response/2048/attach/html/3/2010%20Final%20Journal%20List%20100310%20FOR%20WEBSITE.xls.html

[11] See the Australian Research Council website on 30/07/2018 : http://www.arc.gov.au/excellence-research-australia

The current ABDC list categorises 760 journals in the Australian and New Zealand Standard Research Classification Field of Research (FoR)[12] classifications of: Statistics, Economic Theory, Applied Econometrics and Other Economics. Table 2.1 lists the distribution of the 760 journals by letter designation and FoR. Note that categorisation by letters C, B, A and A* is 45.00%, 30.79%, 16.71% and 7.50% respectively. Also note, that the FoRs Statistics, Economic Theory, Applied Econometrics and Other Economics, are represented by 11.05%, 3.95%, 66.45%, 4.47% and 14.08%. From Table 2.1 it can be noted that the proportion of the highest grade (A*) is 7.5% for all the journals considered here. However, the "Econometrics" group of journals is listed with 6 of the 34 journals (17.65%) classified as an A* journal, while of the 107 journals in the "Other Economics" FoR none earn an A* rating. Many of the "Other Economics" journals in this category are new, highly specialised or local journals that are not edited in the US or major European country. This table also indicates that approximately 2/3 of the journals graded are in the "Applied Economics" field of research.

To determine the degree to which these grades are consistent with the bibliometrics for these journals that have been proposed we match the list of ABDC graded journals to the corresponding bibliometrics collected from several sources. The next section describes the statistics collected from these ranking lists. In the remainder of this section we describe the sources and the nature of the measures available. The span of possible bibliometrics is quite wide and has spawned a number of studies in this area as reviewed by Waltman (2016).

2.2 The Bibliometrics collected.

The bibliometric measures we use have been generated by several different organisations and include:

- The Scopus CiteScore metrics[13]
- The SCImagojr Journal ranks[14]
- The IDEAS/RePEc citation indices[15]
- The LogEc access measures[16]
- The Web of Science InCites Journal Access Metrics[17]
- The Altmetrics [18]

2.2.1 Scopus CiteScore Measures.

The Scopus ranking statistics are provided under subscription by Elsevier. The primary journal specific metric generated by Scopus is the CiteScore which measures the average number of citations that are recorded for all the papers published in the journals during the previous 3 years. The CiteScore data for 22,366

[12] These can be found at: http://www.abs.gov.au/ausstats/abs@.nsf/0/6BB427AB9696C225CA2574180004463E
[13] Scopus CiteScore data and details can be downloaded at https://journalmetrics.scopus.com/ .
[14] The SCImagojr data and details can be found at http://www.scimagojr.com/journalrank.php .
[15] The IDEAS/RePEc rankings and details can be found at https://ideas.repec.org/top/top.journals.all.html .
[16] The LogEc data and details can be found from at: https://logec.repec.org/about.htm .
[17] InCites data can be found at https://clarivate.com/products/incites/
[18] The Altmetrics are available from https://www.altmetric.com/

titles[19] used here was accessed on April 30, 2018 based on data from May 31, 2017. In addition to the CiteScore that indicates the average number of cites per paper we also recorded the CiteScore Percentage that measures the relative CiteScore for the journal within its field, the total number of cites, the percent of the papers cited at least once, the Source Normalized Impact per Paper (SNIP) which indicates the number of citations received relative to citations expected in the journal's subject field, SCImago Journal Rank (SJR) measures weighted citations received by the journal where the citation weighting depends on the subject field and prestige (the SJR) of the citing journal[20] and the total number of papers published in 2013 to 2015.

To match the Scopus data to the ABDC list we used the titles of the journals and the ISSN numbers for both the electronic and paper versions of the journals. To facilitate the matching of the titles we removed the case and special characters from the titles. In addition, once the matching was done we checked the matching by comparing all non-matched records for both sets using a generalised distance function based on the Levenshtein (1966) edit distance to measure the differences between two strings.[21] This distance measure attempts to make the second string from the first by using each character from the first and computes the distance based on a weighting of the number of moves needed. In this case we listed the titles of the closest of the non-matched titles to determine if there was any similarity between the two sets. When a similar title was found we modified the titles compared to make the match. In this way we matched 510 of the 760 on the ABDC list. Of the 250 that were not matched over 80% were classified as C journals, 18% as B journals and only 2 A journals. None of the A* journals were not matched to the Scopus list.

2.2.2 The SCImago Journal Ranking Metrics

The SCImago journal ranking metrics are based on data taken from the Scopus data. It is a research group based at the Consejo Superior de Investigaciones Científicas (CSIC), University of Granada, Extremadura, Carlos III (Madrid), Spain. They have developed a number of journal ranking metrics that are also included in the Scopus CiteScore data series discussed above with coverage that matches most but not all the same journals.[22] The metrics obtained from the SCImago data include: the total number of papers in journal in 2016 and from 2013 to 2015, the number of citable papers from 2013 to 2015, the Hirsch index(2005)[23], the SCImago journal rank (SJR)[24], cites per paper in last 2 years, total cites in last 3 years, SJR rank over all journals, and the total number of references.

The coverage of the journals for the SCImago data is 509 of the ABDC journals covered.[25] The majority of the journals that are not matched are C's (with 274 non-matches) B's (with 71 non-matches) and

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[19] Note that a number of journals were listed more than once in the original list of 49,146 due to being classified in multiple categories.

[20] The details of the SJR metric are listed in Section 2.2 that describes the SCImago Journal ranking metrics.

[21] These comparisons were made using the *compged* function in SAS.

[22] SCImago. (2007). SJR — SCImago Journal & Country Rank. Retrieved July 21, 2015, from http://www.scimagojr.com

[23] The Hirsch index is the rank (when ordered by number of citations) of the article(s) in a journal with at least as many citations.

[24] The description of the construction of the SJR metric can be found

[25] There are 28 journals that do not match between the Scopus and SCImago data series.

A's (with 5 non-matches) with all the A* journals matched. The same procedure for matching the series was employed as was used for the Scopus data.

2.2.3 The InCites Journal Access Metrics

The InCites journal citation reports are produced by Clarivate Analytics as part of their Web of Science products. The metrics available in this data are like those in the Scopus and SCImago series with the addition of the Eigenfactor score, the separation of self-cites from all cites, the immediacy index, and the article influence score. The Eigenfactor score was first proposed by Bergstrom (2007). It involves an iterative ranking method by which the citations in more influential journals are weighted higher. The article influence score is based on a weighted value of the Eigenfactor score where the number of articles in the journal is used as the weight. The immediacy index is based on the number of citations to the articles in the journal in the year it is published indicating how quickly the journal's articles are cited. By self-cites the InCites data is referring to citations to articles in the same journal. The coverage of the ABDC list journals in the InCites list is the lowest of the metrics we consider here with only 364 journals. However, the majority of these are of the highest three categories.

2.2.4 The RePEc Journal Ranking Metrics

Research Papers in Economics (RePEc) has been an on-line bibliographic service for academic economists since 1997. Traditionally this web-site and the related products have been a repository for working papers and software. It provides a web-page for academics in the field of economics to list their work including working papers, published papers and software. This process is done automatically, and each registrant is provided with monthly updates as to the number of cites, downloads and abstract reads of their work. The details of the RePEc and the related sites are described in detail in Zimmermann (2013). In this study we have downloaded a series of citation measures that are available via the CitEc site that are like those provided by Scopus and SCImago with a more extensive coverage of smaller journals in economics, but less coverage of statistics journals.

The measures we have obtained from CitEc include: Hirsch index (see Hirsch 2005), the Euclidian index (see Perry and Reny 2016), simple impact factor, discounted impact factor, recursive impact factor, the discounted recursive impact factor, and the number of articles. The simple impact factor is the number of citations (after removal of self cites to the same journal) divided by the number of articles. The discounted impact factor uses weights for each citation that is proportional to the inverse of how long ago the cite was made. One interpretation of the recursive impact factor for a journal is that it provides a measure of the probability that the random selection of references in all articles would result in a search ending at the journal. The recursive discounted impact factor combines the recursive process with the discounted impacts. The details of the definitions of these different metrics are given in Zimmermann (2013). The Euclidean index was proposed by Perry and Reny (2016) which they found to be superior to the Hirsch index in the prediction of the

strength of a selection of economics departments in Macroeconomics. This measure is computed as the square-root of the sum of the squares of the number of cites each article received.

Although, the RePEc data coverage for economics journals is wider than the for the SCImago and Scopus economics journals it does not include many specialized statistics journals and thus we can only match 478 journals of the 760 ABDC ranked journals using the RePEc citation data.

2.2.5 The LogEc Journal Access Metrics

In a difference from the other journal metrics, the RePEc site also collects data on article text downloads as well as abstract views from its site and reports them on LogEc.[26] Originally, these statistics were mainly available for determining the visibility of working papers and could be accessed for individual researchers. However, they are also available by journal on the related LogEc site that collects statistics for all items listed in RePEc and accessed through that site. In this analysis we accessed the abstract views and article downloads for the years 2014, 2015 and 2016 for all the journals on the RePEc list. Unlike the citation data which is based on the years the articles were published, these data are defined by when the download or abstract view occurred. Consequently, these observations may be influenced by the downloads and abstract views of articles that were published years ago. To scale these observations by the number of articles in these journals we divided the abstract views and downloads by the reported number of items listed in the RePEc data to obtain ratios of downloads and abstract views. These measures are more in the spirit of internet related measures that are based on the non-paper access and not the older technology citation statistics. In addition, we also constructed a new measure defined as the number of downloads per abstract view as a potential quality measure to establish the degree to which visitors to the site would go to the extent of reading the entire paper. The coverage of the LogEc data is a bit wider than the RePEc data. This meant that we could match 542 journals for the number of abstract views and downloads. However, due to cases where the number of abstract views was zero we lost 11 observations. Since 2008 the LogEc statistics have indicated a downturn across all journals due to the shift in the use of Google instead of RePEc to download and review abstracts, thus these statistics may be biased by the nature of the access used.[27]

2.2.6 The Altmetrics

"Altmetrics is the study and use of scholarly impact measures based on activity in online tools and environments". (Priem 2014). These are measures based on the access and reference to articles that appear in journals in areas that are less formal than citations in other scholarly journals in such web-based locations such as blogs, Wikipedia entries, news sites and specialized scientific websites. These alternative references appear in what may be described as research "products" as differentiated from research publications. The shift to consideration of the inclusion of products in US grant applications was referred to in a comment in *Nature*

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[26] See the LogEc web site at: https://logec.repec.org/, the journal metrics can be found at: https://logec.repec.org/scripts/seriesstat.pf

[27] This observation was made in a private communication with Professor Sune Karlsson the maintainer of the LogEc web-site.

(Piwowar 2013). The study of social media and its ability to disseminate information has been compared to traditional bibliometrics by a number of authors (see Costas et al (2015), Bornmann (2014), Haustein et al (2014), and Zahedi et al (2014)). These studies have investigated the correlations between these measures and the traditional measures available from the other sources discussed above based on article and researcher specific measures as well as acceptance of these sources in scientific research. They have not considered the journals we include in this analysis nor do they consider the full set of other bibliometrics as described above.

These measures are closest in nature to the LogEc measures of abstract views and downloads since they are not limited to output produced during a specified period – the limiting factor is when the output was mentioned. Here we limit the counts to those that have been measured during the 3-year period from January 1, 2015 to December 31, 2017. They provide count references in locations that are not traditionally associated with scientific research such as blogs, Wikipedia and social networks. Although the Altmetrics site includes 19 metrics we have chosen 7 that have the greatest number of non-zero values for the ABDC listed journals over this time. The bibliometric with the greatest coverage is defined as the "Total mentions" of those items counted by the "Number of mentioned outputs" metric. The seven web indicators we include are the number of: Blog mentions, Wikipedia mentions, Facebook mentions, Policy mentions, Twitter mentions, mentioned outputs, and all mentions. In addition, we added an eighth metric as the ratio of all mentions to the number of outputs mentioned. Note that the Altmetrics match 573 of the ABDC listed journals which is more than any of the other metrics from our traditional sources.

