The Research Impact of Open Access Journal Articles

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Abstract

The availability of scientific and intellectual works freely through scientists' personal web sites, digital university archives or through the electronic print (eprint) archives of major scientific institutions has radically changed the process of scientific communication within the last decade. The "Open Access" (OA) initiative is having a tremendous impact upon the scientific communication process, which is largely based on publishing in scientific periodicals. This exploratory paper investigates the research impact of OA articles across the subject disciplines. The research impact of OA articles as measured by the number of citations varies from discipline to discipline. OA articles in Biology and Economics had the highest research impact. OA articles in hard, urban, and convergent fields such as Physics, Mathematics, and Chemical Engineering did not necessarily get cited most often.

Keywords: Open Access articles; research impact of Open Access articles; scholarly communication; citations analysis of Open Access articles

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1. INTRODUCTION

There are some 24,000 scientific journals publishing 2.5 million articles each year. Scientific journals are expensive. The economic model of publishing is based on subscription and licensing. Price hikes in the publishing sector within the last 30 years are well beyond the inflation rates. This has been primarily due to lack of competition. Some publishers can easily become monopolies, as no two journals can publish the same article in view of copyright restrictions. Moreover, those who use the scientific journals (scientists) and those who pay for this service (usually libraries) are different, which results in what is called the "price inelasticity" in economics and empowers the scientific journal publishers further (Meyer, 1997). As scientific journal prices increase, some libraries cancel some of their subscriptions because they cannot afford the price hikes. Publishers then increase prices further to make up the lost income. Consequently, some more libraries discontinue their subscriptions. In response, to make up the lost income, publishers increase the prices again. . . This vicious circle is not only the main cause of the so called "serials crisis," but also it affects the scientific communication process. Interestingly, the lack of competition in scientific journal publishing enables some publishers to increase their market shares by increasing prices. When the price of an already expensive journal is further increased, libraries tend to cut off subscriptions to cheaper but prestigious journals in order to keep the more expensive ones (House of Commons, 2004).

Scientific research and its outcome (e.g., scientific journal articles) get supported primarily by public money. Articles are given by scientists to commercial publishers free of charge and refereed by scientists free of charge. Yet, the same scientists pay dearly, through their libraries, to subscribe to the very same journals despite the fact that their salaries are paid for by public monies and their libraries are supported by public funds. The triple payment of public money to support research projects, to pay for salaries of scientists, and to fund libraries is emphasized by the following comment: "What other business receives the goods

that it sells to its customers from those same customers, a quality control mechanism provided by its customers, and a tremendous fee from those same customers?" (House of Commons, 2004). Universities and governments have recently begun to scrutinize the scientific communication process. Web access to research articles created new opportunities and showed that alternative or complementary economic models can be experimented with (Prosser, 2004; Willinsky, 2003).

One of these models is what is called Open Access (OA). OA is defined as "free . . . access to" scientific publications. "A complete version of the work . . . is deposited (and thus published) in at least one online repository . . . maintained by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, inter operability, and long-term archiving" (Bethesda, 2003). OA increases the research impact by making articles available, free of charge, to all those interested. Two parallel and integrated strategies to create a more effective and equitable scientific communication process are suggested: (1) researchers "self-archiving" their articles that are published in refereed journals in their web sites or institutional repositories and making them available through the Internet; and (2) researchers publishing their articles in OA journals. More than 90% of commercial publishers support self-archiving. There are currently more than 2,500 OA journals published in all subjects.

Several prominent institutions including OECD and UN support OA. Recently, some universities decided to mandate researchers to self-archive their published articles. A bill (Federal Research Public Access Act) mandating OA to publicly-funded scientific publications in the United States is likely to become enacted in the near future. The European Commission (EC) recommends OA to EC-funded research reports (European Commission, 2006, p. 87). Governments allocate billions of dollars of taxpayers' money to research. For instance, the annual budget (28 billion dollars) of the US National Institute of Health alone is higher than the GDP of 142 nations (Suber, 2006). OA increases the impact of the publicly-funded research and triggers new research projects, thereby increasing the return on investment (Lawrence, 2001; Harnad & Brody, 2004; Harnad et al., 2004; Antelman, 2004).

