Polarization in the future journal publishing ecosystem : Selective subscription journals and open access mega-journals

doi: 10.22381/JSME6320183

Addleton Academic Publishers

Journal of Self-Governance and Management Economics 6(3), 2018
pp. 96–128, ISSN 2329-4175, eISSN 2377-0996 doi:10.22381/JSME6320183

POLARIZATION IN THE FUTURE JOURNAL PUBLISHING ECOSYSTEM: SELECTIVE SUBSCRIPTION JOURNALS AND OPEN ACCESS MEGA-JOURNALS

MASAHIRO OKADA
masahiro_okada@ide.go.jp;
masahiro.okada@anu.edu.au
Australia–Japan Research Centre,
Crawford School of Public Policy,
Australian National University, Canberra;
Institute of Developing Economies, JETRO, Japan

ABSTRACT. The development of information technology has drastically changed scholarly communication. The advent of electronic journals has changed the industrial structure of academic publishing. As the market concentration of journal publishing continues to increase, the pricing of journals has been dominated and controlled by large publishers. The never-ending rise of subscription prices is approaching a tipping point that libraries/institutions – even in high-income countries – can no longer bear. In these circumstances, the open access (OA) movement has been promoted over the past 15 years, and new types of publications have appeared. This paper discusses the position of each stakeholder in the OA landscape, and foresees a new ecosystem of future journal publishing – the polarization of selective subscription journals and OA mega-journals.
JEL codes: D83; L86

Keywords: scholarly communication; open access; OA mega-journals; funders' OA platforms

How to cite: Okada, Masahiro (2018). "Polarization in the Future Journal Publishing Ecosystem: Selective Subscription Journals and Open Access Mega-Journals," *Journal of Self-Governance and Management Economics* 6(3): 96–128.

Received 29 May 2018 • Received in revised form 16 August 2018
Accepted 18 August 2018 • Available online 10 September 2018

Introduction

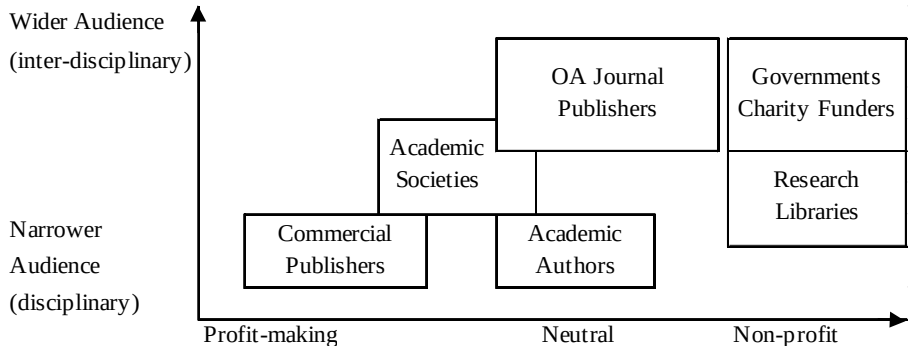
The development of information technology (IT) has drastically changed people's attitudes toward information collection. Around the globe, as long as people can access the Internet, useful information can easily be obtained free of charge. As this IT revolution has evolved, academic publishing, especially journal publishing, has dramatically changed, with the most significant innovation being the advent of electronic journals.

Electronic journals have drastically changed the attitudes of researchers. Scholars no longer need to visit a library building to read and photocopy journal articles because they can easily access and download those articles from their offices or their home computers. This remarkable convenience, however, has been accompanied by a major problem, i.e., the skyrocketing of journal-subscription prices over nearly three decades.[1] Currently, not only libraries (i.e., research libraries) in low-income countries but also those in high-income countries face serious difficulties paying the subscription fees of the journals they need.

From these circumstances, the open access (OA) movement was born. Over the past 15 years, numerous OA arguments have been made and new types of publications have appeared. As described in the next section, the extensive growth of open access publications is indisputable. However, traditional expensive toll-access (TA) journals have not been replaced by full-OA journals (i.e., Gold OA journals, which will be explained in the next section; hereafter, this type is called OA journals), and the problem of exorbitant increases in subscription prices, the so-called "serials crisis," does not seem as though it will end in the near future.

The promotion of open access is not straightforward. Various stakeholders have a variety of interests in open access. The main stakeholders are libraries, authors (researchers), funding agencies, commercial publishers, and OA journal publishers. Their positions on the OA map are illustrated in Figure 1.

Figure 1 Standing position of OA stakeholders



Libraries, who take a strong hostile attitude toward oligopolistic commercial publishers, vehemently hope to reduce the cost of journal subscriptions. Libraries have to meet the needs of researchers and students under budgetary constraints. Although they would like the OA movement to lighten their budgetary burdens, it seems that this has not been realized up until now.

Academic authors take an ambivalent stance on the OA movement. They are increasingly aware of the merits of OA, but the reputation of journals carrying their articles is the most important factor to consider when selecting a journal (Guedon, 2017; Togia and Korobili, 2014). They hope to publish articles in prestigious journals, i.e., well-known high-ranking journals; they want their articles to be read by academics in the same sub-discipline and want to contribute to their fields. Publishing in core academic journals garners academic prestige, and a list of publications certifies the academic standing of researchers. The future of academics, i.e., their tenure, promotion, or funding, is dependent on academic publication.

Academic associations/societies, especially those that publish high-ranking journals, have benefited substantially from the sale of their TA journals, which are published through large commercial publishers. Although these societies are not profit-making entities, the income from the sale of their journals has been locked into their activity budgets. As turning TA journals into OA journals will certainly decrease income, these societies are placed in an awkward position with regard to the OA movement (Bull, 2016b; Hockschild, 2016).

Funding agencies such as governments and charity funders are playing an important role in the promotion of OA. Research funders are not profit-making, and they strongly desire to contribute to the global community. They have strongly endorsed open access to the publications that result from the research they fund. The UK government, the EU, and charity foundations have issued OA mandates to require grantees to make their research results open. These mandates from funders are powerful and certainly serve to promote open access.

Commercial publishers that publish TA journals are profit-making entities. Leading publishers are Elsevier, Springer, Wiley, Taylor & Francis, and Sage. These publishers have been reluctant to promote OA but have recently shown interest in OA publishing because they have also identified a business opportunity in OA publications.

Non-commercial and commercial publishers that mainly publish OA journals are the primary advocates of OA and are new business entities of the digital revolution. They run their businesses based on an article processing charge (APC). A large number of full OA journals are currently published, but it is unlikely that they will replace existing TA journals. However, a unique and innovative journal model has emerged, known as an OAMJ (open access mega-journal). These mega-journals and other similar journals that

publish a huge number of articles may have a great impact on the journal publishing landscape, which is described in detail in Section 4.

The positions of respective stakeholders, as suppliers of research products, are different from one another, but from the demand side, beneficiaries – including authors, academics, students, and citizen-researchers – welcome OA movements. Readers simply prefer free and instantaneous access that can be obtained with one click on the Internet (Bjork, 2016).

The next section defines OA. In Section 2, the prevalence of OA and its impact will be described. In Section 3, the situations of the above-mentioned stakeholders are described in detail. In Section 4, the emergence of OA mega-journals and the innovative features of their business models are introduced. The final section concludes the discussion.

1. What Is Open Access?

The OA movement is strongly championed by librarians who have become exasperated by prohibitively high – and rising – journal subscription fees. The UK government and charity funders have also promoted OA due to their belief that research results funded by public or charity funds should be freely available to the public. In addition, the movement is also promoted by the increasingly recognized – and much broader – concept of open science, which is a movement to make scientific research and data accessible to all people so that they can contribute to the further development of science. Suber (2012: 4) states succinctly that "Open access (OA) literature is digital, online, free of charge, and free of most copyright and licensing restrictions." The term was introduced by the Budapest Open Access Initiative (BOAI) in February 2002.[2]

There are several routes to attaining OA (libre, gratis, and in between). These routes are described as follows:

1. Gold OA: A route to making peer-reviewed articles free to read and reuse (libre OA). This type of OA is realized by the publication of articles in OA journals. The basic idea is that the author-side pays the cost of publishing in a journal by paying the APC (article processing charge), so readers are not required to pay a subscription fee.[3] As nearly 95% of OA journals use creative commons licenses (basically CC BY),[4] almost all articles in OA journals are reusable. The UK and Dutch governments advocate this Gold OA route.