3. The Journal Metrics.

In this section we present a description of the journal metrics we apply. We also discuss the relationship between these metrics and the ABDC grades based on interrater agreement statistics. Then we examine the interrelationship between these metrics using the same metric and assess the potential grouping of these metrics using a hierarchical clustering algorithm.

3.1 A description of the Bibliometrics

Table 3.1 provides the descriptive statistics for the metrics used in this analysis. This table also lists the variable names and source series for each of the metrics. To insure that higher values of each metric are considered an indication of greater quality we have constructed inverse ranks such as *i_rnk_area*.

Most of these metrics are all significantly positively correlated with each other (using both Pearson and Spearman rank measures). Figure 3.1 displays the scatter plot of the Spearman rank and Pearson correlation coefficients with boxplots of the distribution of the correlations on the axes. The difference between the Spearman and Pearson correlations indicates that these measures tend to be skewed. Most of the correlations between these metrics are sufficiently large enough to reject the null that they are equal to zero. The main exception is the ratio of downloads to abstract views (*D_p_AV*) which is uncorrelated with most of the other metrics. We examine the interrelationship between these metrics using their ranks in Section 3.3 below.

Variable mnemonic	Source*	Label	N	Mean	Sd	Min	Max
h_index	R	Hirsch-index	478	12.43	12.62	0	100.00
e_c_score	R	Euclidian citation score	478	152.22	257.64	0	2528.79
s_impact	R	Simple impact factor	478	3.33	5.82	0	55.67
d_impact	R	Discounted impact factor	478	0.88	1.57	0	15.63
dr_impact	R	Discounted recursive impact factor	478	0.33	0.90	0	10.91
r_impact	R	Recursive impact factor	478	0.35	0.93	0	10.76
Number	R	Number of items listed	478	408.28	469.92	1	3840
absv_item	R&L	Abstract Views / Item	478	117.75	163.76	0	1831.67
dl_item	R&L	File downloads / Item	478	25.37	38.17	0	488.50
sjr_cscore	C	SCImago Journal Rank Index	510	1.20	2.09	0.1	24.77
SNIP	C	Source Normalized Impact per Paper	510	1.07	0.84	0	6.75
CiteScore	C	Average citations received per document	510	1.18	1.11	0	8.21
Citation_Count	C	# cites in 2016 for papers from 2013-15	510	245.81	766.94	0	15407
Percent_Cited	C	% of papers in 2013-15 cited	510	44.79	19.94	0	96.00
Percentile	C	Relative standing in its subject field.	510	61.23	25.14	0	99.00
Scholarly_Output	C	Documents published in 2013 – 15	510	163.07	240.47	6	3424
i_rnk_area	C	5000 - Rank in subject area	510	4863.26	141.79	3700	4999
Total_2016	S	Total Docs. (2016)	509	60.83	85.34	0	1192
Total_3yr	S	Total Docs. (3years)	509	167.91	256.45	5	3424
Cit_Doc_3yr	S	Citable Docs. (3years)	509	156.58	224.26	3	2343
h_ind_sjr	S	Hirsch index	509	36.00	33.13	0	300
SJR	S	SCImago Journal Rank	509	1.19	2.10	0.1	24.77
Cites_p_D__2yr	S	Cites per document in the last 2 years	509	1.07	1.03	0	8.77
Total_C_3yr	S	Total Cites (3years)	509	245.53	765.46	0	15342
i_rnk_sjr	S	30000 - SJR overall rank	530	20878.32	6827.31	1901	29993
Total_Refs	S	Total Refs	509	1961.17	2222.33	0	16656
D_p_AV	L	Downloads/Abstract Views 2013-2017	531	0.21	0.07	0	0.41
File_Ds	L	File Downloads 2013-2017	542	10425.33	23483.73	0	314208
Abs_Vs	L	Abstract Views 2013-2017	542	43970.46	86030.92	0	1197132
jif_inc	I	Journal Impact Factor	364	1.30	1.13	0.04	9.44
jif_wo_inc	I	Journal Impact Factor w/o self-cites	364	1.17	1.09	0.03	9.31
jif5_inc	I	5yr Journal Impact Factor	364	1.69	1.50	0.07	10.70
EIFac_inc	I	Eigenfactor	364	0.0057	0.0135	0.00	0.1833
im_index_inc	I	Immediacy Index	364	0.3055	0.4216	0.00	5.0770
inf_sc_inc	I	Article influence score	364	1.27	1.89	0.02	17.15
av_jif_inc	I	Average Journal Impact Factor	364	48.53	27.35	0.14	99.86
Blog_mentions	A	Blog mentions	573	38.10	126.35	0.00	1737
Wikipedia_mentions	A	Wikipedia mentions	573	24.96	74.79	0.00	1128
Facebook_mentions	A	Facebook mentions	573	33.29	104.87	0.00	1288
Policy_mentions	A	Policy mentions	573	174.36	578.08	0.00	6036
Twitter_mentions	A	Twitter mentions	573	901.36	3140.21	0.00	59256
Number_of_mentioned	A	Number of mentioned outputs	573	227.67	475.12	1.00	7659
Total_mentions	A	Total mentions	573	1248.40	4000.31	1.00	70978
Mentions_p_Output	A	Mentions per outputs	573	4.04	5.94	1.00	103.46

* Codes for sources: R – RePEc, C – Scopus CiteScore, S – SCImago, L – LogEc, R&L match of RePEc and LogEc, I – InCites, A - Altmetrics

Table 3.1 Summary statistics for journal bibliometrics (N indicates the number of ABDC journals matched).

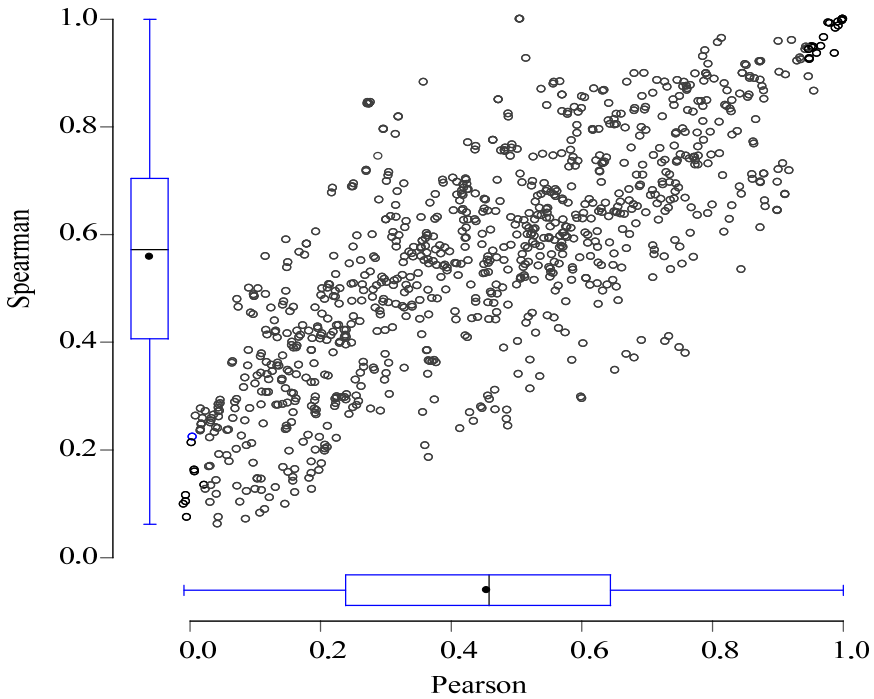


Figure 3.1 The scatter plot of the correlations between the metrics described in Table 3.1 with the boxplots of the correlations.

Table 3.2 provides the level of coverage of the journals by FoR. From these tables it can be noted that the LogEc and RePEc have the lowest coverage for the Statistics. In this case RePEc only matches 21 journals while there are 78 matches by the Altmetrics. Another anomaly occurs in the FoR Other Economics where the InCites metrics only match 24 journals while LogEc matches 87.

Field of Research	Source					
	Altmetrics	CiteScore	InCites	LogEc	RePEc	SCImago
Statistics	78 13.61	76 14.9	63 17.31	30 5.54	21 4.39	77 14.53
Economic Theory	27 4.71	22 4.31	18 4.95	24 4.43	21 4.39	22 4.15
Applied Economics	381 66.49	345 67.65	243 66.76	374 69	333 69.67	357 67.36
Econometrics	22 3.84	18 3.53	16 4.4	27 4.98	27 5.65	20 3.77
Other Economics	65 11.34	49 9.61	24 6.59	87 16.05	76 15.9	54 10.19
Total	573 100.00	510 100.00	364 100.00	542 100.00	478 100.00	530 100.00

Table 3.2 The coverage of the bibliometrics by FoR and ABDC grade. (top is number bottom is column %)

In Table 3.3 we present the coverage by ABDC grade. In this table we also note that the InCites metrics have a much lower coverage of the B and C graded journals than any of the other metrics. Although coverage of the InCites metrics are comparable to the other metrics for the ABDC grades A and A* they cover far fewer of the B and C grade journals. The lower coverage for the A* journals by LogEc and RePEc would indicate the lack of the inclusion of some major Statistics journals.

ABDC	Source					
	Altmetrics	**CiteScore**	**InCites**	**LogEc**	**RePEc**	**SCImago**
A*	57 9.95	57 11.18	57 15.66	50 9.23	49 10.25	57 10.75
A	127 22.16	125 24.51	124 34.07	111 20.48	100 20.92	125 23.58
B	208 36.3	188 36.86	134 36.81	182 33.58	163 34.1	194 36.6
C	181 31.59	140 27.45	49 13.46	199 36.72	166 34.73	154 29.06
Total	573 100.00	510 100.00	364 100.00	542 100.00	478 100.00	530 100.00

Table 3.3 The coverage of the bibliometrics by ABDC grade. (top is number bottom is column %).

3.2 Comparison of bibliometric grades to ABDC grades

For our analysis we employ the ranks of these metrics since our objective is to match them to the ranking of the journals as was done in ZR. In this way we use the distribution of the sample of journals where we observe the metric and the ABDC grade. The process proceeds as follows:

First, we grade each journal into the A*, A, B and C designation based on the rank of each bibliometric where we can match a value for the metric. For example, of the 478 journals for which we measure the metrics from the RePEc list we determine the distribution of those that are listed as A*, A, B and C as shown in Table 3.4 along with the distribution from Table 2.1 of the full set of journals

	RePEc		ABDC (all)	
Score	Number	%	Number	%
C	166	34.73	342	45.00
B	163	34.10	234	30.79
A	100	20.92	127	16.71
A*	49	10.25	57	7.50
Total	478		760	

Table 3.4 The distribution of the journals listed in the RePEc metrics by the ABDC grade as compared to the distribution of all the journals classified by the ABDC.

From Table 3.4 we note that the RePEc data significantly under represents the C and B level journals while the top 10.25% of the journals for which we observe a RePEc metric are classified as A*. We conclude then, that if the ranking was made based on any of the metrics found from RePEc that the top 10.25% would be graded as A* journals. Hence, we can use this distribution of 10.25%, 20.92%, 34.10% and 34.74% to determine the grades of all the journals in the RePEc data in the A*, A, B and C classes.

Thus, if we rank the journals that we observe in the RePEc data by the Hirsch index (*h-index*) we can then compare the grouping in the A*, A, B and C grades based on the 10.25%, 20.92%, 34.10% and 34.74%. To compare these journal grades to those that were assigned by the ABDC we can construct a frequency table

of the RePEc Hirsch index grades versus the equivalent ABDC grades for the same journals as given in Table 3.5:

	RePEc *h_index*				
ABDC	C	B	A	A*	Total
C	119	42	5	0	166
B	40	98	22	3	163
A	6	22	63	9	100
A*	1	1	10	37	49
Total	166	163	100	49	478

Table 3.5 The cross tabulation of the classification by rank of Hirsch index reported in RePEc to the ABDC classification.

From Table 3.5 we find that of the 478 journals in the RePEc data that we can match the ABDC series we grade the same number of journals as A*, A, B and C, however a journal may not have the same grade when ranked by the metric (here the Hirsch index). We note that 119 of the journals graded as C journals in the ABDC list are also graded as C journals according to the ranking of the Hirsch index. But we also note that the Hirsch index would result in 42 of the journals graded as B journals whereas by the ABDC they would be graded as C journals. Alternatively, 40 of the journals graded as B by the ABDC would be graded as C journals based on the ordering of the Hirsch index. The diagonal values in this table (119, 98, 63, 37) indicate the journals where both the Hirsch index and the ABDC grades agree.