In this paper we look into the research impact of OA journal articles in sciences, social sciences, and arts and humanities. The term "research impact" in this study is defined as the number of times that each article is cited in the literature. Journal articles representing nine disciplines were selected from the Directory of Open Access Journals (www.doaj.org). Citations to each article were identified through Elsevier's Scopus. The research impact of articles in different disciplines was compared to find out the underlying trends. Findings were discussed in light of why OA is supported in varying degrees in sciences, social sciences, arts and humanities.

2. LITERATURE REVIEW

It has for long been observed that scientific communication processes differ in sciences, social sciences, and arts and humanities. While scientists publish their contributions primarily in journals as articles, social scientists and scholars of arts and humanities prefer monographs as the main outlet of their contributions. Whereas journal articles constitute 90% of all publications in sciences, books and monographs in social sciences constitute 40% of all publications (Suber, 2004). The intensity of production also differs from discipline to discipline. In chemistry it is not uncommon for a researcher to produce several journal articles in a given year whereas a social scientist would publish a single article perhaps every other year or so. Some social scientists and humanities scholars may not even bother to publish journal articles but concentrate on publishing a few monographs instead throughout their academic careers. "Disciplinary cultures" have an impact on scholarly communication

processes and the ways by which researchers in each discipline communicate their findings (Becher & Trowler, 2001).

The emergence of the Internet and electronic publishing in the early 1990s has profoundly changed the scientific communication patterns. While physicists and computer scientists, for instance, reacted very quickly and began to use electronic publishing as a means of disseminating research results over the Internet, social scientists and arts and humanities scholars were somewhat slow to react. For some researchers the acceptance of electronic publishing in support of scientific communication was "not just a matter of time": field differences have to a large extent determined the acceptance levels (Kling & McKim, 2000). Electronic publishing is seen as a transitory period by some reserachers, for example. Some do not trust the electronic media while others see electronic journals inferior compared to printed journals. Copyright concerns discourage some researchers. . . Reasons are too numerous to discuss in detail here. These cultural issues shape the scholarly communication and explain the degree of use of electronic journals across the fields (Fry & Talja, 2004).

Field differences and disciplinary cultures also played an important role in OA movement since mid-1990s. Similar concerns shied away some researchers from self-archiving their contributions through their personal web sites or institutional archives. While almost all articles in sciences (e.g., physics and mathematics) have currently been open access, the percentages are much lower in social sciences, arts and humanities (e.g., 60% in economics, 25%-30% in political science, psychology and sociology, and less than 20% in anthropology and geography) (Antelman, 2006, p. 88). Only 5% of social scientists self-archive their papers.

As mentioned earlier, OA makes scientific papers more visible and increase their research impact (Lawrence, 2001; Harnad & Brody, 2004; Harnad et al., 2004; Antelman, 2004). OA articles get cited more often by other researchers, thereby bringing their authors more recognition and prestige, and providing them incentives to do more research. The *Proceedings of the National Academy of Sciences* (PNAS) is a prestigious journal with an high impact factor (IF) publishing both OA and non-OA articles. OA articles published side by side with non-OA articles at *PNAS* were cited more quickly and twice as many times than non-OA articles (Eysenbach, 2006). This finding is somewhat contradictory with that of an earlier study (McVeigh, 2004) that analyzed the impact factors and citation patterns of OA journals in ISI databases and found that OA journals usually have lower IFs than non-OA journals in their subject categories. It appears that OA articles help increase the IF of a prestigious journal even further.

Earlier studies tended to measure the research impact of OA journal articles mainly by using the Web of Science (WoS) database of ISI (now Thomson Scientific). WoS at that time did not index that many OA journal titles. The situtation has changed in 2004, however. Elsevier's Scopus and Google's Google Scholar (GS) citation databases were introduced almost at the same time in November 2004. These databases track citations that come from refereed journals as well as those from resources available on the Web. The overlapping citations between WoS and Scopus, and WoS and GS are not as high as one would expect (58% and 31%, respectively, for articles in library and information studies) (Meho & Yang, in press). Scopus covered the library and information studies (LIS) literature more comprehensively and retrieved 26% unique citations that were not retrieved by WoS. The percentage of unique citations retrieved by GS was somewhat lower (21%). In different studies, WoS retrieved higher citation counts for articles that were published in 1985 in the Journal of American Society for Information Science and for articles in oncology and condensed matter physics in 1993 than Scopus and GS (Bauer & Bakkalbasi, 2005; Bakkalbasi, Bauer, Glover, & Wang, 2006). This is primarily due to the fact that the WoS database goes back to 1900s while the Scopus database cover citations since 1996.