2. Green OA: A route to making peer-reviewed articles (self-archived versions) free to read. This access is enabled by the self-archiving of final manuscripts that are accepted for publication in a subscription journal. These articles are called "postprints" (any versions of an article approved by peer-

review) and are archived either in institutional repositories (IRs) or disciplinary repositories. Well-known disciplinary repositories are ArXiv and PubMed Central. Reuse rights depend on the respective articles. Repositories also include any versions of an article produced prior to peer review; these articles are called "preprints."

3. Hybrid OA: A route to making published (printed) articles free to read. Many TA journals have increasingly adopted an open access option. This option makes an article immediately freely available on the journal website to everyone, although authors have to pay high fees for this option. Authors choosing this option can opt for reuse rights by selecting one of the available creative commons licenses.

4. Delayed OA: In this route, articles published in a TA journal are free to read, but they are only made available on a journal's website after an embargo period (Laakso and Bjork, 2013). Reuse rights are limited.

5. Academic Social Networks: In this route, articles published in a TA journal are free to read; they are shared on commercial online social networks such as ResearchGate and Academia.edu. However, this route is problematic because many articles are said to be illegally posted and hosted because of authors' negligence/ignorance of copyrights.

6. Robin Hood/Rogue OA: A route to making articles published in a TA journal free to read; the articles are shared on illegal pirating sites. A well-known popular site is Sci-Hub (Archambault et al., 2014).

Open access (or open science) has been predominantly discussed in science disciplines, and OA has gained a foothold in scientific fields. However, the social sciences and humanities also follow this trend, and funders' OA mandates do not distinguish these disciplines from those in the natural sciences.[5] The history of the OA movement is provided in detail by the Open Access Directory.[6] Guedon (2017) and Tennant et al. (2016) are also very informative.

2. How Does OA Work?

2.1. The prevalence of OA

Many studies have estimated the proportion of articles that are free to read, and studies have also analyzed the citation advantage of OA articles. For example, Archambault et al. (2014) analyzed data on one million randomly sampled articles from Scopus, and Piwowar et al. (2018) analyzed three sets of 100,000 randomly sampled articles from Crossref, Web of Science, and Unpaywall, respectively. Although both studies used different data, time periods, and estimation methods, 40–50% of articles published recently seem to be freely available online. The proportion of OA is said to be relatively high

in biomedical research and mathematics (more than 50%) but notably low in engineering, chemistry, the social sciences, and the humanities (20–30%).

Archambault et al. (2014) also examined the free availability of scholarly publications for 44 countries (EU28, ERA,[7] Brazil, Canada, Japan, and the US) during 2008–2013 period. All countries had more than 50% of their papers freely available online. For the Netherlands, Portugal, Croatia, Estonia, and Switzerland, the figure surpassed 70%. The rates of availability in other countries were as follows: the United States (67.9%), Canada (64.4%), Brazil (76%), and Japan (50%).

Table 1 shows the data from the Web of Science Core Collection, which illustrates the number of articles written by authors in certain countries (countries show the location of the author's affiliation. An article written by multiple authors with different nationalities has plural nationalities). The Netherlands, England, and Switzerland show high shares of OA articles.

Table 1 Number of English articles according to the nationality of author's institutions, 2017 (Web of Science)

	Total	OA Articles	OA/Total
USA	426,191	143,684	33.7%
China	345,769	96,906	28.0%
England	114,118	49,663	43.5%
Germany	107,876	37,704	35.0%
Japan	84,667	30,605	36.1%
India	84,506	20,807	24.6%
France	73,432	22,280	30.3%
Canada	72,170	21,457	29.7%
Italy	70,113	22,021	31.4%
Australia	68,618	19,660	28.7%
South Korea	61,086	19,745	32.3%
Spain	57,507	18,601	32.3%
Brazil	47,733	17,654	37.0%
Netherlands	40,996	18,822	45.9%
Switzerland	31,805	13,073	41.1%
Taiwan	25,673	8,945	34.8%

Source: Web of Science (accessed on August 6, 2018).
Notes: 1. Author's affiliation: An article written by multiple authors has more than one country, but a country is counted only once even if multiple authors are from the same country.
2. Articles in English only. Other types, e.g., proceeding papers, reviews, and editorial matters, are not included.

2.2. The impact of OA

Open access is expected to bring about many benefits, such as higher citation counts, higher media exposure, new findings via data mining, and availability to low-income people.

First, one of the most interesting questions is whether there is a citation advantage to OA. Tennant et al. (2016) examined 33 survey articles (2001–2015), each of which estimated the citation advantage of OA publication, and tabulated the studied disciplines and OA citation advantages by article.

Although the magnitude of the advantage varies substantially depending on the discipline, the general tendency showed at least some association between OA publishing and increased citation counts. A more comprehensive list of studies is available on SPARC Europe's Open Access Citation Advantage Service (OACA).[8] The list includes article titles, disciplinary areas, sample sizes, basic analytical approaches, citation advantage, and attribution of advantage to a particular OA component. The list contains 70 studies published by 2015, showing that 46 studies found a citation advantage; 17 studies found no citation advantage; and 7 studies were inconclusive. In addition, Archambault et al. (2014) analyzed data on one million articles from Scopus, Archambault et al. (2016) analyzed data on 3.3 million articles from the Web of Science, and Piwowar et al. (2018) analyzed data on 0.1 million articles from the Web of Science; all authors agreed that open access confers citation advantages compared with publishing in TA journals.

Second, media exposure is also important for impact. A variety of alternative metrics (e.g., social media attention, Mendeley readership, and media attention) have been proposed recently as measurements that can complement traditional bibliometrics (e.g., journal impact factor [JIF] based on citation counts) (Roemer and Borchardt, 2015).[9] Alternative metrics are capable of tracking articles that attract attention in media other than journals. Many studies show that OA publications get more media coverage than do TA journal articles. Alternative metrics do not necessarily evaluate the quality of articles, but it is reasonable to expect that easily accessible articles will have more chances of being noticed and cited.

Third, the text- and data-mining (TDM) of OA literature has the potential for innovative impact. License-free publications, such as articles published in OA journals, allow computer reading. For example, TDM makes it "possible to easily compare one's results with those of the published literature, identify convergence of evidence, … and discover frequent tentative hypotheses that can be used for new research." "TDM can be used in various innovative ways and is an emerging and rapidly advancing field. Non-restrictive licensing through OA certainly promotes its wider application" (Tennant et al., 2016: 11).

Last, OA not only benefits academics in both developed and low-income countries but also has wider impacts on many other segments of the population, e.g., citizen scientists, retired academics, medical patients, and various NGOs. The Internet and OA will open up possibilities for knowledge to be used in unexpected and innovative ways, far beyond mainstream professional research (Tennant et al., 2016; Wilsdon et al., 2015).

In summary, OA is expected to bring about various benefits to society, but the adoption of OA is not straightforward. The next section describes the attitudes of actors who are engaged in scholarly communication.

3. Stakeholders

3.1. Libraries

Librarians are strong advocates of OA movements. Facing budget constraints and increasing journal subscription costs, they want OA movements to lighten their budgetary burdens. The troubles are exemplified by a recent series of big deal/package cancellations from national-level consortia and many universities. For example, in 2017, the Taiwan consortium (CONCERT), representing more than 140 institutions, canceled its contract with Elsevier. The University of Maryland decided to cancel its Taylor and Francis package effective FY2018.[10] A German consortium (DEAL Project) asked Elsevier for a collective deal on future subscription contracts at about half the price that they had paid in the past. However, no agreement was reached, and more than one hundred academic institutions declared that they would not renew their subscription contracts with Elsevier.[11] In April 2018, Couperin, a consortium representing 250 French universities, grandes écoles, and other research bodies, had not yet agreed on a new contract with Springer Nature after more than one year, though their access to Springer content has not yet been cut.[12] In May, Bibsam Consortium, representing 85 Swedish universities and research institutions, cancelled their contract with the publisher Elsevier.[13]

SPARC (Scholarly Publishing and Academic Resources Coalition), the members of which are more than 200 research libraries in the United States and Canada, has been actively promoting the open sharing of research outputs. SPARC has a global network of partners, including more than 600 libraries and research institutions around the world. Its website provides a list of recent negotiations and cancellations of big deals between universities/consortia and publishers,[14] as well as other resources relating to open access initiatives.