We can measure the consistency of the bibliometric and the ABDC grading as the % of the journals with the same grades. Measures of this type are referred to as interrater agreement statistics (IAS) (chapter 18 of Fleiss et al 2003). In this case we have 66.32% of the classifications are the same. We can also establish the number that are graded higher by the Hirsch index than the ABDC as the number above the diagonal divided by the total as 16.95% and those graded higher by the ABDC than the Hirsch index as the number below the diagonal divided by the total as: 16.74%.

Table 3.6 lists the IAS defined by *%same*, *%high* and *%low* compared to the ABDC classification for all the metrics. The *%same* is the percent of journals where the ranking based on the metric matches the ranking based on the ABDC ranking, *%high* indicates the percent of journals that would be classed higher using this metric than the ABDC classifications and *%low* indicates the percent of journals that would be classed lower using this metric than the ABDC classification. The table is sorted by *%same*. In addition, we also report Cohen's *kappa* as an alternative IAS (Cohen 1960). Here we find that the Hirsch index from RePEc is the most consistent in the categorisation and the ratio of downloads to abstract views is the least consistent.

The definition of *kappa* is given as:

$$\kappa = \frac{p_0 - p_c}{100 - p_c}$$

where x_{ji} is the number in row *i* and column *j*, *N* is the number of journals compared, p_0 is the *%same* defined as $p_0 = \frac{100}{N}\sum_{i=1}^{4} x_{ii}$, and p_c is the hypothetical *%same* based on the product of the marginal percentages defined by $p_c = \frac{100}{N^2}\sum_{i=1}^{4} x_{.i}x_{i.}$ where $x_{.i} = \sum_{j=1}^{4} x_{ji}$ and $x_{i.} = \sum_{j=1}^{4} x_{ij}$. In the comparisons used here we have designed the marginal percentages to be the same for each category across the metrics. Thus p_c is the same for every metric from the same source and very similar across metric sources consequently, the value of κ is approximately a simple linear transformation of p_0. Note that the ordering by the %same in general coincides with the order determined by the kappa agreement statistic. This occurs because we have designed the comparison in such a way that the marginal proportions of each ranking are the same for the metric as it is for the ABDC grade and the kappa agreement statistic is designed to account for differences in the marginal proportions that is not allowed to be present here. However, below where we compare the different grades assigned by different bibliometrics we use the *kappa* since the marginal totals are not equal for different metrics that have varying coverage.

Because several of the metrics we use are integer valued, the rank for journals with the same value is arbitrary. To avoid ties we add a very small random value to each metric. However, breaking ties could influence the statistics reported in Table 3.6 when the ties are at the limiting rank for moving a journal from one ABDC grade to another. To check the degree to which this perturbation influences our results we reestimated the values in Table 3.6 for 1000 potential draws from this random variable for each metric to establish their influence. The column labelled CV in Table 3.6 is the coefficient of variation for the *%same* for each metric.[28] Note that those metrics where no ties occurred do not have a value in this column. From this table we find that in no case was the standard deviation of the metric's value of %same greater than .51% which would have only a slight impact on the ordering in Table 3.6.

To establish statistical significance for the statistics reported in Table 3.6, we constructed a randomisation test to determine the distribution under the null hypothesis that the metrics had no relationship to the ABDC grade. This was done by assigning a uniformly distributed random variable instead of the metric for the same coverage of the journals in the ABDC list as the metric to be tested. From this analysis we found that all the values in Table 3.6 had less than a 1% probability of being generated under the null hypothesis of no relationship.[29] The asymptotic standard error for κ can also be derived and we found that all of the values in Table 3.6 are significantly different from zero. Banerjee et al (1999) propose that values of $\kappa > .75$ indicate

[28] The coefficient of variation is defined as $100 * \hat{\sigma} / \bar{x}$ where $\hat{\sigma}$ and $\bar{x}$ are the estimated standard deviation and mean over the simulated *%same* values. na in the column labelled CV indicates that these metrics are real valued and thus there is no possible difference in order.

[29] The 98% range for same % under the null was from 23.4% to 34.5%, for the higher % under the null was from 32.1% to 38.9% , and for the lower % under the null was from 32.3% to 38.5% based on 1000 random sets of metrics with the same match to the ABDC list.

excellent agreement with values of $.75 > \kappa > .40$ as an indication of fair to good agreement. Using this rule of thumb, we may conclude that the ABDC and these metrics only have a fair degree of agreement for the first 10 metrics in Table 3.6.

Metric	*Source*	*Label*	*%same*	*%high*	*%low*	κ	*CV*
h_index	R	Hirsch-index	66.32	16.74	16.95	**0.52**	0.53294
dr_impact	R	Discounted recursive impact factor	64.23	17.57	18.20	**0.50**	0.23073
e_c_score	R	Euclidian citation score	63.81	17.78	18.41	**0.49**	Na
r_impact	R	Recursive impact factor	62.97	18.20	18.83	**0.48**	Na
d_impact	R	Discounted impact factor	62.34	18.41	19.25	**0.47**	0.17371
s_impact	R	Simple impact factor	62.13	19.04	18.83	**0.47**	na
h_ind_sjr	S	Hirsch index	59.62	19.81	20.57	**0.43**	0.78387
i_rnk_sjr	S	30000 - SJR overall rank	58.30	19.06	22.64	**0.42**	na
SJR	S	SCImago Journal Rank	57.92	19.25	22.83	**0.41**	0.25435
sjr_cscore	C	SCImago Journal Rank Index	57.45	19.41	23.14	**0.41**	na
EIFac_inc	I	Eigenfactor	56.59	20.33	23.08	0.38	0.57223
inf_sc_inc	I	Article influence score	55.22	20.60	24.18	0.37	na
Wikipedia_mentions	A	Wikipedia mentions	54.62	22.69	22.69	0.36	0.63619
Policy_mentions	A	Policy mentions	53.75	23.56	22.69	0.35	0.13268
Number_of_mentioned	A	Number of mentioned outputs	52.53	23.21	24.26	0.33	na
CiteScore	C	Average citations received per document	51.96	21.57	26.47	0.33	0.51313
Total_C_3yr	S	Total Cites (3years)	51.89	21.70	26.42	0.33	na
Abs_Vs	L	Abstract Views 2013-2017	52.40	23.62	23.99	0.32	na
Citation_Count	C	# cites in 2016 for papers from 2013-15	51.37	22.16	26.47	0.32	na
Blog_mentions	A	Blog mentions	51.66	23.39	24.96	0.32	0.45214
SNIP	C	Source Normalized Impact per Paper	51.18	23.14	25.69	0.32	na
File_Ds	L	File Downloads 2013-2017	51.29	24.72	23.99	0.31	na
Cites_p_D__2yr	S	Cites per document in the last 2 years	49.43	22.26	28.30	0.29	0.37841
Percent_Cited	C	% of papers in 2013-15 cited	48.82	23.53	27.65	0.29	0.44141
jif5_inc	I	5yr Journal Impact Factor	49.45	22.80	27.75	0.28	na
Total_mentions	A	Total mentions	48.34	24.96	26.70	0.27	na
Number	R	Number of items listed	47.49	24.69	27.82	0.26	na
av_jif_inc	I	Average Journal Impact Factor	47.25	23.63	29.12	0.25	na
jif_wo_inc	I	Journal Impact Factor w/o self-cites	46.15	24.18	29.67	0.24	na
dl_item	R&L	File downloads / Item	44.98	26.78	28.24	0.22	na
jif_inc	I	Journal Impact Factor	45.05	24.18	30.77	0.22	na
Percentile	C	Relative standing in its subject field.	43.33	26.08	30.59	0.21	0.24392
Twitter_mentions	A	Twitter mentions	43.80	28.10	28.10	0.21	0.09199
absv_item	R&L	Abstract Views / Item	43.72	26.15	30.13	0.21	na
Facebook_mentions	A	Facebook mentions	42.41	27.57	30.02	0.19	0.68678
Cit_Doc_3yr	S	Citable Docs. (3years)	41.89	28.11	30.00	0.19	0.27604
Total_Refs	S	Total Refs	40.57	27.74	31.70	0.17	na
Total_3yr	S	Total Docs. (3years)	40.00	28.87	31.13	0.16	0.40327
Scholarly_Output	C	Documents published in 2013 – 15	39.80	29.22	30.98	0.16	0.17051
Total_2016	S	Total Docs. (2016)	39.62	29.62	30.75	0.15	0.68788
i_rnk_area	C	5000 - Rank in subject area	37.65	30.78	31.57	0.13	0.09205
im_index_inc	I	Immediacy Index	37.64	28.85	33.52	0.12	0.06553
Mentions_p_Output	A	Mentions per Outputs	36.65	30.19	33.16	0.11	na
D_p_AV	L	Downloads/Abstract Views 2013-2017	35.78	32.20	32.02	0.09	na

* Codes for sources: R – RePEc, C – Scopus CiteScore, S – SCImago, L – LogEc, R&L match of RePEc and LogEc, I – InCites, A - Altmetrics

Table 3.6 The interrater agreement statistics for different metrics and the ABDC classifications.

3.2 Comparisons between bibliometric grades

To make comparisons between the bibliometrics, we employed the same type of table as Table 3.5 for the relationship between different metrics except instead of comparing them to the ABDC classifications we compared them to the implied ABDC classes based on the ranks of each metric. Table 3.7 is a cross tabulation

table of the rankings based on the Number of downloads to abstract views from the LogEc series (*D_P_AV*) as compared to the Hirsch index compiled in the RePEc series (*h-index*). From this table we find that these two metrics agree on the ABDC rankings for 178 out of 471 journals for which there is a match in both series. Thus, we have the %same as 37.8% for the rankings they match and 62.2% do not.

	LogEc D_p_AV				
RePEc *h_index*	C	B	A	A*	Total
C	71	44	28	16	159
B	55	65	33	10	163
A	29	39	26	6	100
A*	4	11	18	16	49
Total	159	159	105	48	471

Table 3.7 The cross-tabulation between the ABDC rankings based on the RePEc *h-index* and the LogEc ratio of article downloads to abstract views.

To compare the journal metrics based on the %same from the cross-tabulation tables we can define a distance between each metric based on the *kappa* since the margins are different between metrics from different sources. This distance is defined by: 100 – *kappa*. Figure 3.2 provides a heatmap of the distance matrix between each metric where the order of the metrics is based on their proximity. Note that the metric comparisons are based only on the journals for which we have a value for each metric.

To further investigate the similarities of these metrics we use this distance matrix to perform a hierarchical cluster analysis. Figure 3.3 is a dendrogram or tree diagram based on a hierarchical cluster analysis using the distance matrix as shown in Figure 3.2. These clusters were formed using the complete linkage distance to determine the distances between clusters. The dendrogram indicates the relationship between the metrics and provides an indication of the distances between the clusters formed. Note that each metric begins the agglomeration process in a cluster of its own, then the distances between the clusters are compared to find the closest one to combine with until all the metrics are included in one cluster. The complete linkage method employed here defines the distance between clusters as the maximum distance between the members of the clusters being compared.