(Information is not available for GS.) Jacso (2005) reviewed these three citation databases in more detail and compared them in terms of their major features such as database subject coverage and composition, number of records, and search and retrieval characteristics.

3. RESEARCH QUESTIONS

As reviewed earlier, the research impact of both OA and non-OA articles has been addressed in the past. There is a considerable difference between scientific disciplines in terms of both the rates of research impact and the acceptance of OA as a means of dissemination of research results. Antelman (2004) found that OA articles in mathematics and electrical and electronics engineering have a greater research impact than that in political science and philosophy. In a different study Antelman (2006) identified different degrees of acceptance of self-archiving in six social science disciplines (economics, sociology, geography, political science, anthropology, and psychology). Based on Becher and Trowler's (2001) and Whitley's (2000) studies, she posited that "differences between disciplines can be characterized in terms of the degree of mutual dependence between researchers and the degree of task uncertainty in defining shared problems, goals, and procedures" (Antelman, 2006, p. 92). The interdependency in social science disciplines is low and common issues and objectives are defined ambiguously. Moreover, the rates of self-archiving practice were found lower in divergent social science disciplines that concentrate on rural issues (e.g., anthropology, geography, sociology and psychology) and higher in convergent ones that concentrate on urban issues and have close relationships with other disciplines (e.g., economics) (Antelman, 2006, p. 92).

Antelman's interpretation of her findings seems interesting. If such a relationship between self-archiving rates and different scientific disciplines exists, one would think that a similar relationship may also hold true for varying degrees of research impact of OA articles in different fields. This paper aims to explore the conjecture that OA articles in the interdependent, convergent and urban disciplines would have higher research impact than that of independent, divergent and rural disciplines.

What is meant by hard/soft, urban/rural, and convergent/divergent fields is that "Physics represents hard science, which is convergent and urban in its social aspects; history is a soft discipline, relatively convergent and rural; sociology is a soft, divergent, and rural discipline; whereas biology is both mostly rural science, and also a mixture of soft and hard elements" (Kekäle, 2002, p. 68).

Nine fields under three groups were identified along this continuum of hard/soft, urban/rural, convergent/divergent and interdependent/independent scientific fields. In the first group, physics, mathematics, and chemical engineering represent hard and applied sciences that are convergent and urban in their social aspects. In the second group, economics, biology, and environmental science represent disciplines that have both hard and soft components. Economics is a more urban discipline than both biology and environmental science in this group. In the last group, sociology, psychology and anthropology represent soft, divergent, and rural disciplines. According to Whitley's (2000) dimensions, disciplines in the first group have "high degree of mutual dependence and low degree of task uncertainty" while the ones in the last group have the opposite. The disciplines in the last group lie somewhere in between.

This paper addresses the following research questions:

- Does the research impact of OA articles differ across the fields in sciences, social sciences, and arts and humanities?
- If it does, do OA articles in hard, urban and convergent fields receive more citations (hence higher research impact) than those in soft, rural, and divergent ones?

4. METHODOLOGY

What follows is a detailed account of the sampling process of articles published in OA journals.

The Directory of Open Access Journals (DOAJ, www.doaj.org) lists more than 2,500 OA journal titles. It was used to select OA journals representing nine disciplines (physics, mathematics, chemical engineering, economics, biology, environmental science, sociology, psychology and anthropology). The detail of each journal title (subject, year, language) was recorded (January 2007). Non-English journal titles and titles that did not have enough back issues (since 1999) published were excluded from the sample frame. DOAJ (www.doaj.org) assigns one or more subject headings to each journal title. Journal titles with a single subject heading were preferred.

Journal titles not covered by Elsevier's Scopus were excluded since Scopus was used to identify citations that each selected article received (more below). It was noted in the Scopus web site (info.scopus.com) that Scopus is the largest abstract and citation database of research literature containing 29 million abstracts from about 15,000 peer-reviewed journal titles in all fields along with 265 million citations. Abstracts and citations go back to 1966 and 1996, respectively.