In addition, library publishing has become a much-discussed topic over the course of the OA movement. The LPC (Library Publishing Coalition),[15] the members of which are more than 70 academic/research libraries, has been supporting the library publishing initiative. An increasing number of university libraries have started to enter the area of publishing. A survey of the Association of American University Presses (AAUP 2013) conducted in May 2012 reported that 77% of 42 library respondents agreed that publishing should be part of the library's mission.

The Library Publishing Directory 2018 issued by the LPC provides information on the publishing programs of 156 libraries around the world. Countries included in this directory are the United States (119 libraries), Canada (14), the UK (7), Australia (7), Brazil (2), New Zealand (2), Germany (1), Ireland (1), South Africa (1), Ukraine (1), and Sweden (1) (LPC, 2017). This directory summarizes the listed programs as follows: (1) the major publishing outlets are faculty-driven journals (442 journals), monographs (488

titles), and student-driven journals (224 journals); (2) 50% of the programs rely on the library's operations budget; and (3) 82% of the programs focus entirely or almost entirely on OA publishing.

How do librarians view the future of research libraries? Pinfield, Cox, and Rutter (2017) conducted a survey of library staff (261 respondents) at UK higher education libraries and 33 interviews of experts in the UK, the United States, and other countries to elucidate librarians' views about the next decade. The authors discovered that library professionals are overwhelmingly optimistic about the future of libraries and positive about the value of their skills, while they still recognize that they will face many challenges in the near future, e.g., fewer library jobs, repurposing of the library's role, and new skill requirements. The need to shift focus from collection management to services was widely acknowledged. The librarians were aware that libraries need to add new services to support the creation, curation, and discoverability of internally created contents. This report proposed that the traditional image of libraries should be questioned.

Wolff (2017) reports the results of the "Ithaka S+R US Library Survey 2016." The respondents to this survey are 722 deans/directors at US academic libraries, and they anticipate increased resource allocation toward services. Spending on e-resources has been increased at the cost of spending on print resources, but dependence on e-resources has potentially peaked. These respondents are concerned about budget cuts affecting their purchasing of print books. Library directors are increasingly recognizing that discovery does not and should not always happen in the library. Doctoral university libraries gave high ratings to the role of the library in paying for resources needed by faculty members, maintaining a repository, and providing active support for faculty research.

Fruin (2017) surveyed 12 out of 37 RLUK (Research Libraries of the UK) member libraries in 2015–2016 and compared the results with a comparable survey from the US (Radom, Feltner-Reichert, and Stringer-Stanback, 2012), which included 60 out of 126 ARL (Association of Research Libraries) member libraries. The types of scholarly communication services provided by UK libraries and US libraries are very similar, with a few exceptions. All the UK libraries provide financial support for OA publishing through open access publishing funds, but only 33% of the US counterparts have those funds.[16] In addition, UK libraries have more personnel dedicated to scholarly communication than do US libraries. These differences are due to differences in circumstances surrounding research funding and funders' open access mandates. Ensuring compliance with the OA mandate has become a crucially important job for UK research libraries.

3.2. Authors

Governments and research funders, especially in the UK and other European countries, have been increasingly requiring universities and academics to make their publications open to the public. However, the awareness and knowledge of OA among academics is insufficient, even in the UK (Bull, 2016a). Academics are preoccupied with publishing an article in a prestigious journal (Togia and Korobili, 2014). Furthermore, the established journals are TA journals, which require no APC. Many studies note that OA journals requiring APC limit the publishing abilities of researchers with less funding, such as academics in low-income countries or those in less-funded, non-natural-science disciplines, such as the arts/humanities and social sciences. All in all, authors do not care whether the journal carrying their papers is OA or not (Armstrong, 2015).

Nicholas (2017) surveyed 116 early career researchers in seven countries and reported that they are still especially eager to publish articles in prestigious journals. These scholars want to earn reputational credit, and they show little interest in OA publications, institutional repositories, and Open Science. Tenopir et al. (2016) surveying 2,021 scholars at four research universities (University of British Columbia–Vancouver, University of California–Davis, University of California–Irvine, and Ohio State University), reported that open access is the least important attribute when scholars are choosing where to publish.

In the "Ithaka S+R US Faculty Survey 2015," Wolff, Rod, and Schonfeld (2016a) surveyed 9,203 faculty members in humanities, social sciences, sciences, and medical science at US four-year colleges/universities. Interesting findings in the context of OA or open science arguments are: (1) monographs in print format are still preferred; and (2) scholars in the social sciences and in medical disciplines think that preprints should also be rewarded.

In the "Ithaka S+R UK Survey of Academics 2015," Wolff, Rod, and Schonfeld (2016b) surveyed 6,679 academic staff in arts and humanities, social sciences, sciences, and medical/veterinary science at UK higher education institutions (i.e., both RLUK and non-RLUK institutions).

Interesting findings in relation to the above-mentioned US survey are: (1) when respondents lack immediate access through their library's physical or digital collections to monographs/articles that they want, their first choice is to search for a freely available version online, followed by giving up, followed by using interlibrary loan or document delivery services; (2) scholars think that preprints/e-prints and software/code should also be rewarded; and (3) nearly 70% of respondents have received or are currently receiving extramural funding for their scholarly research from a public or government grant-making organization.

In summary, there is no strong motivation/incentive for authors to promote OA at least under the current circumstances. However, it is worth noting that academics are crucial stakeholders who can tip the scale of the landscape of scholarly communications. Researchers are authors as well as major readers of scholarly publications. To promote the OA movement, any transformation needs to satisfy the fundamental interests of researchers.

3.3. Academic societies

Large academic societies, especially those that own high-ranking journals, receive a sizable amount of income by licensing their journals to major publishers. For example, the UK's Political Studies Association earned £0.51 million in 2014 from the publishers of its journals (Bull, 2016b). This association publishes five journals, including *Politics* (Sage), *BJPIR–British Journal of Politics and International Relations* (Sage), *Political Studies* (Sage), *Political Studies Review* (Wiley), and *Political Insight* (Sage). In 2014, the American Sociological Association (2015) recorded publication revenue of $2.74 million, against $1.45 million in publication and editorial office costs. This association publishes 14 journals (including OA journals), of which the representative journals published by Sage are *American Sociological Review*, *Contemporary Sociology*, *Journal of Health and Social Behavior*, and *Sociological Theory*.

These societies utilize this income to fund their activities, such as outreach, support for young and early career researchers, conferences, and so on (Hockschild, 2016). As their activities have been largely dependent on publication income, most scholarly associations have a vested interest in maintaining the current subscription model. Moving away from the current model risks costing them their financial return.

However, academic societies are non-commercial and have charitable status, so it is difficult for them to go against the OA movement. Maintaining hybrid journals would be easy, but this option is no more than a transitional strategy. It is not realistic to expect that the income from APC will match the current income level generated from the subscription model (Bull, 2016b; Siler, 2017).

Thus, academic societies, especially those earning large incomes from their subscription-based publishing, are placed in an awkward position.

3.4. Research funders

An increasing number of research funders and institutions have adopted OA policies, though the specifics of their requirements are slightly different from one another. According to ROARMAP (Registry of Open Access Repository Mandates and Policies),[17] there are 889 policies registered, i.e., 83 funder policies, 56 funder and research organization policies, 666 research organi-

zation policies (e.g., universities and research institutions), and 74 policies concluded at the department, faculty, or school level. As these policies are voluntarily registered by the sponsor organization, there are undoubtedly many more policies around the world.