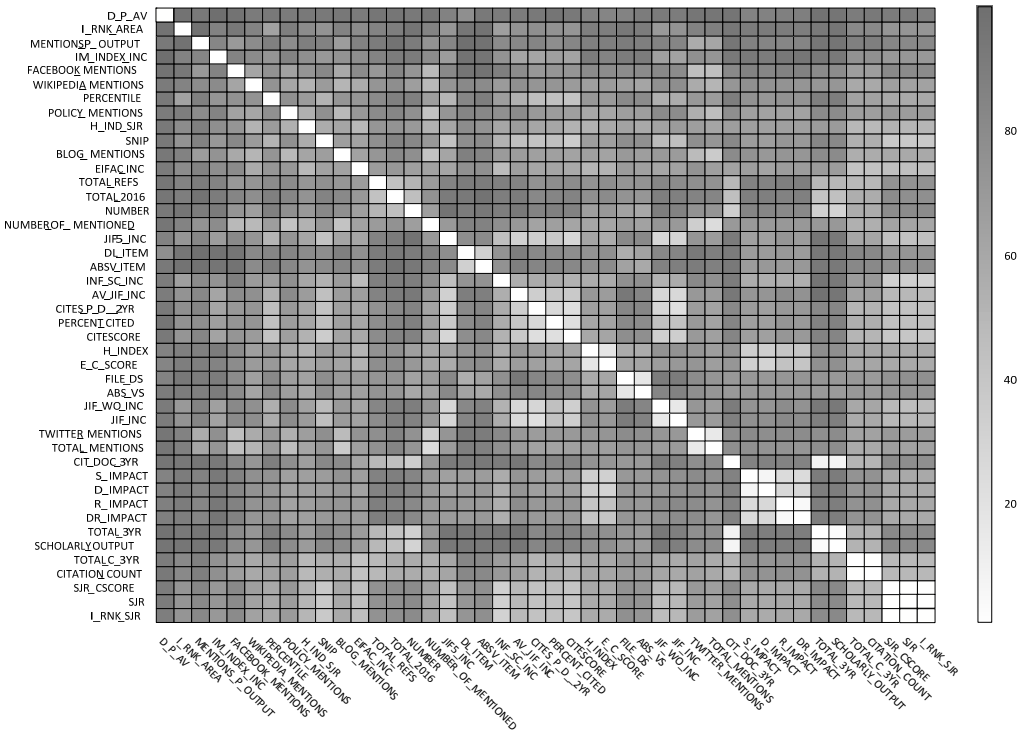


Figure 3.2 The Heatmap of the distance matrix based on the interrater score between the grading of a common set of journals defined as 100 - *kappa*.

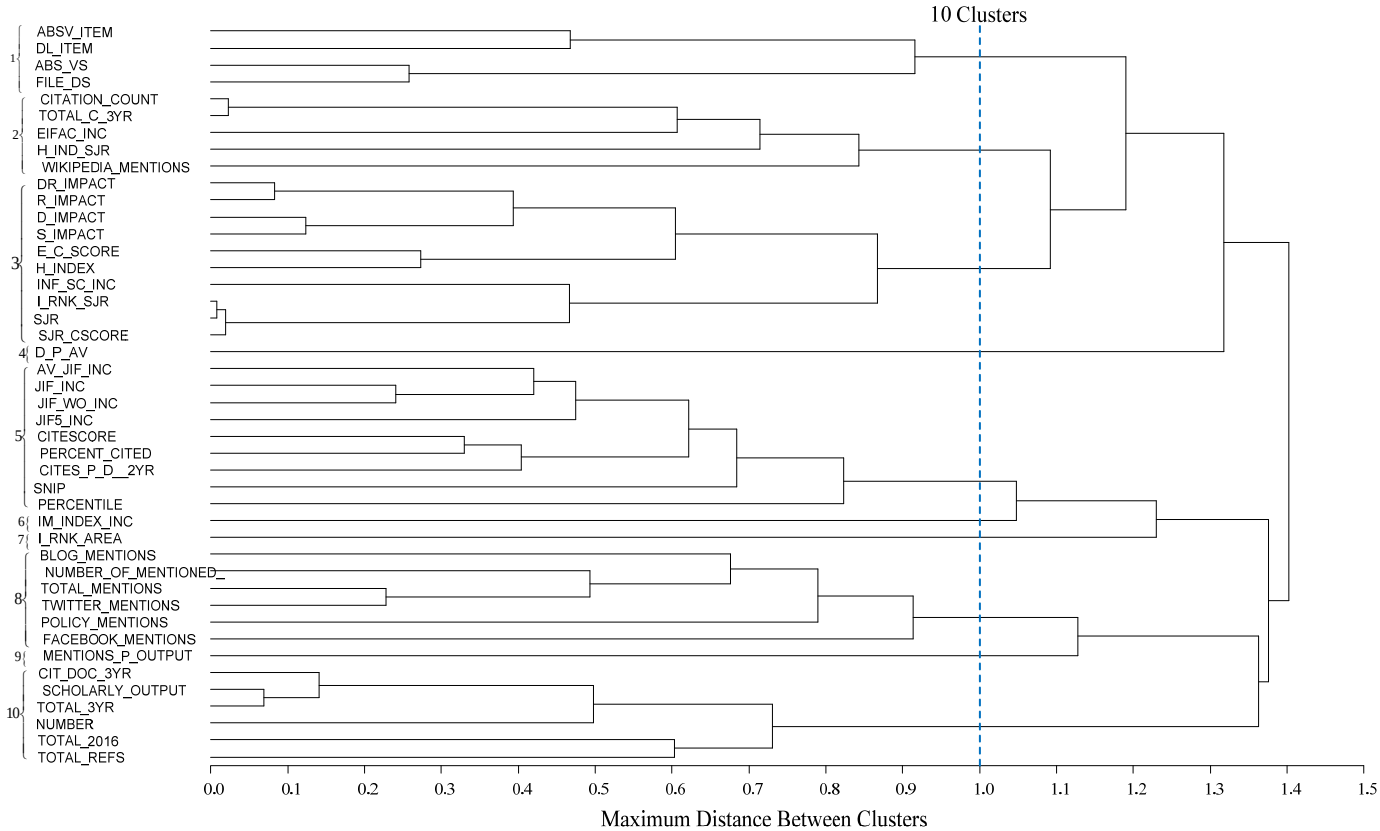


Figure 3.3 The dendrogram of the clustering of the journal metrics using the *kappa* IRS distances as shown in Figure 3.2 using a complete linkage hierarchical algorithm.

From the dendrogram we can see that at 1.00 we can define 10 clusters. From the top of Figure 3.3 to the bottom we can find the bibliometrics absv_item (abstract views per item), dl_item (downloads per item) , abs_vs (abstract views) and file_ds (file downloads) all metrics from LogEc and RePEc make up the first cluster. Note that abstract views per item and downloads per item clustered together first then abstract views and file downloads clustered together and finally these two clusters combined to one cluster. All 10 clusters are identified in Figure 3.3 with four bibliometrics d_p_av (downloads per abstract view), im_index_inc (immediacy index), i_rnk_area (the inverse of the rank in subject area), and mentions_p_output (mentioned per output) that are included in clusters with only one member. Those clusters that are formed first are the ones formed with branches that are closest to the left-hand axis. For example, i_rnk_sjr (30000 - SJR overall rank), sjr (SCImago Journal Rank) and sjr_cscore (SCImago Journal Rank Index) all appear to combine with very little distance between them since the only difference between them is a slight difference in coverage of different journals. Also note that the ratio of downloads to abstract views (d_p_av) appears to be combined at the furthest distance with the other bibliometrics which indicates that its measure is the most diverse from all the other metrics.

Table 3.8 lists the membership of each cluster as implied by the dendrogram in Figure 3.3. Note that some clusters are dominated by bibliometrics from one source as in the case of cluster one and cluster eight. We use the order of the bibliometrics on the left axis from the dendrogram to indicate different collections of bibliometrics in the heatmaps provided in Figures 4.1 and 4.2 listed below. We have also provided the cluster membership on the top margin of these heatmaps.

4. The Academic Journal Quality Guide (AJG)

Alternative journal classification schemes have been proposed by individual institutions. A similar classification to the ABDC list has been proposed by the UK Chartered Association of Business Schools' *Academic Journal Quality Guide* (see Harvey et al 2007) that grades scholarly journals in business research fields. Recently this classification of journals has been updated as the *Academic Journal Guide* (AJG) (Chartered Association of Business Schools 2018). The guide provides a ranking of journals into 5 categories 4*, 4, 3, 2, and 1. Where the 4* category is very small and reserved for only a handful of journals designated as "Journals of Distinction". In this study we compare these rankings for the economics, econometrics and statistics journals in the ABDC list. For our comparison we note that these 4* journals would be designated as A* in the ABDC list. The implications for the consistency of the AJG rankings have been investigated by Mingers and Yang (2017) who perform a similar analysis on a smaller range of metrics.

Cluster	Variable	Source*	Label
1	*absv_item*	***R&L***	Abstract Views / Item
	dl_item	***R&L***	File downloads / Item
	Abs_Vs	***L***	Abstract Views 2013-2017
	File_Ds	***L***	File Downloads 2013-2017
2	*Citation_Count*	***C***	# cites in 2016 for papers from 2013-15
	Total_C_3yr	***S***	Total Cites (3years)
	EIFac_inc	***I***	Eigenfactor
	h_ind_sjr	***S***	Hirsch index
	Wikipedia_mentions	***A***	Wikipedia mentions
3	*dr_impact*	***R***	Discounted recursive impact factor
	r_impact	***R***	Recursive impact factor
	d_impact	***R***	Discounted impact factor
	s_impact	***R***	Simple impact factor
	e_c_score	***R***	Euclidian citation score
	h_index	***R***	Hirsch-index
	inf_sc_inc	***I***	Article influence score
	i_rnk_sjr	***S***	30000 - SJR overall rank
	SJR	***S***	SCImago Journal Rank
	sjr_cscore	***C***	SCImago Journal Rank Index
4	*D_p_AV*	***L***	Downloads/Abstract Views 2013-2017
5	*av_jif_inc*	***I***	Average Journal Impact Factor
	jif_inc	***I***	Journal Impact Factor
	jif_wo_inc	***I***	Journal Impact Factor w/o self-cites
	jif5_inc	***I***	5yr Journal Impact Factor
	CiteScore	***C***	Average citations received per document
	Percent_Cited	***C***	% of papers in 2013-15 cited
	Cites_p_D__2yr	***S***	Cites per document in the last 2 years
	SNIP	***C***	Source Normalized Impact per Paper
	Percentile	***C***	Relative standing in its subject field.
6	*im_index_inc*	***I***	Immediacy Index
7	*i_rnk_area*	***C***	5000 - Rank in subject area
8	*Blog_mentions*	***A***	Blog mentions
	Number_of_mentioned	***A***	Number of mentioned outputs
	Total_mentions	***A***	Total mentions
	Twitter_mentions	***A***	Twitter mentions
	Policy_mentions	***A***	Policy mentions
	Facebook_mentions	***A***	Facebook mentions
9	*Mentions_p_Output*	***A***	Mentions per Outputs
10	*Cit_Doc_3yr*	***S***	Citable Docs. (3years)
	Scholarly_Output	***C***	Documents published in 2013 – 15
	Total_3yr	***S***	Total Docs. (3years)
	Number	***R***	Number of items listed
	Total_2016	***S***	Total Docs. (2016)
	Total_Refs	***S***	Total Refs

** Codes for sources: R – RePEc, C – Scopus CiteScore, S – SCImago, L – LogEc, R&L match of RePEc and LogEc, I – InCites, A - Altmetrics*

Table 3.8 The Cluster membership of the 10 clusters.

Table 4.1 provides the cross tabulation of the AJG ranking with the ABDC rankings. From this table we note that most of the AJG ranks are the same or lower than the ABDC ranks and that only 332 out of 760 journals in the ABDC list are ranked by the AJG. The main reason for this discrepancy is the inclusion of the statistics journals in the ABDC list we use here where the AJG list includes only a few statistics journals that publish econometrics papers. Thus the %*same* is 52.71% while 40.96% of the journals are ranked higher by the ABDC ranking than the AJG list and only 6.32% are ranked higher by the AJG than the ABDC rankings. Since the marginal totals are not the same we use the more appropriate Cohen's *kappa* statistic which in this case is .3397 with an estimated standard deviation of .0387. From this comparison we see that the AJG

rankings are usually lower than the ABDC. Where the journals are ranked by the AJG we have included the rank in the lists provided in Appendices A and B.

	ABDC				
AJG	**C**	**B**	**A**	**A***	**Total**
1	**33**	58	1	0	92
2	9	**66**	51	0	126
3	0	9	**52**	26	87
4+4*	0	0	3	**24**	27
Total	42	133	107	50	332

Table 4.1 The cross tabulation of the AJG rankings for 2015 and the ABDC rankings.