The total number of articles published in OA journals in 1999, 2001 and 2003 were identified for selected nine disciplines. A sample of 30 articles was selected to represent each discipline, thereby making a total of 270 articles for all nine disciplines. Needless to say, sampling intervals were different for each discipline. As the number of OA journals in each discipline varied, articles in the samples for some disciplines came from a few journals (e.g., anthropology). Similarly, the number of articles published in some disciplines were much higher (e.g., physics), thereby making the sampling rates uneven across fields (Table 1).

Subjects	# of journals in DOAJ	# of journals in the sample	# of total articles in OA journals	# of OA articles taken from the sample journals	sample rate
Physics	23	6	2,543	30	1.2
Mathematics	77	16	1,092	30	2.7
Chemical Engineering	6	3	818	30	3.7
Economics	36	2	113	30	26.5
Environmental Sciences	12	3	247	30	12.1
Biology	50	7	690	30	4.3
Psychology	45	4	271	30	11.1
Sociology	33	3	97	30	30.9
Anthropology	22	2	111	30	27.0
Total	304	46	5,982	270	4.5

Table 1: Sampling statistics

All 270 articles were searched on Scopus for citations (March 2007). Retrieval results were entered into SPSS, a statistical analysis software. The number of citations, citing authors and journals along with years, and self-citations were recorded for each article. The citation age of each article was calculated. Various statistical tests were run using SPSS.

5. FINDINGS

Table 2 provides descriptive statistics about citations that 30 OA articles in each subject discipline received. All OA articles (N = 270) were cited 761 times ($\overline{X}$ = 2.8, SD = 4.7). The average number of citations per OA article ranged between 0.8 (Sociology) and 6.4 (Biology), although the distributions of citations for all disciplines were rather skewed (note the standard deviations being always higher than the averages). OA articles in Biology and Economics received almost half of all citations (25.2% and 20.2%, respectively) whereas the ones in Psychology and Sociology did much fewer (3.7% and 3.2%, respectively).

Subjects	# of OA articles	# of citations	%	$\overline{X}$	SD	# of OA articles with zero citations	median	max
Physics	30	95	12.5	3.2	3.7	9	2	16
Mathematics	30	44	5.8	1.5	1.9	11	1	7
Chemical Engineering	30	63	8.3	2.1	3.2	12	1	16
Subtotal	*90*	*202*	*26.5*	*2.2*	*3.1*	*32*	*1*	*16*
Economics	30	154	20.2	5.1	7.5	6	2.5	39
Environmental Sciences	30	63	8.3	2.1	2.8	12	1	13
Biology	30	192	25.2	6.4	7.4	2	4.5	38
Subtotal	*90*	*409*	*53.7*	*4.5*	*6.5*	*20*	*2.5*	*39*
Psychology	30	28	3.7	0.9	1.4	17	0	5
Sociology	30	24	3.2	0.8	1.3	20	0	5
Anthropology	30	98	12.9	3.3	5.3	6	2	26
Subtotal	*90*	*150*	*19.7*	*1.7*	*3.4*	*43*	*1*	*26*
Grand Total	270	761	100.1	2.8	4.7	95	1	39

Note: The percentage is not equal to 100% due to rounding.

Table 2: Citation statistics of open access articles in different fields

OA articles in the second group of fields received more than half (53.7%) of all citations, followed by the first group (26.5%) and the third group (19.7%). The second group of fields (Economics, Environmental Sciences, and Biology) that have both hard and soft components scored a much higher research impact than either the first group of fields (hard, convergent and urban) and the third group of fields did. The number of citations for each field within groups also differed. For instance, OA articles in Biology and Economics in the second group received much higher citations than that in Environmental Sciences. The difference was even more substantial for OA articles in Anthropology in the third group: they received about four times more citations than that in Sociology and Psychology.