SHERPA Juliet provides research funders' OA policies. This database includes data for 142 research funders (UK 62, US 15, Canada 14, and other countries). The statistics page shows that 101 funders (71%) require OA archiving, 42 funders (30%) require OA publishing, and 40 funders (28%) require data archiving.[18]

For example, the Wellcome Trust's OA policy states that articles from funded projects must be made openly available within six months of publication; in particular, projects receiving publishing fee support are required to publish under a creative commons attribution (CC-BY).[19] The Bill and Melinda Gates Foundation's open access mandate requires that publications be deposited in a specified repository(s) under CC-BY immediately upon their publication.[20]

The research excellence framework (REF) in the UK has already made OA a core feature of evaluation. The HEFCE policy for open access in the next REF2021 requires that to be eligible for REF submission, journal articles and conference papers accepted from 1 April 2016 must have been deposited in an open access repository within three months of acceptance for publication.[21]

Science Europe (the association of research funding and research performing organizations with 44 member organizations from 27 European countries) collectively endorsed moving to a system of open access in 2012.[22]

All beneficiaries of the EU's research fund, Horizon 2020, are required to deposit peer-reviewed scientific publications related to funded research (publication is not necessarily obligation) and to ensure OA. This mandate requires free online access but recommends free reuse rights. A machine-readable copy of the published version or a final peer-reviewed paper accepted for publication must be deposited in a repository upon publication (at the latest), and access must be made open within six months (12 months for social sciences and humanities).[23]

The Netherlands' National Plan Open Science set a goal of 100% OA for all publicly funded scientific publications by 2020.[24] Switzerland approved a National Open Access Strategy that aims at 100% OA for all publicly funded publications by 2024. The Swiss National Science Foundations (SNSF) decided to realize OA implementation of SNSF-funded publications by 2020.[25]

In the United State, NIH (National Institutes of Health under the U.S. Department of Health and Human Services) grantees have to deposit final peer-reviewed journal manuscripts to the digital archive PubMed Central no later than 12 months after publication. All US Departments and Agencies who

fund scientific research are required to make both articles and data resulting from that funding publically available (Guedon, 2017).

Canada's three federal granting agencies (the Canadian Institutes of Health Research [CIHR], the Natural Sciences and Engineering Research Council of Canada [NSERC], and the Social Sciences and Humanities Research Council of Canada [SSHRC]) issued the Tri-Agency Open Access Policy on Publications. Grantees are required to make their research publications (i.e., peer-reviewed journal publications) freely accessible within 12 months of publication. Only the CIHR require the deposit of data as well.[26]

The Australian Research Council, a funding entity that provides national competitive grants, also requires grantees to make their publications open within 12 months of the publication date. The metadata of the publication must be made open in an institutional repository within a three-month period from the date of publication. The most unrestricted CC BY is recommended but not required.[27]

It is recognized that the mandates of funders are an effective way to fill up repositories. Wolff, Rod, and Schonfeld (2016b) reveal the influence of funders' OA policies based on surveys of US and UK academics' behaviors. For example, the share of researchers who preserve their research data in a repository has substantially increased. Compared with their US counterparts, UK academics more frequently make their findings freely available online in preprint or e-print digital archives and/or online under a Creative Commons or Open Source license. These facts seem to be related to the growing compliance of UK academics with funders' open access mandates.

According to the report of the Charity Open Access Fund (COAF),[28] which was produced in early 2017, 91% of grantees' articles fully complied with the COAF's OA policy (full text article available within Europe PubMed Central with a CC BY license), which was a remarkable improvement from 74% the previous year. The number of articles published using this fund in 2015/16 was 3,552, a 21% increase from the previous year. Total COAF spending in 2015/2016 was £6.6 million, a 32% increase from the previous year.

Table 2 illustrates the breakdown of OA types into full OA journals and hybrid journals. The number of publications in hybrid journals is still much larger than that in full OA journals, though the share of the former type is declining. The APC of hybrid journals remains higher than that of full OA journals. High dependence on the hybrid-type publication is not to be sustainable because of its high cost and double-dipping problems. To tackle the continuing increase in APC payments, a number of European funders have reportedly placed caps on APCs.

Table 2 APCs covered by the Charity Open Access Fund (COAF)

		OA Journals			Hybrid Journals	
	2013–14	2014–15	2015–16	2013–14	2014–15	2015–16
No. of articles published in	607	775	1,038	1,894	2,065	2,514
Share (%)	24.3%	27.3%	29.2%	75.7%	72.7%	70.8%
Average APC	£1,241	£1,396	£1,644	£2,030	£2,104	£2,209
Median APC	-	£1,352	£1,397	-	£2,005	£2,125

Source: Wellcome website. https://wellcome.ac.uk/funding/managing-grant/wellcome-and-coaf-open-access-spend-2015-16

Note: COAF members are Arthritis Research UK, Breast Cancer Now, Bloodwise, British Heart Foundation, Cancer Research UK, Parkinson's UK, and Wellcome.

Table 3 shows the top five publishers that received the most APCs paid by COAF-funded articles. Elsevier tops the list and is followed by big publishers such as Springer Nature, Wiley, Oxford University Press, and PLOS.

Table 3 Top five publishers: APC paid by COAF-supported research, 2015–16

	No. of articles	Average APC	Total spent
Elsevier:	830		£2,083,111
Fully OA	63	£2,957	£186,299
Hybrid	767	£2,473	£1,896,812
Springer Nature:	637		£1,159,639
Fully OA	444	£1,781	£790,974
Hybrid	193	£1,910	£368,665
Wiley:	423		£840,156
Fully OA	20	£1,289	£25,782
Hybrid	403	£2,021	£814,374
OUP:	269		£559,383
Fully OA	39	£1,415	£55,169
Hybrid	230	£2,192	£504,214
PLOS:			
Fully OA	258	£1,379	£355,759

Source: Wellcome website. https://wellcome.ac.uk/funding/managing-grant/well come-and-coaf-open-access-spend-2015-16

Note: Funders include Arthritis Research UK, Breast Cancer Now, Bloodwise, British Heart Foundation, Cancer Research UK, Parkinson's UK, and Wellcome.

To increase compliance with OA mandates and probably to reduce the burden of APC payments, the Wellcome Trust (*Wellcome Open Research*) and the Bill and Melinda Gates Foundation (*Gates Open Research*) launched OA publishing platforms in 2016 and 2017, respectively. The concept of these platforms is to provide researchers who receive grants from the funders with a place for speedy publication (in one week) without traditional novelty-emphasized subjective peer review. Referee comments are openly given after publication (post-publication peer review), and revisions are completed

by authors. Articles need to be published with data. APC is essentially not required (paid by respective funders). EC also plans to launch the European Commission Open Research Publishing Platform, which will provide Horizon 2020[29] grantees with a free and fast open-access publishing venue with open peer review. This will assist grantees in complying with the Horizon 2020 open access mandate.[30]

3.5. TA journal publishers

"The ethos of the academic research community had historically been noncommercial, and the sharing of knowledge had historically been enabled by the generosity of publishing organisations – such as learned societies and university presses – with a mission for scholarship rather than profit. But since the end of the Second World War, academic publishing has become increasingly commercialised" (Fyfe et al., 2017: 4).

Ever since the Second World War, academic research products expanded around the world, underpinned by world economic development. The number of universities and researchers has increased remarkably. Various new sub-disciplines have emerged. The number of libraries and their budgets have expanded.