5. Applying Metrics to the Journals.

In this section the journal metrics described in Section 3 are used to grade journals in the ABDC rankings using the various metrics we have discussed. Thus, for all the journals that are included in the journal data (i.e. Scopus, Citescore, RePEc and LogEc) we determine the distribution of A*, A, B, and C journals using a similar approach as was described for Table 3.4. Then we rank the journals based on the different metrics and allocate them a grade so that the distribution of the grades matches the distribution we observe in the data.

Thus, for example, a journal may be classified as an A* in the ABDC list but its ranking according to the RePEc *h-index* may indicate that it is an A journal. And we can use the corresponding ranking for each metric we observe for the journal to establish the degree to which the ABDC ranking agrees with the rankings that may have been created by any of the metrics.

An example of the rankings can be found from the heatmap given in Figure 5.1 for the journals that have been categorised by the ABDC as A* journals and we have matched them to all the 44 metrics. The darkest value in the heatmap indicates the highest numeric value, where A* = 4, A = 3, B = 2 and C = 1. The journals are ordered by the average numerical rank they receive. From this figure all but one of the 44 metrics are of A* rank for the *American Economic Review* (the downloads per abstract view is the exception that ranked this journal as an A). However, although five metrics rank *Quantitative Economics* as an A* journal, eighteen rank it as an A, and twelve rank it as a B journal and consequently it is listed last among the ABDC A* journals in this list.

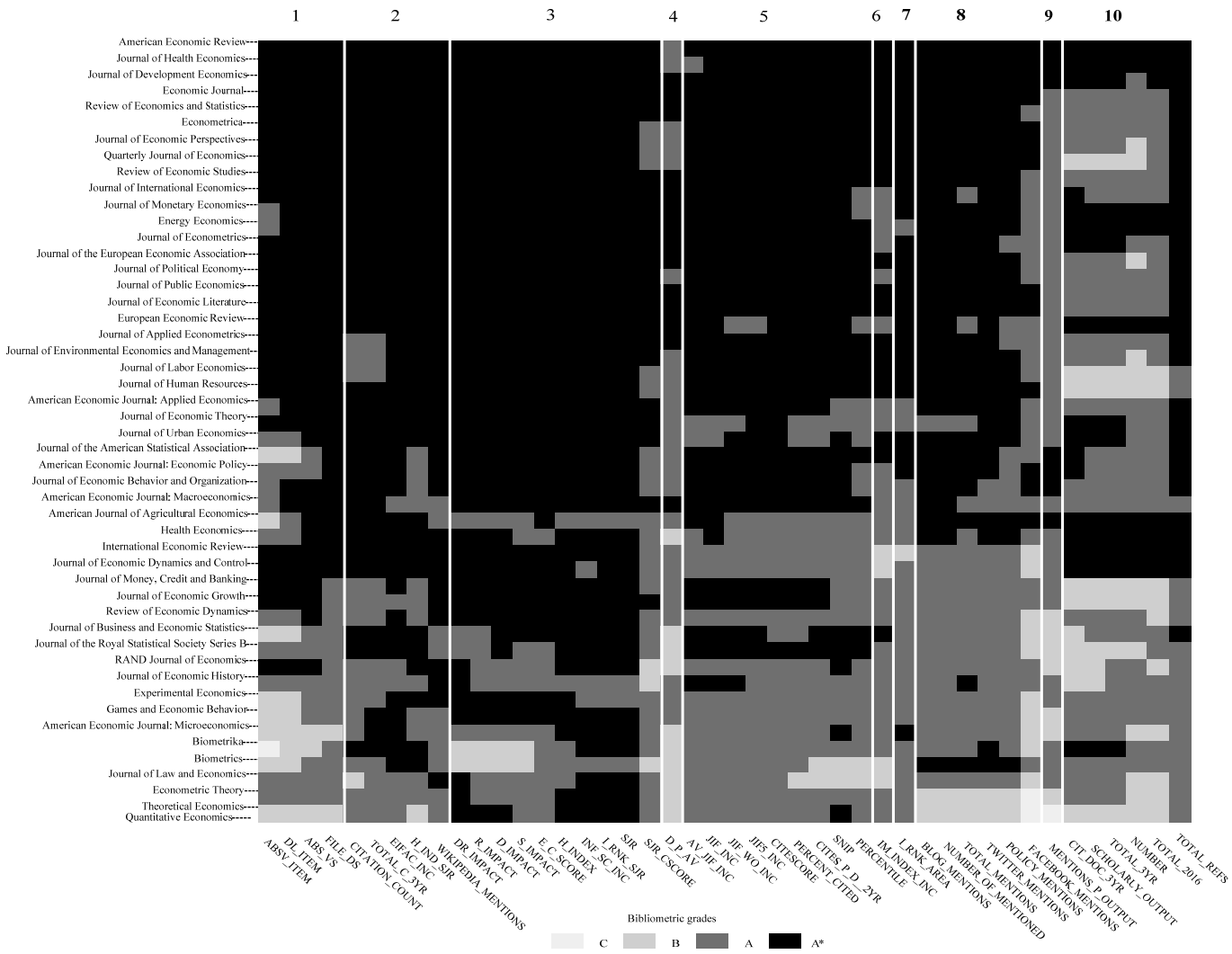


Figure 5.1 The heatmap of the grades based on 44 bibliometrics observed for the journals designated as A* journals in the ABDC rankings. (cluster membership is given on the top axis).

To appreciate how these bibliometrics coincide with the journals graded by the ABDC in all categories, we provide the equivalent heatmap for the 260 journals that we can match to the full set of 44 metrics in Figure 5.2. To reduce the clutter in this Figure we have removed the journal titles. These journals are ordered by ABDC grade then by the average numeric metric grade within the ABDC rank based on the bibliometrics. From Figure 5.2 one can see that the top journals in the A, B and C categories often have several bibliometric grades that would indicate the journal is above their designated ABDC category listed. This especially occurs at the borders of the ABDC grade and at the bottom of the ABDC grade we note that some would be more consistent with a lower grade. Also, the heatmaps allow us to establish the degree of inconsistency in the ranking across the different metrics that could be employed. The number of journals in this map indicates the coverage of the metrics thus the number of C ranked journals appears to be the smallest when only listing those journals for which we have all 44 metrics.

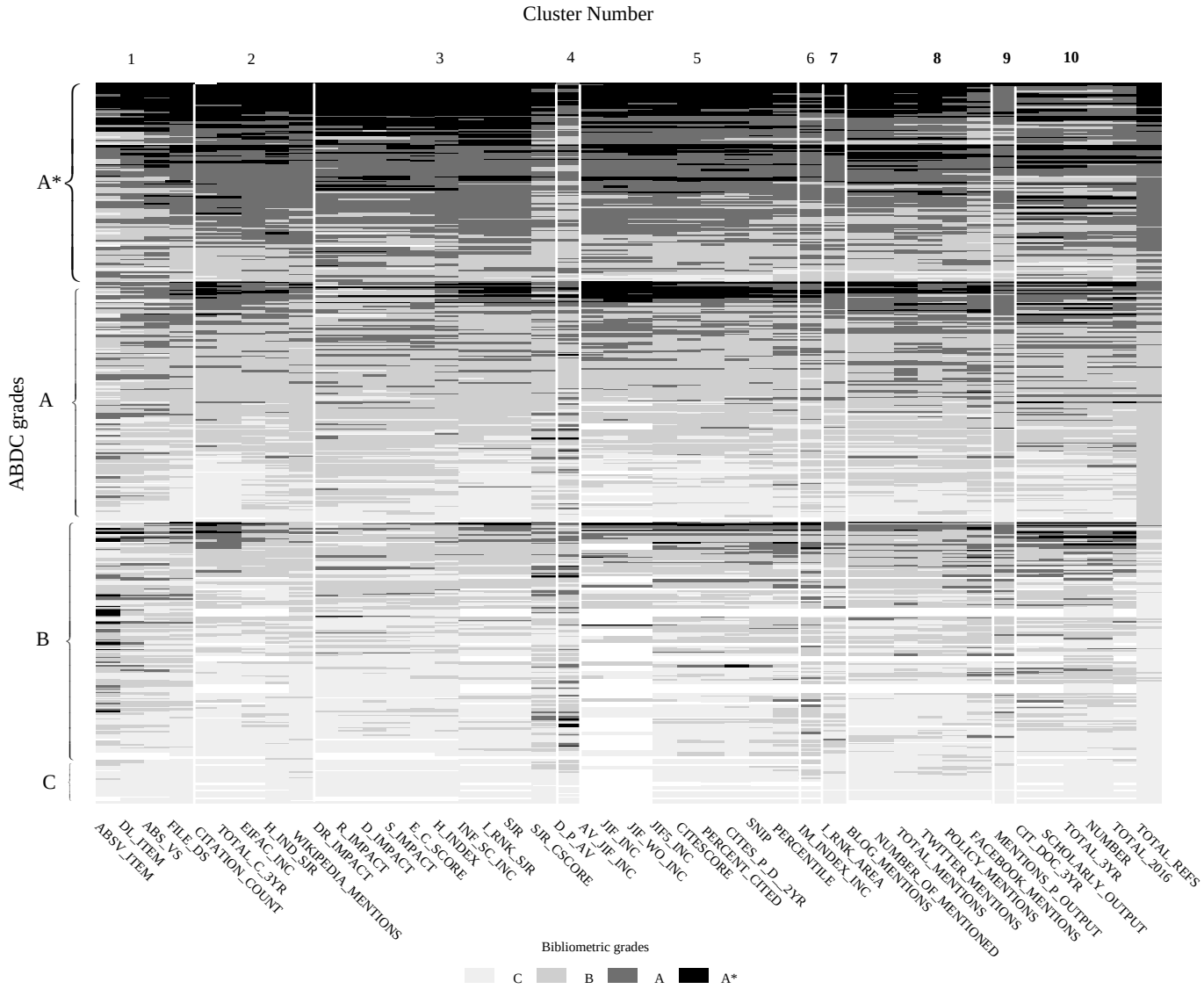


Figure 5.2 The heatmap of the grades for the 260 journals for which we observe the set of all 44 bibliometrics.[30]

We can use the average grade and the median grade based on all the bibliometrics available for a journal. Thus, we assign a numeric value for each bibliometric and then compute the grade point average (GPA) and grade point median (GPM) for each journal. Note that we use all the measures available for each journal and thus we have a total of 667 journals on the ABDC list that match at least one bibliometric. Once this was done we ordered all the journals based on both their GPA and GPM and allocated them a rank in the same manner as was done for the individual bibliometrics. The cross tabulation of these GPA and GPM based grades with the journal's ABDC grade are listed in Tables 5.1 and 5.2. From Table 5.1 the *%same* for this grading is 60.7% with 21.0% graded higher by the ABDC than the GPA and 18.3% graded higher by the GPA than the ABDC. In Table 5.2 the *%same* is found to be 60.3% with 18.7% graded higher by the ABDC and 21.0% graded

[30] Appendix C provides the equivalent heatmaps by ABDC grade using all the bibliometrics.

lower. The similarity between these results would indicate that there is little to indicate an influence of outlier measures.

	GPA based grades				
ABDC	***C***	***B***	***A***	***A****	***Total***
C	184	65	10	1	260
B	74	114	26	9	223
A	2	43	71	11	127
A*	0	1	20	36	57
Total	260	223	127	57	667

Table 5.1 The cross-tabulation of the grade point average GPA based grades and the corresponding ABDC grades

	GPM based grades				
ABDC	***C***	***B***	***A***	***A****	***Total***
C	185	64	10	1	260
B	72	115	29	7	223
A	3	43	67	14	127
A*	0	1	21	35	57
Total	260	223	127	57	667

Table 5.2 The cross-tabulation of the grade point median (GPM) based grades and the corresponding ABDC grades

To examine the degree to which the bibliometric grades for specific journals match the ABDC grades we have provided tables in Appendices A and B. Tables A.1 to A.3 list those journals with the greatest discrepancy where they graded higher by the GPA than the ABDC. Tables B.1 to B.3 list the journals that are graded higher by the ABDC than the GPA.