The average self-citation rate for all subjects was 28.4% (216/761). Self-citation rates were much higher in Mathematics (45.5%) and Physics (43.2%) than that in Psychology (7.1%) and Economics (13.6%). More than one third (35%) of OA articles (95/270) were never cited at all. OA articles in Sociology and Psychology had the highest zero citation rates (67% and 57%, respectively) whereas only two out of 30 articles (7%) in Biology went uncited. About 17% (or 45 articles) were cited only once, 15% (40 articles) twice, 7% (20 articles) three times, and a further 26% (70 articles) four or more times. Two OA articles in Economics and Biology received the highest number of citations (39 and 38, respectively). The most-cited 10 OA articles collected 27% (209/761) of all citations (Table 3).

Rank	Authors (Publication Year). Article title. *Journal*.	# of times cited in Scopus	Subject
1	Berg, A., & Pattillo, C. (1999). Are currency crises predictable? A test. *IMF Staff Papers*.	39	economics
2	Lyubarsky, A.L. et al. (2001). RGS9-1 is required for normal inactivation of mouse cone phototransduction. *Molecular Vision*.	38	biology
3	Nishida, T., Kano, T., et al. (1999). Ethogram and ethnography of Mahale chimpanzees. *Anthropological Science*.	26	anthropology
4T	Plascak, J.A. et al. (1999). Phenomenological Renormalization Group Methods. *Brazilian Journal of Physics*.	16	physics
4T	Ishida, H. et al. (1999). New hominoid genus from the Middle Miocene of Nachola, Kenya. *Anthropological Science*.	16	anthropology
4T	Miura, M. (1999). Detection of chromatin-bound PCNA in mammalian cells and its use to study DNA excision repair. *Journal of Radiation Research*.	16	biology
4T	Yu, Q. et al. (2001). Retinal uptake of intravitreally injected Hsc/Hsp70 and its effect on susceptibility to light damage. *Molecular Vision*.	16	biology
4T	S.P. Asprey & Naka, Y. (1999). Mathematical Problems in Fitting Kinetic Models—Some New Perspectives. *Journal of Chemical Engineering of Japan*.	16	chemical engineering
9T	Blanchard, O. & Shleifer, A. (2001). Federalism with and without political centralization: China versus Russia. *IMF Staff Papers.*	13	economics
9T	Casey, T.G. et al. (1999). Metabolic behaviour of heterotrophic facultative aerobic organisms under aerated/unaeratedconditions. *Water SA*.	13	environmental sciences

Table 3: The 10 most-cited open access articles

Articles in the sample came from 46 different OA journals across the fields. Fifteen articles that appeared in 7 OA journals in different fields (Environmental Sciences, Mathematics, Physics, and Psychology) received no citations while 7 articles appeared in 7 OA journals (6 in Mathematics, 1 in Physics) received only one citation each (see Appendix). In addition to the Scopus database, half (23) of those OA journal titles were also listed in Thomson Scientific's Web of Science (WoS) citation database. There was no difference, however, between the articles listed in the Scopus database only and that listed in both Scopus and WoS databases in terms of the number of citations they received ($\chi^2_{(21)}$=.382, p = .396).

More than 60% of all citations to OA articles were received within the first three years after their publication (Figure 1). OA articles got cited in the literature less often after three years. The "half-life" (the time it takes to receive half of all citations) was 2 years for OA articles in Physics, Mathematics, Biology, and Psychology, and 3 years in Chemical Engineering, Economics, Environmental Sciences, Sociology and Anthropology.