Then, with the development of digital technology, academic journal publishing came to be dominated by several oligopolistic commercial publishers, such as Elsevier, Wiley, Springer, Taylor & Francis, and Sage. These publishers have increased their share of published outputs, especially since the mid-1990s. According to Lariviere, Haustein, and Mongeon (2015), based on the data in the Web of Science, these five most prolific publishers accounted for more than 50% of all articles published in 2013. These publishers have the most influence in the social sciences, where they publish 70% of all articles.[31]

As of April 2018, the Scopus database covers 23,793 journal titles. As shown in Table 4, among them, Elsevier publishes 2,447 titles (10.3%), Springer Nature publishes 2,408 titles (10.1%), Taylor & Francis publishes 2,286 titles (9.6%), Wiley-Blackwell publishes 1,449 titles (6.1%), and Sage publishes 787 titles (3.3%). These five publishers account for 39.4% of all Scopus-registered journals. In terms of TA journals, these publishers account for 43.2%, whereas they account for 21.3% of OA journals.

Table 4 Number of journals indexed in Scopus and published by the four major publishers in 2018

	Main publishers including group imprints						
	Elsevier	Springer Nature	Taylor & Francis	Wiley-Blackwell	Sage	Five Publishers	Scopus Total
No. of journals (A)	2,447 (10.3%)	2,408 (10.1%)	2,286 (9.6%)	1,449 (6.1%)	787 (3.3%)	9,377 (39.4%)	23,793 (100%)
No. of TA journals (B)	2,195 (11.1%)	2,015 (10.2%)	2,143 (10.9%)	1,398 (7.1%)	755 (3.8%)	8,506 (43.2%)	19,702 (100%)
No. of OA journals (C)	252 (6.2%)	393 (9.6%)	143 (3.5%)	51 (1.2%)	32 (0.8%)	871 (21.3%)	4,091 (100%)
Rate of OA (C)/(A)	10.3%	16.3%	6.3%	3.5%	4.1%	9.3%	17.2%

Source: Scopus "ext_list_April_2018_2017_Metrics." Downloaded from "Download the Source title list" on August 6, 2018. https://www.elsevier.com/solutions/scopus/how-scopus-works/content

These publishers have been enjoying huge profits from publishing TA journals (including a hybrid version), but the OA movement and research funders' OA mandates have nudged them to adopt a hybrid model (OA option for articles in TA journals), publish Gold OA journals, and accept the Green route for articles published in TA journals to maintain their market power.

Bjork et al. (2014) examined the OA policies of TA journals (i.e., the Green route) published by the top 100 publishers indexed in Scopus in 2010. The top 100 publishers accounted for 68% of all articles indexed in Scopus. It is noted that 62% of articles were permitted to be self-archived, 4% were given a 6-month embargo, 13% were given a 12-month embargo, and 2% were given an 18-month embargo. Thus, 79% of published articles could be made open within 12 months if authors actually and promptly self-archived their articles. This figure was not realized because of authors' misunderstanding and reluctance, but the actual figure will surely increase because an increasing number of research funders have begun to strongly require grantees to abide by their OA mandates.

3.6. OA journal publishers (gold OA road)

The Directory of Open Access Journals (DOAJ) lists 11,927 journals published in 128 countries (publisher's location) as of August 7, 2018. The top five countries are the UK (1,395 titles), Indonesia (1,358), Brazil (1,271), the US (653), and Spain (645). The top five languages used in these journals are English (9,267 titles), Spanish (2,308), Portuguese (1,674), Indonesian (1,136), and French (876).[32] There are 583 institutions that publish three or more OA journals. Big commercial journal publishers also publish OA jour-

nals (Elsevier 340; Springer 190; Sage 141; Taylor & Francis 136, and Wiley 85) (see Table 5). The share of articles published in OA journals indexed in Scopus was 0.9% in 1996 but grew to 12.8% in 2012 (Archambault et al., 2014). As of April 2018, Scopus indexes 4,091 DOAJ/ROAD-registered active OA journals, which accounts for 17.2% of all active journals indexed in Scopus (see Table 4). The Journal Citation Report (JCR) indexes 1,274 OA journals, which accounts for 10.4% of all journals indexed in the JCR (12,271 journals; 2017 JCR year).[33]

Table 5 Top 10 OA journal publishers

	Number of OA journals	
Publisher's name in DOAJ	DOAJ-registered	DOAJ/ROAD-registered OA journals in Scopus
Elsevier	340	252 (Elsevier)
Sciendo	330	102 (Walter de Gruyter)
Hindawi Limited	273	181 (Hindawi)
BioMed Central*	311	242 (BioMed Central)
Springer	190	151 (Springer Nature except for Bio Med Central)
MDPI AG	177	59 (MDPI)
Wolters Kluwer Medknow Publications	160	65 (Medknow Publications)
Sage Publishing	141	32 (Sage)
Taylor & Francis Group	136	103 (Taylor & Francis except for Dove Medical Press)
Dove Medical Press**	102	40 (Dove Medical Press Ltd)

Sources: DOAJ website (accessed on August 7, 2018) and Scopus "ext_list_April_2018_2017_Metrics." Downloaded from "Download the Source title list" on August 6, 2018. https://www.elsevier.com/solutions/scopus/how-scopus-works/content Scopus (accessed on April 2, 2018).
Note: Publisher's names in parentheses are those given in Scopus.
* Springer Nature group.
** Taylor & Francis group.

Essentially, the cost of the Gold OA publishing model is covered by the APC for accepted papers, which is paid by the authors' side. However, more than 70% of OA journals listed in the DOAJ do not charge an APC as of August 7, 2018.[34] While major OA journals charge an APC, they have full/partial fee waiver schemes for researchers, especially those from low-income countries (Lawson, 2015). Almost all funders allow authors to use grants/funding for the payment of APC.

Regarding the social sciences, publishers have been cautious about OA journal publishing because research in the social sciences, let alone in the humanities, is far less funded than science research. In other words, social scientists do not need to follow funders' OA mandates or do not have enough funding to pay APC. In addition, researchers in these disciplines still prefer publishing their research in the form of monographs rather than journal articles (Okada, 2018). According to Archambault et al. (2014), Gold OA availability in the general sciences and technology was 58% (the highest) of

the sampled papers, whereas that of the general arts, humanities, and social sciences was 2.6% (the lowest).

Nevertheless, social science publishers have certainly begun to engage in OA publishing. Nearly 40 OA journals were launched by major traditional publishers after 2012, with approximately 25 new titles in 2014 alone. Although the funding and editorial models are different from one another, the majority of the journals require APCs, with prices ranging from US$195 to $1,360 per article. Over a third of the titles require no APC, which is covered by third-party financial support such as from universities, private foundations, learned societies, and national funding bodies (Mainwaring, 2016).

Regarding so-called journal flipping (converting from TA to OA), Solomon, Laakso, and Björk (2018) conducted an extensive literature survey to learn the methods, pathways, or scenarios that occurred during the flipping (83 cases are reported). Each journal's situation and motivation was very different. The Open Access Directory listed 280 OA journals that converted from TA journals as of November 11, 2017,[35] whereas 11,927 OA journals were listed in DOAJ as of August 7, 2018.

A number of OA journals are currently being published, but the emergence of OA mega-journals deserves special mention. This type of OA journal has innovative features, which will be described in the next section.

4. Emergence of OA Mega-Journals

Special attention should be paid to the so-called OA mega-journals (OAMJs). What distinguishes these from other ordinary OA journals – as well as from conventional TA journals – is their innovative approach to scope and quality (Wellen, 2013; Wakeling et al., 2017a).

A representative example is *PLOS ONE*, which was launched in 2006. This journal has many unique features: (1) most importantly, the publication criteria emphasize articles' high ethical standards and the rigor of the methodology and conclusions; there is a departure from the traditional peer-review criteria emphasizing the novelty and perceived future impact of articles. *PLOS ONE*'s website states that "When PLOS ONE launched, editors and reviewers asked a simple yet groundbreaking question: 'Should this research be part of the scientific record?' instead of 'Is it appropriate for this journal?'; (2) The creative commons attribution (CC BY) license is applied to all articles; (3) Publication fees are charged (US$1,495 per manuscript as of April 2018) and billed upon acceptance; (4) There is a broad subject scope covering research from the natural sciences, medical research, engineering, as well as the related social sciences and humanities, contrasting with the increasing disciplinary specialization of the past; (5) The journal accepts a

broad range of article types, such as systematic reviews; papers describing methods, software, databases, or other tools; qualitative research; and studies reporting negative results; (6) A tremendous number of articles are published each year: 20,099 articles were published in 2017; and (7) Publication is rapid."