6. Conclusions

By comparing the bibliometric metrics for journals classified by the ABDC we can determine that some journals are undervalued by many metrics. Although we find that most of the journals that are graded as C journals that would be higher are specialist journals (*Journal of Medical Economics, Economic Systems Research, Forest Policy and Economics*), some are more mainstream (*Monetary and Economic Studies, Applied Econometrics, Networks and Spatial Economics*). In addition, we are able to identify a number of journals that are classed by the ABDC as A* journals that metric ranks would order as Bs. These include *Quantitative Economics, Journal of Law and Economics and Economics Theory*, and *Econometric Theory*.

There is no question that these rankings provide some indication of research quality and have been devised as an inexpensive method for the evaluation of research that can be conducted by individuals that have no expertise in the research areas. It is important to keep in mind that these bibliographic metrics were originally designed to aid in the planning of library holdings. However, there are several recent papers that demonstrate their short-comings.

One recent vein of this research is that citations do not account for the desire for original contributions or neophilia. Packalen and Bhattacharya (2017) propose a metric that is based on the originality of contributions where the innovative aspects of articles are characterised. They find that although the rank of the usual citation indices for journals in the area of General and Internal Medicine are related to the index of neophilia the correlation is -.47 there are a significant number of outliers. Wang et al (2017) investigate a similar phenomenon with research into the bias against novelty in scientific research.

Another area of concern that relates to the development of bibliometric measures is the movement away from considering a single statistic for measurement and using the full distribution. Lariviere et al (2016) suggest the full distribution of citations for a journal be used. In this way the nature of the skewness that may dominate the journal level citation count maybe accounted for. The Hirsch index is a measure of the nature of the distribution – however there are other metrics that could be defined for a distribution.

A caveat to this analysis is that none of the citation and access statistics match the full set of the journals in the ABDC list. Partly this is due to the imperfect information available in both the ABDC list and the citation information lists where journals have conflicting titles, changing titles and problems in translation from non-English titles and where non-English characters are used. In addition, some of the smaller and less frequently published journals are not included in the major citation indices. Furthermore, the RePEc and LogEc lists only include those outlets that are primarily oriented toward economics and econometric journals and do not cover all statistics journals.

In addition, the entire concept of the use of these lists for the determination of research quality has been called into question. One aspect of these rankings is that they are open to gaming the result. This was the position taken by Biagioli (2016) who claimed that "All metrics of scientific evaluation are bound to be abused". In a recent panel discussion held at the 2017 American Economic Association Annual Meeting, five economics Nobel Laureates discussed the topic of "Publishing and Promotion in Economics: The Curse of the Top Five", (American Economic Association 2017, see also notes by Heckman 2017). A major concern of this panel was the over reliance on publishing activity in the top journals as a measure of the worth of prospective hires and promotion in academic economics departments. Angus Deaton observed that academics in other countries may encounter significant difficulties in publishing on local policy issues in US/UK based journals when promotion decisions are heavily weighted toward these journals. Interestingly, a number of Australian journals are graded by the ABDC above the grade that would be classified based purely on their bibliometric grades. However, are these "inflated grades" sufficient to encourage research in the areas that are pertinent to Australian policy?

7. References

American Economic Association (Producer), (2017, Jan 7), "Publishing and Promotion in Economics: The Curse of the Top Five" [Video file], American Economic Association Annual Convention, 2017, retrieved from https://www.aeaweb.org/webcasts/2017/curse.php on Sep 18, 2018.

Banerjee, M., M. Capozzoli, L. McSweeny, and D. Sinha (1999), "Beyond *kappa*: A review of interrater agreement measures", *The Canadian Journal of Statistics*, 27, 3-23.

Bergstrom, C. (2007), "Eigenfactor: measuring the value and prestige of scholarly journals". C&RL News 68:314–316. Downloaded from: https://crln.acrl.org/index.php/crlnews/article/viewFile/7804/7804.

Biagioli, M. (2016), "Watch out for cheats in citation game", *Nature,* 535, 201.

Bornmann, L. (2014), "Do altmetrics point to the broader impact of research? An overview of the benefits and disadvantages of Altmetrics", *Journal of Informetrics*, 8, 895-903.

Chartered Association of Business Schools (2018), *Academic Journal Guide 2018*. Downloaded from: https://charteredabs.org/academic-journal-guide-2018-view/

Cohen, J. (1960), "A Coefficient of Agreement for Nominal Scales", *Education and Psychological Measurement*, 20, 37-46.

Costas, R., Z. Zahedi, and P. Wouters (2015), "Do "Altmetrics" Correlate with Citations? Extensive Comparison of Altmetric Indicators with Citations From a Multidisciplinary Perspective", *Journal of the Association for Information Science and Technology,* 66, 2003-2019.

Fleiss, J. L., B. Levin and M. C. Paik (2003), *Statistical Methods for Rates and Proportions,* 3rd ed., John Wiley & Sons.

Harvey, C., H. Morris and A. Kelly (2007), *Academic Journal Quality Guide*, Association of Business Schools, London.

Haustein, S., I. Peters, J. Bar-Ilan, J. Priem, H. Shema, and J. Terliesner, (2014), "Coverage and adoption of altmetrics sources in the bibliometric community", *Scientometrics,* 101, 1145-1163.

Heckman, J. (2017), "Publishing and Promotion in Economics: The Curse of the Top Five", https://hceconomics.uchicago.edu/sites/default/files/file_uploads/AEA-Curse-Five-HO-SMALL-STATIC_2017-01-06d_jbb.pdf.

Hirsch, J. E. (2005), "An index to quantify an individual's scientific research output", *Proceedings of the National Academy of Sciences of the United States of America*, 102(46),16569-16572.

Larivière, V., V. Lariviere, V. Kiermer, C. J. MacCallum, M. McNutt, M. Patterson, B. Pulverer, S. Swaminathan, S. Taylor S. and S. Curry (2016), "A simple proposal for the publication of journal citation distributions", *Biorxiv*. doi: 10.1101/062109.

Levenshtein, V. I. (February 1966), "Binary codes capable of correcting deletions, insertions, and reversals". Soviet Physics Doklady. 10 (8): 707–710. Bibcode:1966SPhD...10..707L.

Mingers, J. and L.Yang (2017), "Evaluating journal quality: A review of journal citation indicators and ranking in business and management", *European Journal of Operational Research*, 257, 323-337.

Moosa, I. (2011), "The demise of the ARC journal ranking scheme: an ex post analysis of the accounting and finance journals", *Accounting & Finance*, 51, 809-836.

Packalan, M. and J. Bhattacharya (2017), "Neophilia ranking of scientific journals", *Scientometrics*, 110, 43-64.

Perry, M. and P J. Reny (2016), "How To Count Citations If You Must", *American Economic Review*, 106(9), 2722-2741.

Piwowar, H. (2013), "Value all research products", *Nature*, 493, 159.

Priem, J. (2014), "Altmetrics", Chapter 14 in *Beyond Bibliometrics: Harnessing Multidimensional Indicators of Scholarly Impact*, ed. B. Cronin and C. R. Sugimoto, MIT Press.

SCImago (2007), SJR — SCImago Journal & Country Rank. Retrieved July 21, 2015, from http://www.scimagojr.com.

Waltman, L. (2016), "A review of the literature on citation impact indicators", *Journal of Informetrics*, 10, 365-391.

Wang, J., R. Veugelers, and P. Stephan (2017), " Bias against novelty in science: A cautionary tale for users of bibliometric indicators", *Research Policy*, 46, 1416-1436.

Zahedi, Z., R. Costas, and P. Wouters (2014), "How well developed are altmetrics? A cross-disciplinary analysis of the presence of 'alternative metrics' in scientific publications", *Scientometrics,* 101, 1491-1513.

Zainuba, M. and A. Rahal (2015), "Assessing the Validity of Business and Management Journals Ranking List: An Alternative Approach for Determining Journal Quality", *Annals of Management Science*, 4(2), 1-28.

Zimmermann, C. (2013), "Academic Rankings with RePEc", *Econometrics*, 1, 249-280.

Appendix A.1 The most undervalued journals with a ABDC ranking of C (average differences in grade > 0.75) [31].

Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Journal of Medical Economics	C	100.0	0.00	0.00	2.24	25	3.24		A*
Journal of Statistical Software	C	95.45	0.00	4.55	2.07	44	3.07		A
Economic Systems Research	C	100.0	0.00	0.00	1.91	44	2.91	2	A
Forest Policy and Economics	C	86.36	0.00	13.64	1.89	44	2.89		A
Expert Review of Pharmacoeconomics and Outcomes Research	C	100.0	0.00	0.00	1.78	32	2.78		A
Applied Health Economics and Health Policy	C	92.86	0.00	7.14	1.71	28	2.71		A
Cost Effectiveness and Resource Allocation	C	92.00	0.00	8.00	1.60	25	2.60		A
Monetary and Economic Studies	C	91.67	0.00	8.33	1.58	12	2.58		A
Sustainable Development	C	93.18	0.00	6.82	1.57	44	2.57		A
Journal of Statistical Computation and Simulation	C	96.88	0.00	3.13	1.50	32	2.50		A
Applied Econometrics	C	66.67	0.00	33.33	1.42	12	2.42		A
Energy Sources. Part B. Economics, Planning, and Policy	C	93.75	0.00	6.25	1.34	32	2.34		B
Networks and Spatial Economics	C	79.55	0.00	20.45	1.34	44	2.34	2	B
Review of African Political Economy	C	81.82	0.00	18.18	1.32	44	2.32	2	B
Economics Bulletin	C	67.57	0.00	32.43	1.30	37	2.30		B
Journal of Biopharmaceutical Statistics	C	96.88	0.00	3.13	1.28	32	2.28		B
Brussels Economic Review	C	83.33	0.00	16.67	1.25	12	2.25		B
Journal of Theoretical Probability	C	90.63	0.00	9.38	1.25	32	2.25		B
Working USA	C	100.0	0.00	0.00	1.25	8	2.25		B
Aquaculture Economics and Management	C	84.00	0.00	16.00	1.20	25	2.20		B
International Journal of Economics and Financial Issues	C	52.38	0.00	47.62	1.19	21	2.19		B
Local Economy	C	78.38	0.00	21.62	1.19	37	2.19	2	B
Journal of the Knowledge Economy	C	82.14	0.00	17.86	1.18	28	2.18		B
International Journal of Energy Economics and Policy	C	82.76	0.00	17.24	1.17	29	2.17		B
Journal of Consumer Policy	C	97.30	0.00	2.70	1.16	37	2.16	2	B
Socio Economic Planning Sciences	C	94.59	0.00	5.41	1.14	37	2.14		B
Journal of Development Effectiveness	C	86.36	0.00	13.64	1.09	44	2.09		B
Review of Black Political Economy	C	85.71	0.00	14.29	1.07	28	2.07		B
World Trade Review	C	90.91	0.00	9.09	1.02	44	2.02		B
African Development Review	C	84.09	0.00	15.91	1.00	44	2.00		B
Australasian Journal of Economics Education	C	33.33	0.00	66.67	1.00	3	2.00		B
CES IFO Economic Studies	C	93.75	0.00	6.25	1.00	32	2.00	2	B
Cliometrica	C	70.45	0.00	29.55	1.00	44	2.00	2	B
Health Economics Review	C	75.00	0.00	25.00	1.00	28	2.00		B
Empirica	C	93.18	0.00	6.82	0.98	44	1.98	1	B
Intereconomics	C	80.00	0.00	20.00	0.96	25	1.96	1	B
Transformations in Business and Economics	C	75.00	0.00	25.00	0.96	24	1.96		B
Progress in Development Studies	C	70.45	0.00	29.55	0.95	44	1.95		B
Advances in Statistical Analysis	C	75.00	0.00	25.00	0.94	32	1.94		B
Development Southern Africa	C	70.45	0.00	29.55	0.93	44	1.93		B
Rethinking Marxism	C	64.00	0.00	36.00	0.92	25	1.92		B
European Economic Letters	C	66.67	0.00	33.33	0.92	12	1.92		B
De Economist	C	75.00	0.00	25.00	0.91	44	1.91	1	B
Journal of Econometric Methods	C	55.00	0.00	45.00	0.90	20	1.90	1	B
Stochastics	C	75.00	0.00	25.00	0.88	32	1.88		B
Asian Social Science	C	44.83	0.00	55.17	0.86	29	1.86		B
Journal of Industry, Competition and Trade	C	82.14	0.00	17.86	0.86	28	1.86	2	B
International Journal of Political Economy	C	60.00	0.00	40.00	0.85	20	1.85	1	B
Statistical Methodology	C	81.25	0.00	18.75	0.84	32	1.84		B
Atlantic Economic Journal	C	75.68	0.00	24.32	0.84	37	1.84	1	B
Islamic Economic Studies	C	50.00	0.00	50.00	0.83	12	1.83		B
Money Affairs	C	58.33	0.00	41.67	0.83	12	1.83		B
Studies in Business and Economics	C	50.00	0.00	50.00	0.83	12	1.83		B
Theoretical and Applied Economics	C	50.00	0.00	50.00	0.83	12	1.83		B
Foundations and Trends in Econometrics	C	56.00	0.00	44.00	0.80	25	1.80	1	B
Journal of Benefit Cost Analysis	C	75.00	0.00	25.00	0.80	20	1.80		B
Journal of Choice Modelling	C	67.57	0.00	32.43	0.78	37	1.78		B
Historical Materialism	C	65.63	0.00	34.38	0.78	32	1.78		B

[31] %high indicates the % of metrics that would indicate a higher rank, %low the % of metrics that would indicate a lower rank, %same the % of metrics that would indicate the same rank, m_diff is the difference between the average of the metric ranks and the ABDC rank, num indicates the number of metrics for which we can match the journal, avg_grade is the average rank based on the observed metrics, AJG indicates the grade given to this journal by the 2015 AJG ranking.

Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Journal of Economic Interaction and Coordination	C	68.57	0.00	31.43	0.77	35	1.77	1	B
Journal of Chinese Economics and Business Studies	C	67.57	0.00	32.43	0.76	37	1.76	1	B

Appendix A.2 The most undervalued journals with a ABDC ranking of B (average differences in grade > 0.75) .

Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Value in Health	B	96.88	0.00	3.13	1.72	32	3.72		A*
Food Policy	B	93.18	0.00	6.82	1.50	44	3.50	3	A*
Statistical Methods In Medical Research	B	96.88	0.00	3.13	1.41	32	3.41		A*
Journal of Happiness Studies	B	91.43	2.86	5.71	1.31	35	3.31	1	A*
European Journal of Health Economics	B	82.86	2.86	14.29	1.26	35	3.26	2	A*
Annual Review of Economics	B	79.55	2.27	18.18	1.25	44	3.25	3	A*
Journal of Economic Surveys	B	93.18	0.00	6.82	1.25	44	3.25	2	A*
Journal of Common Market Studies	B	81.82	11.36	6.82	1.23	44	3.23	3	A*
International Journal of Urban and Regional Research	B	79.55	13.64	6.82	1.20	44	3.20	2	A*
International Organization	B	75.00	4.55	20.45	1.18	44	3.18		A
Health Policy	B	79.55	11.36	9.09	1.14	44	3.14	2	A
Stochastic Environmental Research and Risk Assessment	B	75.00	3.13	21.88	1.13	32	3.13		A
British Journal of Mathematical and Statistical Psychology	B	75.00	6.25	18.75	1.09	32	3.09		A
Journal of Financial Stability	B	79.55	0.00	20.45	1.07	44	3.07	3	A
Resources Policy	B	77.27	0.00	22.73	1.05	44	3.05	2	A
Agriculture and Human Values	B	80.00	2.86	17.14	0.97	35	2.97		A

Appendix A.3 The most undervalued journals with a ABDC ranking of A (average differences in grade > 0.75) .

Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Bioinformatics	A	96.88	0.00	3.13	0.97	32	3.97		A*
World Development	A	77.27	0.00	22.73	0.77	44	3.77	3	A*

Appendix B.1 The most overvalued journals with a ABDC ranking of B. (average differences in grade< -0.75)

Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Asia Pacific Journal of Economics and Business	B	0.00	100.0	0.00	-1.00	12	1.00		C
Economic Issues	B	0.00	100.0	0.00	-1.00	8	1.00	1	C
International Journal of Development and Conflict	B	0.00	100.0	0.00	-1.00	12	1.00		C
Journal of Business Cycle Research	B	0.00	100.0	0.00	-1.00	2	1.00		C
Journal of European Economic History	B	0.00	100.0	0.00	-1.00	8	1.00	1	C
Recherches Economiques de Louvain	B	0.00	100.0	0.00	-1.00	17	1.00		C
Studies in Economics and Econometrics	B	0.00	100.0	0.00	-1.00	9	1.00		C
Statistics Education Research Journal	B	0.00	94.12	5.88	-0.94	17	1.06		C
History of Economic Ideas	B	0.00	91.67	8.33	-0.92	36	1.08		C
Spanish Economic Review	B	0.00	90.91	9.09	-0.91	11	1.09		C
Competition and Regulation in Network Industries	B	0.00	89.66	10.34	-0.90	29	1.10		C
History of Economics Review	B	0.00	87.50	12.50	-0.88	8	1.13		C
Revue d tudes Comparatives Est Ouest	B	0.00	87.50	12.50	-0.88	32	1.13		C
Review of Urban and Regional Development Studies	B	2.70	89.19	8.11	-0.86	37	1.14		C
Decisions in Economics and Finance	B	0.00	85.71	14.29	-0.86	28	1.14	1	C
Review of Economic Design	B	0.00	82.86	17.14	-0.83	35	1.17	2	C
Politica Economica	B	2.27	84.09	13.64	-0.82	44	1.18		C
Agenda	B	4.00	84.00	12.00	-0.80	25	1.20		C
Australian Journal of Labour Economics	B	0.00	80.00	20.00	-0.80	20	1.20	1	C
International Journal of Stochastic Analysis	B	0.00	80.00	20.00	-0.80	25	1.20		C
Indian Growth and Development Review	B	2.70	81.08	16.22	-0.78	37	1.22		C
International Game Theory Review	B	0.00	78.38	21.62	-0.78	37	1.22	1	C
El Trimestre Economico	B	3.70	81.48	14.81	-0.78	27	1.22		C

Appendix B.2 The most overvalued journals with a ABDC ranking of A.(average differences in grade < -0.75)

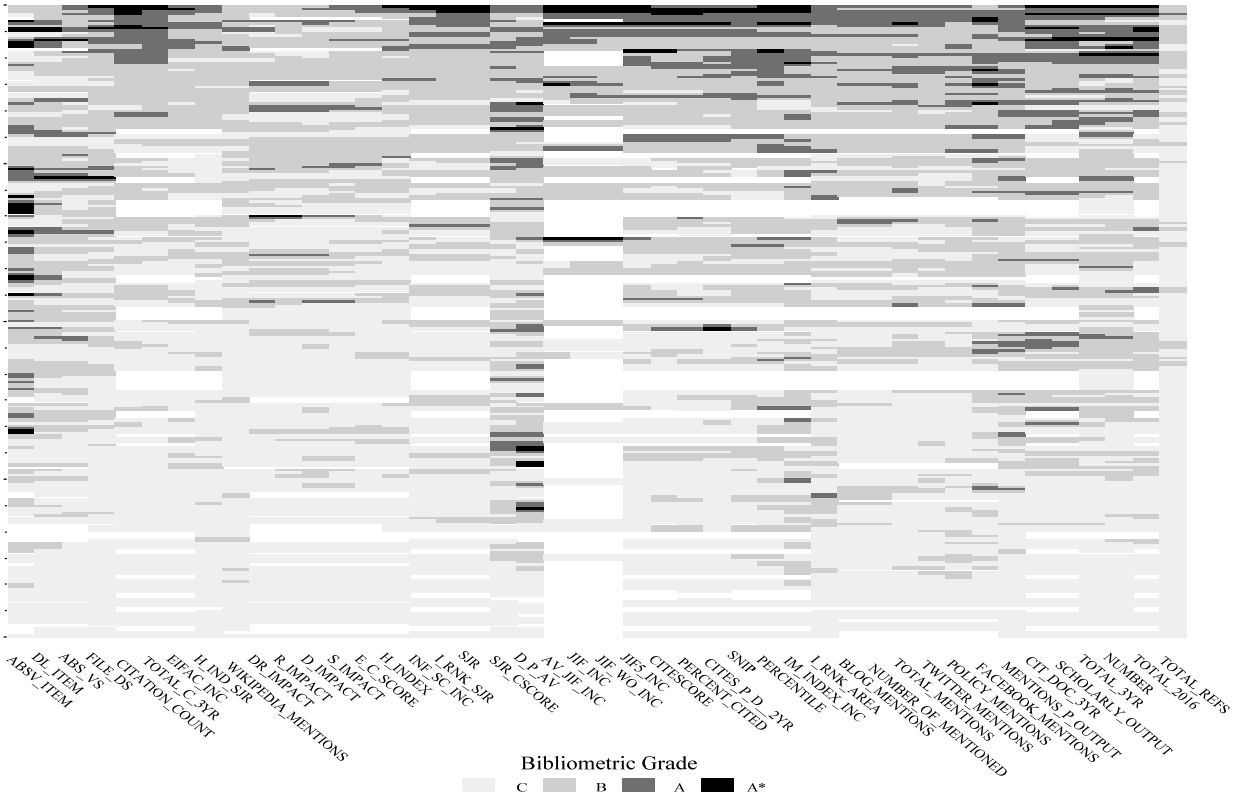
Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
IZA Journal of Labor Economics	A	0.00	89.29	10.71	-1.46	28	1.54	2	C
BE Journal of Theoretical Economics	A	0.00	95.45	4.55	-1.45	44	1.55	2	C
Journal of Institutional and Theoretical Economics	A	0.00	90.91	9.09	-1.32	44	1.68	2	B
Statistica Neerlandica	A	0.00	97.73	2.27	-1.32	44	1.68		B
Journal of the Royal Statistical Society, Series D	A	0.00	87.50	12.50	-1.25	8	1.75		B
BE Journal of Macroeconomics	A	0.00	75.00	25.00	-1.23	44	1.77	2	B
Theory of Probability and its Applications	A	0.00	87.50	12.50	-1.22	32	1.78		B
Australian and New Zealand Journal of Statistics	A	0.00	100.0	0.00	-1.17	35	1.83		B
Studies in Nonlinear Dynamics and Econometrics	A	2.27	93.18	4.55	-1.16	44	1.84	2	B
Journal of Agricultural and Resource Economics	A	0.00	77.27	22.73	-1.07	44	1.93	2	B
NBER Macroeconomics Annual	A	16.22	75.68	8.11	-1.05	37	1.95		B
Environmental and Ecological Statistics	A	0.00	96.88	3.13	-1.03	32	1.97		B
Marine Resource Economics	A	0.00	68.18	31.82	-1.00	44	2.00	1	B
Mathematical Social Sciences	A	0.00	79.55	20.45	-0.98	44	2.02	2	B
Journal of Cultural Economics	A	2.27	79.55	18.18	-0.93	44	2.07	2	B
Journal of Human Capital	A	4.55	72.73	22.73	-0.93	44	2.07		B
Journal of Public Economic Theory	A	0.00	86.36	13.64	-0.93	44	2.07	2	B
Economics of Transition	A	0.00	79.55	20.45	-0.91	44	2.09	2	B
American Journal of Health Economics	A	3.70	59.26	37.04	-0.89	27	2.11		B
Review of Industrial Organization	A	0.00	81.82	18.18	-0.86	44	2.14	2	B
Scottish Journal of Political Economy	A	0.00	81.82	18.18	-0.86	44	2.14	2	B
Economics and Philosophy	A	0.00	72.73	27.27	-0.84	44	2.16	2	B
BE Journal of Economic Analysis and Policy	A	0.00	59.09	40.91	-0.82	44	2.18	2	B
Theory and Decision	A	0.00	75.00	25.00	-0.82	44	2.18	2	B
Canadian Journal of Agricultural Economics	A	0.00	81.25	18.75	-0.81	32	2.19	2	B
Annals of the Institute of Statistical Mathematics	A	0.00	74.29	25.71	-0.80	35	2.20		B
Economic Record	A	0.00	68.18	31.82	-0.80	44	2.20	2	B
Econometrics Journal	A	9.09	70.45	20.45	-0.77	44	2.23	3	B