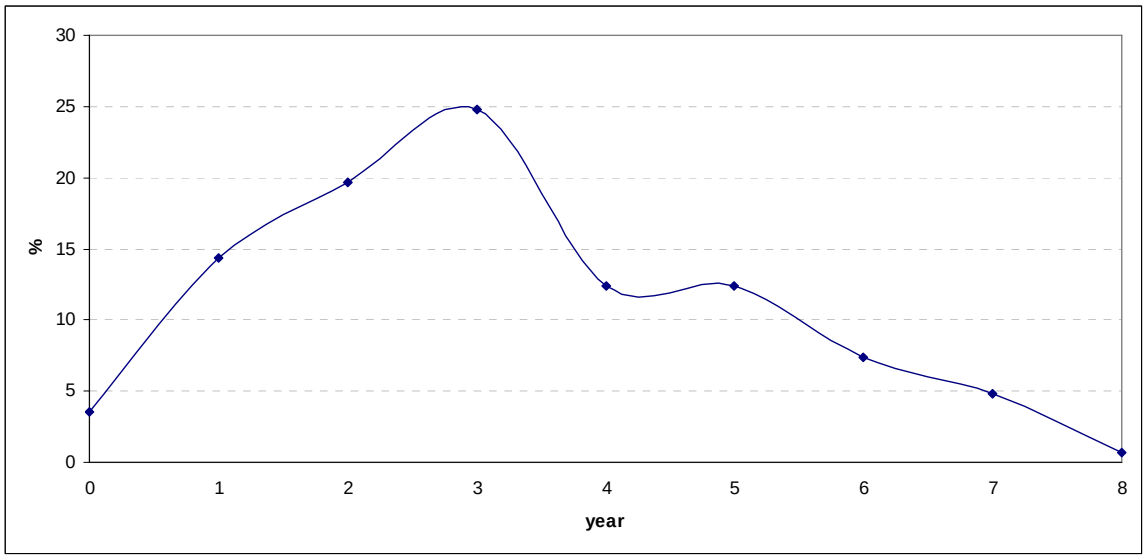

Figure 1: Temporal distribution of citations to open access articles after publication (in years)

6. DISCUSSION

This study confirmed the findings of earlier ones in that the research impact of OA articles differ across the fields. Some subtle differences were observed, however, in terms of the research impact of certain disciplines (e.g., mathematics and anthropology). Antelman (2004) found that mathematics had a greater research impact than some social science disciplines (e.g., political science). Yet, OA articles in Mathematics received much fewer citations in the present study and almost half of them were self-citations. Usually, articles in social sciences and humanities get cited much less often. OA articles in Economics and Anthropology were among the most heavily cited ones (after those in Biology).

Such variations in research impact across the fields may be susceptible to the small sizes of samples (30 articles) for each subject discipline and the uneven distribution of sampled articles to journals in respective fields. For instance, OA articles in Mathematics came from 16 different journals, more than half of which received either zero or one citation only (average being 1.5 citations). On the other hand, those in Economics and Anthropology came from two journals in each subject and they collected relatively higher number of citations per article (averages being 5.1 for Economics and 3.3 for Anthropology). This may perhaps be explained by the research impact of articles that appeared in prestigious OA journals in Economics (IMF Staff Papers, Asian Development Review in Economics) and Anthropology (Anthropological Science, and Journal of Physiological Anthropology and Applied Human Science).

The main objective of this paper was to explore if there is a relationship between the research impact of OA articles and the characteristics of the subject fields (e.g., hard/soft, urban/rural, and convergent/divergent). Findings do not seem to indicate any discernible pattern between these two variables. In other words, OA articles in hard, urban and convergent fields such as Physics, Mathematics, and Chemical Engineering did not necessarily have higher research impact than those that have both hard/soft and urban/rural components such as Biology and Economics. In fact, it was just the opposite: OA articles in the second group (Economics, Environmental Sciences, and Biology) received twice as many citations than those in the first group did. OA articles in soft and divergent fields concentrating on rural issues (e.g., Sociology and Psychology) had lower research impact as expected. Although in the same group with Sociology and Psychology, OA articles in

Anthropology had higher research impact than all the subjects in the first group (Physics, Mathematics, and Chemical Engineering) and Environmental Sciences in the second group.

Recall that the research question in this study emerged from Antelman's (2006) findings on self-archiving rates in different social science disciplines (higher in convergent and urban fields such as Economics, and lower in divergent and rural fields such as Anthropology, Geography, Sociology and Psychology). We hypothesized implicitly that OA articles in hard, urban and convergent fields receive more citations (hence higher research impact) than those in soft, rural, and divergent ones. It appears that the research impact of OA articles in Economics, Sociology and Psychology resembles the behavior of self-archiving. The research impact of OA articles in Anthropology is quite different, however. Moreover, the research impact of hard, urban and convergent fields (Physics, Mathematics, and Chemical Engineering) have no resemblance whatsoever to self-archiving practices. It may well be that self-archiving and research impact measured by the number of citations are two completely different things. It is also highly likely that, as we indicated earlier, the small sample sizes of OA articles in each subject did not allow any trends to emerge. The hypothesis needs to be tested using much larger samples with carefully designed studies.