PLOS ONE created a new journal concept and showed that this business model is viable. The success of the *PLOS ONE* model invited the emergence of similar journals, which adopted a similar editorial policy, such as a broader scope, a non-traditional peer-review standard, rapid publication, and low-cost open access publishing. This type of journal is called an OAMJ; it is typically defined as a journal with a huge volume, objective peer review, and broad subject scope, as shown in Table 6.

Table 6 Criteria for OAMJ

Primary criteria	Secondary criteria
Big publishing volume or aiming at it	Rapid publication
Peer review by scientific soundness only	Moderate author fee
Broad subject area	High-prestige publishers
Full open access	
Funded by authors paying publishing fees	

Source: Bjork (2018).

Tables 7 and 8 illustrate the characteristics and development of OAMJs. *Scientific Reports* was launched by Nature Publishing Group and also covers a wide subject scope (natural and clinical sciences). This journal also adopts the non-traditional peer-review standard, and 24,137 articles were published in 2017. *PLOS ONE* and *Scientific Reports* are the top two OAMJs. *IEEE Access* covers multidisciplinary subjects, adopts the traditional selective peer review standard with quick binary decision making, and published 2,428 articles in 2017. *BMJ Open* covers all fields of medicine and adopts the non-traditional peer review standard, and published 1,803 articles in 2017. *PeerJ* covers biology, medicine, and the environment, adopts the non-traditional peer review standard, and published 1,404 articles in 2017. *AIP Advances* covers all physical sciences, adopts the non-traditional peer review standard, and published 1,395 articles in 2017.

Table 7 Development of article numbers in OAMJs, 2011–2017

	2011	2012	2013	2014	2015	2016	2017
PLOS ONE	13,700	23,426	31,404	30,394	27,858	21,771	20,099
Scientific Reports	208	820	2,499	3,940	10,707	20,384	24,137
AIP Advances	251	373	396	558	930	1,240	1,395
BMJ Open	98	625	894	1,086	1,318	1,844	1,803
Biology Open	14	194	217	199	245	338	300
*Medicine**			28	296	1,814	2,844	2,845
IEEE Access			62	118	230	758	2,428
F1000Research		42	204	269	201	421	339
eLife		42	300	809	988	1,217	1,370

Scientific World Journal		984	1,351	3,318	585	117	54
PeerJ			229	474	829	1,354	1,404
Royal Society Open Science				50	246	414	648
Heliyon					29	156	263
SAGE Open	46	116	222	327	289	367	304
Palgrave Communications					34	73	130
Wellcome Open Research							123

Sources: Scopus (accessed on March 1, 2018). Data for Wellcome Open Research was accessed on August 7, 2018. Data for Palgrave Communications is from its website (accessed on March 1, 2018).
*Medicine was flipped to the OAMJ model in mid-2014 from a highly selective TA journal that had been founded in 1922 (Wakeling et al., 2017c).

Table 8 APC and other related information on OAMJs

	APC	Publisher	Publisher's keywords	Review	License	2017 JIF
PLOS ONE 2007	1,495 USD	Public Library of Science	science, medicine	Peer review	CC BY	2.77
Scientific Reports 2011	1,110 GBP	Nature Publishing Group	natural sciences, biology, chemistry, earth sciences, physics	Blind peer review	CC BY	4.12
AIP Advances 2011	1,350 USD	American Institute of Physics	physical sciences, engineering, biology, physics, chemistry, materials science	Peer review	CC BY	1.65
BMJ Open 2011	1,350 GBP	BMJ Publishing Group	clinical science, clinical practice, health policy, healthcare delivery, medical education, medical research	Open peer review	CC BY-NC	2.41
Biology Open 2012	1,495 USD	The Company of Biologists	cell science, developmental biology, experimental biology, cell biology, animal physiology	Blind peer review	CC BY	2.22
Medicine 2015	1,200 USD	Wolters Kluwer	medicine, health	Peer review	CC BY-NC-ND	2.03
IEEE Access 2014	1,750 USD	IEEE	bioengineering, communication, engineered materials, dielectrics, geoscience	Blind peer review	Publisher's own license	3.56
F1000 Research 2013	1,000 USD	F1000 Research	life sciences	Open peer review	CC BY	-
eLife 2013	2,500 USD	eLife Sciences Publications	biomedicine, life sciences	Peer review	CC BY	7.62
Scientific World	800 USD	Hindawi Publishing	life sciences, biomedical sciences,	Blind peer	CC BY	1.219 (2013)

Journal 2012			medicine, environmental sciences	review		
PeerJ 2013	1,095 USD	PeerJ	biomedical, health, genetics, ecology, biology	Blind peer review	CC BY	2.12
Royal Society Open Science 2015	900 GBP (2018-)*	Royal Society	science	Open peer review	CC BY	2.50
Heliyon 2016	1,250 USD	Elsevier	biological sciences, physics, chemistry, applied sciences, health sciences, earth sciences	Blind peer review	CC BY	-
SAGE Open 2011	395 USD	Sage Publishing	social sciences, humanities	Double blind peer review	CC BY	-
Palgrave Communications 2015	750 GBP	Palgrave Macmillan	social sciences, humanities, business studies, interdisciplinary research, multidisciplinary research	Blind peer review	CC BY	-
Wellcome Open Research 2017	775 GBP (covered by Wellcome)	Wellcome	translational research, clinical research, clinical trials	Open peer review	CC BY	-
Gates Open Research 2018	1,000 USD (covered by B&M Gates F)	Bill & Melinda Gates Foundation	translational research, clinical research, clinical trials	Open peer review	CC BY	-

Sources: DOAJ website (accessed on February 25, 2018; only Gates Open Research was accessed on August 7, 2018) and Journal Citation Report (accessed on August 10, 2018).
Note: Years below the journal title show the year when the journal was added to DOAJ.
*From its launch in 2014 through 2017, the APC waiver has operated.

Although natural sciences account for the majority of articles published in OAMJs, there are some mega-journal initiatives in the humanities and social sciences (Spezi et al., 2017). *SAGE Open*, started in 2011, covers social and behavioral sciences and the humanities, and 304 articles were published in 2017. Peer review focuses only on the validity of the scientific and research methods of each article. Sage's *Research & Politics* started in 2014, covers political sciences, and published 44 articles in 2017. The peer-review standard is selective, but papers of null-findings, forecasts, updates of seminal articles, critiques/replications or exploratory research are acceptable. Papers need to be a short article (up to 4,500 words) or research note (2,000 words). APC is necessary, but authors were not required to pay in 2016 and 2017 because the APCs for those two years were covered by a grant from the Carnegie Corporation of New York. The *Open Library of the Humanities* (OLH) started in

2015, covers any humanities discipline in any language, adopts traditional selective peer review, and requires no APC. Twenty-seven articles were published in 2017. The costs of publication are covered by an international library consortium. *Palgrave Communications* also started in 2015, covers all humanities and social sciences, adopts traditional selective peer review, and requires APCs. In January 2018, University College London also announced the issuance of its OAMJ, though the details are not yet known.[36]

As mentioned in Section 3.4, the Wellcome Trust (*Wellcome Open Research*) and the Bill and Melinda Gates Foundation (*Gates Open Research*) have created OA publishing platforms, the concept of which is quite similar to OAMJs. The service and management of both platforms are provided by F1000 Research. Although peer review is not conducted before publication on these platforms, the basic concept of these platforms, i.e., speedy publication, a different peer-review standard from traditional journals, and broad scope of article types, is almost the same as the concept of OAMJs. The European Commission Open Research Publishing Platform also aims at providing Horizon 2020 grantees with a free and fast open-access publishing venue with open peer review.