Appendix B.3 The most overvalued journals with a ABDC ranking of A*. (average differences in grade < -0.75)

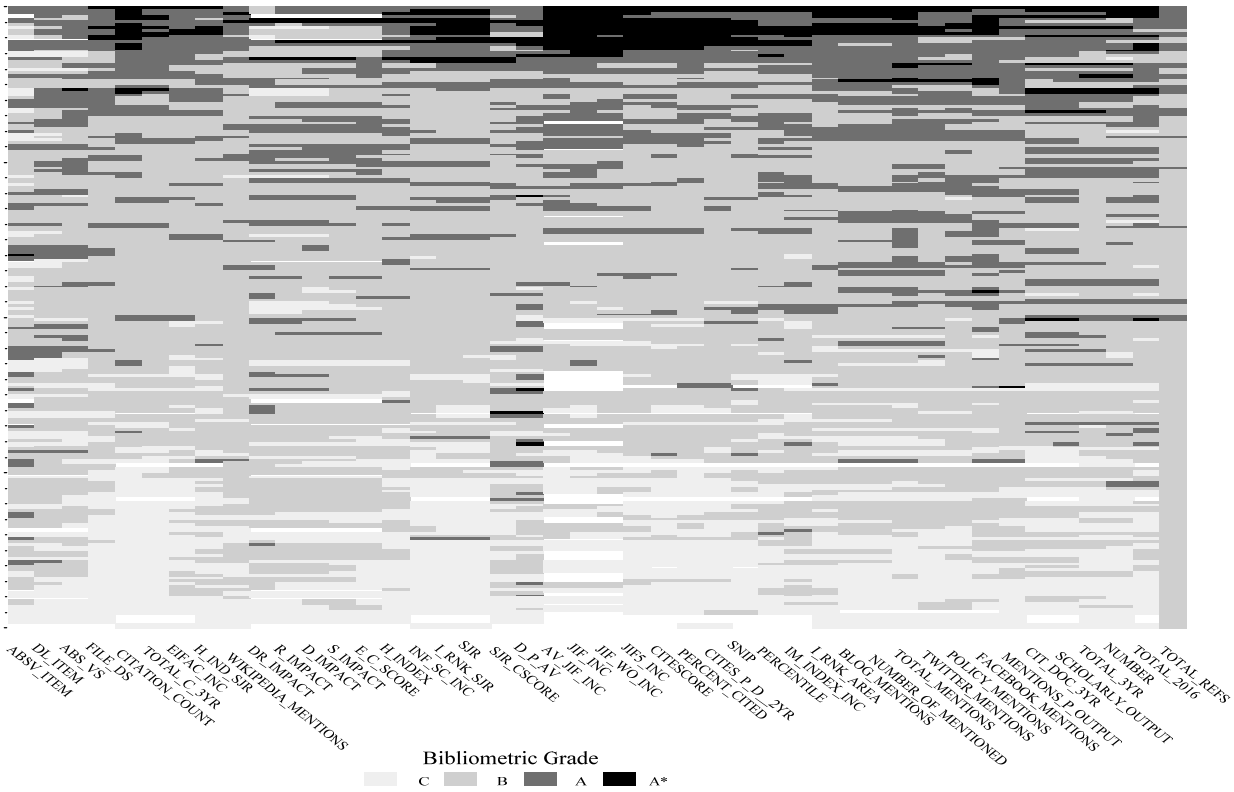
Journal	*ABDC*	*%high*	*%low*	*%same*	*m_diff*	*num*	*avg_grade*	*AJG*	*GPA*
Quantitative Economics	A*	0.00	81.82	18.18	-1.61	44	2.39	3	B
Economic Theory	A*	0.00	100.0	0.00	-1.49	35	2.51	3	A
Theoretical Economics	A*	0.00	79.55	20.45	-1.41	44	2.59	3	A
Econometric Theory	A*	0.00	86.36	13.64	-1.30	44	2.70	4	A
Biometrics	A*	0.00	72.73	27.27	-1.20	44	2.80		A
Journal of Law and Economics	A*	0.00	84.09	15.91	-1.20	44	2.80	3	A
Biometrika	A*	0.00	77.27	22.73	-1.16	44	2.84	4	A
Annals of Applied Probability	A*	0.00	96.88	3.13	-1.16	32	2.84		A
American Economic Journal: Microeconomics	A*	0.00	70.45	29.55	-1.11	44	2.89	3	A
Experimental Economics	A*	0.00	75.00	25.00	-1.02	44	2.98	3	A
Games and Economic Behavior	A*	0.00	77.27	22.73	-1.02	44	2.98	3	A
Probability Theory and Related Fields	A*	0.00	68.75	31.25	-1.00	32	3.00		A
Journal of Economic History	A*	0.00	75.00	25.00	-0.98	44	3.02	3	A
Biostatistics	A*	0.00	93.75	6.25	-0.97	32	3.03		A
Journal of Computational and Graphical Statistics	A*	0.00	90.63	9.38	-0.94	32	3.06		A
RAND Journal of Economics	A*	0.00	65.91	34.09	-0.93	44	3.07	4	A
Journal of the Royal Statistical Society Series B	A*	0.00	56.82	43.18	-0.91	44	3.09	4	A
Journal of Business and Economic Statistics	A*	0.00	68.18	31.82	-0.89	44	3.11	4	A
Annals of Probability	A*	0.00	59.38	40.63	-0.84	32	3.16		A
Journal of Economic Growth	A*	0.00	50.00	50.00	-0.84	44	3.16	3	A
Review of Economic Dynamics	A*	0.00	68.18	31.82	-0.84	44	3.16	3	A
Annals of Applied Statistics	A*	0.00	71.88	28.13	-0.81	32	3.19		A*

Appendix C. Heat maps of all journals with at least one measure by ABDC grade.

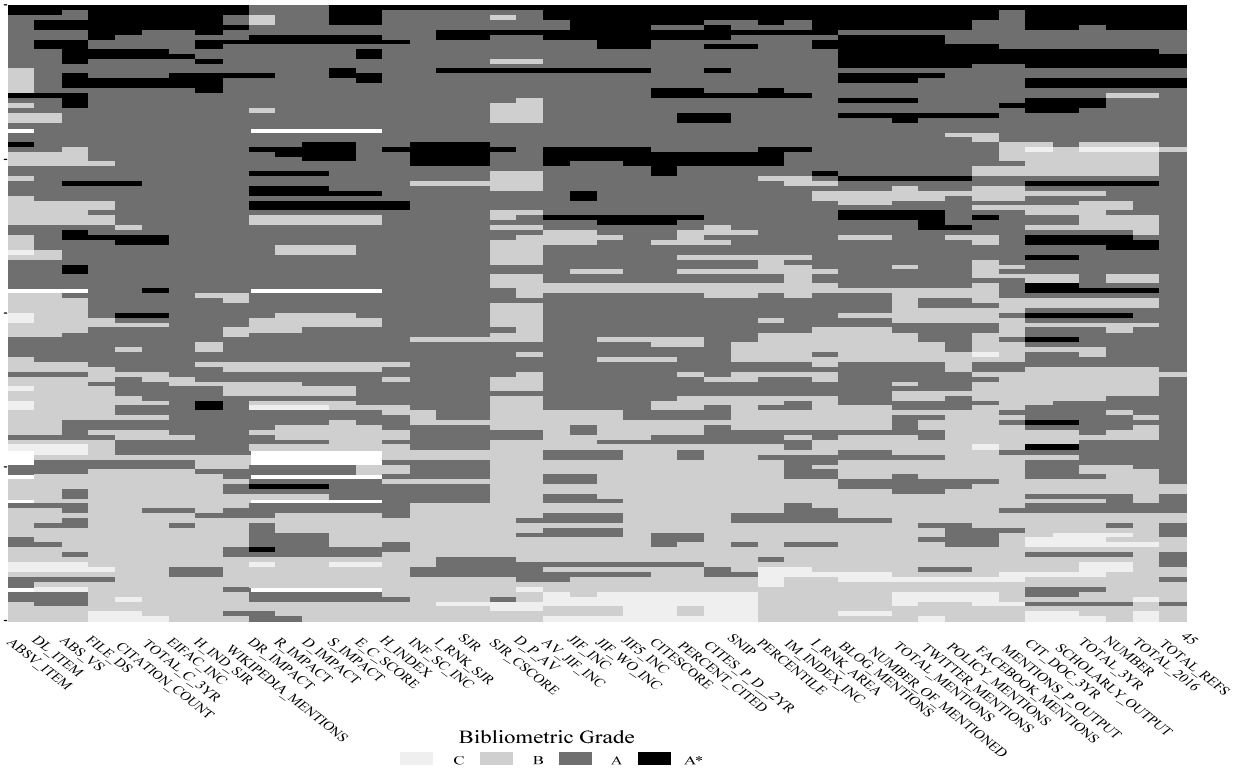
ABDC Grade C



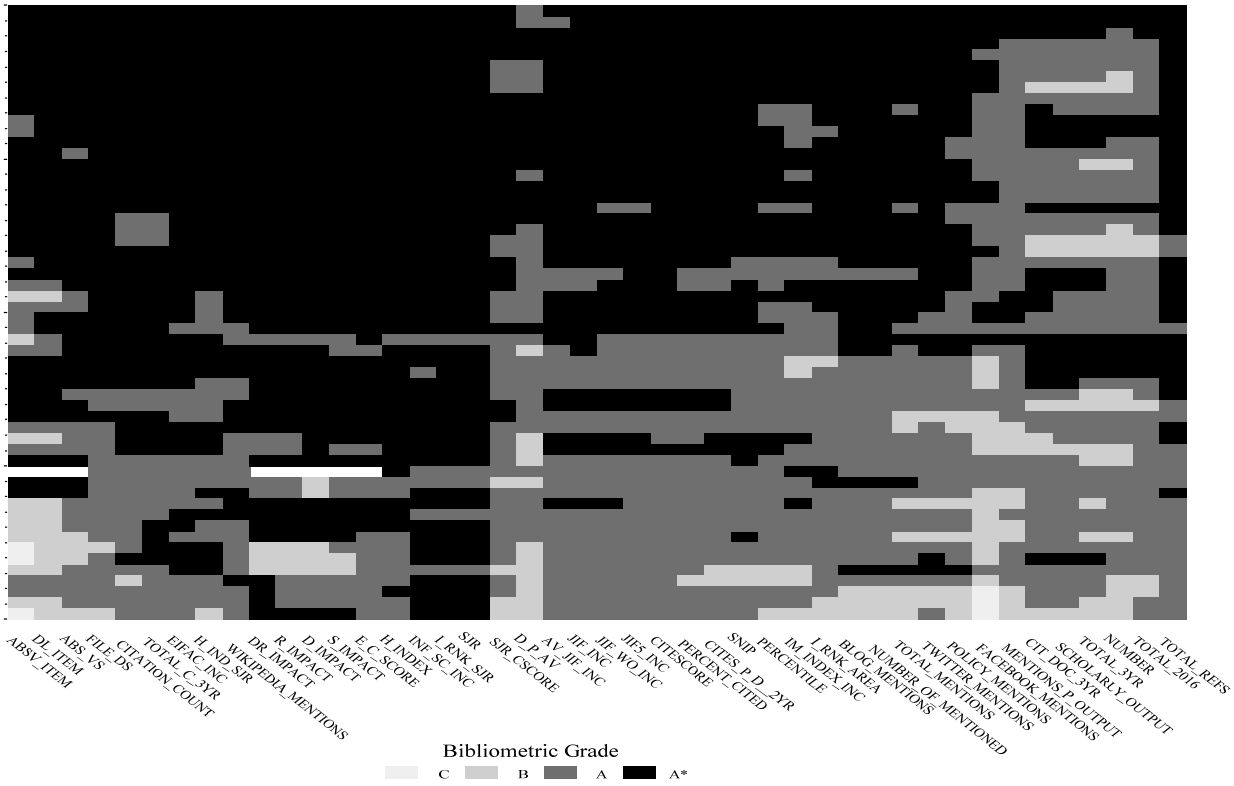
ABDC Grade B



ABDC Grade A



ABDC Grade A*



Heat Chart for All Journals with at least one measure