7. CONCLUSION

We investigated the research impact of OA articles across the subject disciplines in this exploratory paper and found that it varies from discipline to discipline. OA articles in hard, urban and convergent fields do not seem to have higher research impact as measured by the number of citations than mixed (hard/soft, urban/rural, and convergent/divergent) ones. OA articles in Biology and Economics behaved like hard sciences in terms of research impact. Findings are inconclusive, however. Explanatory studies need to be replicated in order to test the hypothesis that OA articles in hard, urban and convergent fields receive more citations (hence higher research impact) than those in soft, rural, and divergent ones.

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Appendix. Number of articles and citations in 46 Open access journal titles

Journal	Subject	# of times cited	# of articles in the sample	$\overline{X}$	Indexed in WoS
Acta Physica Polonica B	physics	56	14	4.0	Yes
Brazilian Journal of Physics	physics	21	4	5.3	Yes
Entropy: international and interdisciplinary journal of entropy and information studies	physics	3	2	1.5	No
New Journal of Physics	physics	0	2	0.0	Yes
Pramana: Journal of Physics	physics	14	6	2.3	Yes
Turkish Journal of Physics	physics	1	2	0.5	No
Balkan Journal of Geometry and Its Applications	mathematics	0	1	0.0	No
Bulletin (new series) of the American Mathematical Society	mathematics	1	1	1.0	Yes
Electronic Journal of Differential Equations	mathematics	9	8	1.1	No
Electronic Journal of Linear Algebra	mathematics	0	1	0.0	Yes
Electronic Journal of Qualitative Theory of Differential Equations	mathematics	1	1	1.0	No
Electronic Research Announcements of the American Mathematical Society	mathematics	0	1	0.0	Yes
Electronic Transactions on Numerical Analysis	mathematics	6	1	6.0	Yes
Homology, Homotopy and Applications(HHA)	mathematics	1	1	1.0	Yes
Journal of Graph Algorithms and Applications	mathematics	3	1	3.0	No
Journal of Inequalities and Applications	mathematics	1	1	1.0	Yes
Journal of Integer Sequences	mathematics	4	2	2.0	No
Lobachevskii Journal of Mathematics	mathematics	2	2	1.0	No
Missouri Journal of Mathematical Sciences	mathematics	1	2	0.5	No
The Electronic Journal of Combinatorics	mathematics	6	4	1.5	Yes
The New York Journal of Mathematics	mathematics	1	1	1.0	No
Theory and Applications of Categories	mathematics	8	2	4.0	No
Brazilian Journal of Chemical Engineering	chemical engineering	5	5	1.0	Yes
Iranian Polymer Journal	chemical engineering	4	5	0.8	Yes
Journal of Chemical Engineering of Japan	chemical engineering	54	20	2.7	Yes
Asian Development Review	economics	14	5	2.8	No
IMF Staff Papers	economics	140	25	5.6	Yes
Electronic Green Journal	environmental sciences	2	3	0.7	No
Park Science	environmental sciences	0	5	0.0	No
Water SA	environmental sciences	61	22	2.8	Yes
Biological Procedures Online	biology	12	2	6.0	Yes
Cell Structure and Function	biology	14	2	7.0	Yes
Experimental and molecular medicine EMM	biology	27	5	5.4	Yes
In Silico Biology	biology	3	1	3.0	No
Journal of Biosciences	biology	21	7	3.0	Yes
Journal of Radiation Research	biology	22	3	7.3	Yes
Molecular Vision	biology	93	10	9.3	Yes
Current Research in Social Psychology	psychology	6	5	1.2	No
Dynamical Psychology: an international, interdisciplinary journal of complex mental processes	psychology	0	3	0.0	No
Journal of Technology in Counseling	psychology	0	2	0.0	No
PSYCHE: An Interdisciplinary Journal of Research on Consciousness	psychology	22	20	1.1	No
Journal of Criminal Justice and Popular Culture	sociology	15	12	1.3	No
IDEA: a Journal of Social Issues	sociology	0	4	0.0	No
Journal of Memetics - Evolutionary Models of Information Transmission	sociology	9	14	0.6	No
Anthropological Science	anthropology	58	14	4.1	Yes
Journal of Physiological Anthropology and Applied Human Science	anthropology	40	16	2.5	No