Different from the general criteria of OAMJs illustrated in Table 6, there exists another type of journal that publishes a huge number of articles, e.g., more than 500 papers per year. This type of journal claims to use a selective peer review policy and focuses on narrow disciplinary coverage but publishes a huge number of papers. It seems to me that the concept of these journals is quite similar in substance to that of OAMJs because publishing 500 papers, for example, seems very hard if rigid peer review and editing are practiced; thus, this type may be called "sub-disciplinary OAMJ." Table 9 shows 18 sub-disciplinary OAMJs indexed in the JCR that published more than 1,000 citable items (articles, reviews or proceedings papers) in 2016. In 2017, the JCR listed 76 OA journals that published more than 500 items and 32 OA journals that published more than 1,000 items.

OAMJs are often criticized for their non-traditional peer review standard, which is seen to be a lower standard than traditional practices; however, it is arguably true that there are many not-bad papers that are rejected by highly selective journals but their quality fall slightly below the high and strict acceptance standard of referees and editorial boards. Even if many of those articles are eventually published in OAMJs, the referee system does not necessarily confer low-grade filtering. Soundness-based peer review is different from loose, non-rigorous peer review. If a journal adopts the latter review process, the brand name of the journal would be eventually tarnished. In this connection, not only metrics such as JIF but also well-established abstract and citation databases will play the role of gatekeepers to guarantee the credibility of the journals.[37]

In addition, peer review systems currently adopted by journals, including prestigious journals, are not free from biases. For example, Lee et al. (2013) made an extensive literature survey and discussed a variety of possible biases in the current peer review forms. They show that the argument over the existence of biases was inconclusive and a perfect alternative review system is not available, but at the same time many have called for an overhaul of the status quo.[38] There is no one-size-fits-all review system that impartially evaluates articles written and reviewed by people with various social identities.[39]

Table 9 List of OA journals that published more than 1,000 articles in 2016

	APC	Publisher	Publisher's keywords	No. of citable items*	2016 JIF
Nature Communications 2016	3,150 GBP	Nature Publishing Group	natural sciences, biology, chemistry, earth sciences, physics	3,534	12.124
Nucleic Acids Research 2002	2,770 USD	Oxford University Press	DNA, biochemistry, computational biology, genomics, molecular biology, RNA	1,270	10.162
Cell Reports 2015	5,000 USD	Cell Press	cytology, neuroscience, biochemistry	1,062	8.282
Journal of High Energy Physics 2016	No	International School for Advanced Studies	elementary particle physics, high-energy physics, astroparticle physics, collider physics, quantum field theory, standard model phenomenology	1,861	6.063
Frontiers in Plant Science 2011	2,490 USD	Frontiers Media S.A.	agricultural science, paleobotany	1,921	4.291
Frontiers in Microbiology 2011	2,490 USD	Frontiers Media S.A.	food microbiology	2,015	4.076
Remote Sensing 2009	1,600 CHF	MDPI AG	microwave remote sensing	1,016	3.244
International Journal of Molecular Sciences 2003	1,800 CHF	MDPI AG	molecular science	2,117	3.226
Molecules 2003	1,800 CHF	MDPI AG	synthesis	1,720	2.861
Sensors 2003	1,800 CHF	MDPI AG	electrochemical sensors	2,190	2.677
Materials 2009	1,400 CHF	MDPI AG	materials science	1,019	2.654
Biomed Research International 2013	2,000 USD	Hindawi	biomaterials, cell biology, genetics, biotechnology, bioinformatics	1,754	2.476
Frontiers in Psychology 2010	2,490 USD	Frontiers Media S.A.	cultural psychology, evolutionary psychology, psychopathology, organizational psychology, developmental psychology, educational psychology	1,812	2.321

BMC Public Health 2003	1370 GBP	BioMed Central	public health, health policy	1,209	2.265
Energies 2008	1500 CHF	MDPI AG	energy sources	1,082	2.262
International Journal of Environmental Research and Public Health 2005	1600 CHF	MDPI AG	health sciences	1,220	2.101
Sustainability 2009	1400 CHF	MDPI AG	economic sustainability	1,331	1.789
Mathematical Problems in Engineering 2002	2000 USD	Hindawi	electrical engineering, differential equations, stochastic processes, nonlinear analysis, engineering, mathematical problems	1,069	0.802

Sources: DOAJ website and JCR (accessed on April 1, 2018).
Note: Years below the journal title show the year when the journal was added to the DOAJ.
* Citable items are those items that comprise the figure in the denominator of the JIF calculation. These items are those identified in the Web of Science as an article, review or proceedings paper and are considered substantive articles.

Table 10 illustrates trends in the nationality of the author's institutions. The growing number of authors from China, South Korea, and Taiwan is conspicuous. It is well known that in these countries, the evaluation of academic performance is strongly based on the metrics of academic publications. As *PLOS ONE* and *Scientific Reports* are well known and have good JIFs despite using soundness-based peer review, these journals match the needs of authors who are under pressure from their governments and funders.

Table 10 Top 20 article-contributing countries – Nationalities of authors' institutions in 2012 and 2017

		PLOS ONE					*Scientific Reports*		
	2017 (19,924 articles)		2012 (23,319 articles)			2017 (24,806 articles)		2012 (794 articles)	
Rank	Country	%	Country	%	Rank	Country	%	Country	%
1(1)	US	29.4	US	37.4	1(2)	**China**	31.1	US	35.5
2(2)	**China**	15.7	**China**	15.5	2(1)	US	25.7	Japan	19.4
3(3)	Germany	8.9	Germany	9.9	3(5)	Germany	9.3	**China**	19.4
4(4)	England	8.0	England	9.3	4(4)	England	8.8	England	8.4
5(7)	Japan	6.2	France	7.0	5(2)	Japan	8.6	Germany	6.3
6(5)	France	5.4	Canada	5.7	6(8)	France	5.7	Spain	6.2
7(6)	Canada	5.1	Japan	5.3	7(15)	**S. Korea**	5.6	Italy	6.2
8(8)	Australia	5.0	Australia	5.1	8(6)	Italy	5.0	France	6.0
9(18)	**S. Korea**	4.7	Italy	4.6	9(10)	Australia	4.6	Canada	4.9
10(11)	Spain	4.5	Spain	4.4	10(9)	Canada	4.1	Australia	4.3
11(9)	Italy	4.1	Netherlands	4.4	11(6)	Spain	4.1	Switzerland	4.3
12(11)	Netherlands	4.1	Sweden	3.1	12(25)	**Taiwan**	3.3	**Singapore**	3.4
13(16)	Brazil	3.7	Switzerland	2.8	13(13)	India	3.1	India	2.8
14(16)	Switzerland	2.9	India	2.3	14(16)	Netherlands	2.7	Finland	2.6
15(15)	**Taiwan**	2.9	**Taiwan**	2.3	15(10)	Switzerland	2.7	**S. Korea**	2.5
16(12)	Sweden	2.9	Brazil	2.1	16(18)	Sweden	2.6	Israel	2.0

17(14)	India	2.0	Belgium	1.9	17(19)	Brazil	2.0	Netherlands	2.0
18(19)	Denmark	1.9	**S. Korea**	1.8	18(26)	Belgium	1.6	Sweden	1.9
19(22)	Norway	1.8	Denmark	1.7	19(10)	Austria	1.6	Brazil	1.8
20(17)	Belgium	1.7	Scotland	1.6	20(12)	Singapore	1.6	Russia	1.8

Source: Web of Science (accessed August 6, 2018).

Notes: 1. Rankings in parentheses are those of 2012. 2. An article written by multiple authors has more than one country, but a country is counted only once, even if multiple authors are from the same country.

The advent of the concept of OAMJs is certainly an innovative challenge to traditional scholarly communication. If the number of good OAMJs (e.g., indexed by well-known abstract/citation databases and preferably not so expensive) increase and academics increasingly recognize the status of OAMJs, this type of journal will become one of the mainstream journal types. OAMJs have the potential to meet the necessary conditions that satisfy the fundamental interests of researchers, i.e., acceptable academic prestige, an open access norm, not-too-strict/not-too-time-consuming peer review, and fast publication.

As a result, a large number of TA journals (except for prestigious titles) and unrenowned/small-scale OA journals may face difficulties. Currently, an increasing number of researchers search for articles, not journals, using a general purpose search engine and electronic research resources/databases (Wolff, Rod, and Schonfeld, 2016a,b). The titles of all but the well-established brand-name journals may be losing their value. Furthermore, the practice of the cascade model, explained below, will also make the future of these journals bleak in the long run.[40]

Currently, major publishers have both types of journals, which means that they not only hold on to traditional TA journals (must-have titles) as they are but also make use of the merits of OAMJ publishing. Researchers would prefer to publish in OAMJs published by major publishers, as opposed to publishing in other OA journals published by lesser-known publishers. Major publishers have a strategy called a cascade model, under which articles rejected by selective TA journals are recommended for resubmission to sister journals, such as OAMJs or more specified OA journals published by the same publisher.

For example, Elsevier has an article transfer service. If your manuscript is declined for publication in one journal, e.g., a selective journal, you may receive a transfer offer from the editor by email, with a link to this service. If, from those suggestions, you select an appropriate journal for the next submission, your manuscript's files and information, as well as any existing reviews, will be automatically transferred, without the need to edit, reformat or resubmit your paper. For example, *Heliyon*, a mega-journal published by Elsevier, has partnered with over 1,000 journals, including some journals published by Cell Press and *The Lancet*, using this article transfer service.

As referee reports are portable, if declined articles are submitted to an OAMJ, no new referees need to be assigned. This process can save consider-

able time when decisions are made about whether to accept the article, and this time-saving is a great advantage, as one referee period would take several months at least. Authors whose articles are declined usually make their next submission to a similar- or lower-level journal (Cronin and McKenzie, 1992). This process repeats again and again until the article is finally accepted by a journal. If authors prioritize speedy publication over publication in a top-ranked journal, this cascade model can work well for authors as well as publishers. Wakeling et al. (2017a,b) suggests that this model allows publishers to retain articles rejected by the selective titles in their business while also preventing those articles from flowing to the journals of rival publishers. This model helps group journals to ensure a stable number of submissions and possibly retain good papers, as papers rejected by highly selective journals are still likely to be of high quality.

In summary, future journals may converge on two types of journals, i.e., selective high-ranking TA journals adopting a hybrid option and well-recognized OAMJs and sub-disciplinary OAMJs (Lăzăroiu, 2017). Whether major commercial publishers also take the lead in OAMJ publishing in the future remains an open question.

Conclusion

Academic institutions and research funding institutions have been using bibliometrics such as JIF, directly or indirectly, to evaluate the academic credibility of researchers.[41] Researchers have a desire to publish their articles in high-ranking (high JIF) TA journals to acquire tenure, promotions, and research funding. Although there are strong doubts about the validity of JIF for research assessment (Gingras, 2014),[42] no better alternative measurement is available at the present. Metrics are not perfect, but they are useful measurements.

In the past, the most prestigious journals were non-OA TA journals, but circumstances are gradually changing. An increasing number of Gold OA journals have come to be indexed in the abstract and citation database, and they have obtained JIFs and the like.

As of April 2018, the JCR indexed more than 12,000 journals, of which more than one thousand are OA journals. Some OA journals have gained high citation rates. In the 2012JCR, 31 OA journals had a JIF over 5.0, and 7 journals had a JIF over 10.0. In the 2017JCR, 99 OA journals had a JIF over 5.0, and 17 journals had a JIF over 10.0.[43] OA journals indexed in the JCR/Scopus are increasingly becoming an option for researchers choosing a journal for submission. In this context, with the development of smarter search engines in the coming, more advanced digital era, OAMJs and sub-disciplinary OAMJs, with not-too-strict/not-too-time-consuming peer review,

non-strict sub-disciplinary boundaries, and fast publication, will increase their presence.

In addition, newly launched OA platforms such as Wellcome Open Research, Gates Open Research, and the would-be EC Open Research Publishing Platform may also play a crucial role in the future of academic publishing. As many academics conduct research based on grants made by research funders, they have to abide by the OA mandates issued by these research funders. Although publishing on these platforms may not give authors the academic prestige they want, these platforms will provide a new space for OA scholarly communication.

Wakeling et al. (2017b) state that OAMJs offer some hope of change from journal-based publishing to article-centered publication. In addition, they introduce the comments of some publishers that OAMJs are akin to repositories or databases rather than traditional journals. This point is important. In the future, journals, except for the top-tier (and second-tier) ones, will lose the meaning of their physical facades, their names, and volume/issue numbers. A younger generation accustomed to digital publications will be open to this kind of change.

In the near future, we may embrace a bipolar era of OA scholarly communication: selective subscription journals and OAMJs and the like. In the course of this polarization, the journal impact factor currently tagged on more than 12,000 journals may eventually lose its specter.

Acknowledgments

This research was conducted at the Australian National University. The author would like to thank four anonymous reviewers for their useful comments and suggestions on an earlier version of this article. This article is an extensively revised version of "Scholarly Communications Revisited: Journal Publishing, Open Access, and Digital-Age Journals," IDE Discussion Paper 715.

Author Contributions

The author confirms being the sole contributor of this work and approved it for publication.

Conflict of Interest Statement

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

NOTES

1. The cost has outpaced inflation by over 300% since 1986 (Eve, 2014: 13).

2. http://www.budapestopenaccessinitiative.org/read. Peter Suber introduces open access (OA) in detail for those who are new to the concept. http://legacy.earlham.edu/~peters/fos/overview.htm; OA has been widely and deeply discussed in the

sciences and is currently discussed in the social sciences. OA is not popular in the humanities. See Eve (2014) for comprehensive arguments in the humanities.

3. However, more than 70% of OA journals charge no fees as of February 16, 2018. http://oad.simmons.edu/oadwiki/OA_by_the_numbers

4. Ibid.

5. OA in social and political science is discussed from the standpoints of academics and publishers in *European Political Science* 15(2), 2016, in which seven articles based on a symposium are featured.

6. Timeline of the OA movement (http://oad.simmons.edu/oadwiki/Timeline).

7. Albania, Bosnia and Herzegovina, Faroe Islands, Former Yugoslav Republic of Macedonia, Iceland, Israel, Moldova, Montenegro, Norway, Serbia, Switzerland, Turkey, and Ukraine.

8. https://sparceurope.org/what-we-do/open-access/sparc-europe-open-access-resources/open-access-citation-advantage-service-oaca/

9. Alternative metrics are suitable for viewing societal impact. These include usage metrics (downloads), mentions (blog posts, comments, reviews), and social media metrics (likes, shares and tweets).

10. http://lib.guides.umd.edu/serials_review. According to Anderson (2017), the University of Wisconsin-Milwaukee ($500,000), Towson University ($350,000), the University of Calgary ($1.5 million), the University of New Mexico ($468,000), the University of Missouri ($200,000), and Colorado State University ($135,000) cut their budgets for journal subscriptions in recent years.

11. The list of academic institutions is available at https://www.projekt-deal.de/vertragskundigungen-elsevier-2017/. Although these institutions' contracts no longer exist, Elsevier is still permitting their access to subscription journals until an agreement is reached. *Nature News* doi: 10.1038/d41586-018-00093-7

12. *Nature* 557: 479-480 (2018). doi:10.1038/d41586-018-05191-0

13. https://www.openaire.eu/sweden-open-access-elsevier

14. Big deal cancellation tracking. https://sparcopen.org/our-work/big-deal-cancellation-tracking/

15. https://librarypublishing.org/resources/. The LPC is an independent, community-led membership association of academic and research libraries and library consortia engaged in scholarly publishing.

16. As an increasing number of open access mandates have been given by various research funders, mandate compliance has become a priority for UK research libraries, including the management of the block grants disbursed by funding agencies in order to cover APC.

17. http://roarmap.eprints.org/view/policymaker_type/

18. http://v2.sherpa.ac.uk/view/funder_visualisations/1.html

19. https://wellcome.ac.uk/funding/managing-grant/open-access-policy

20. https://www.gatesfoundation.org/How-We-Work/General-Information/Open-Access-Policy

21. http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2016/201635/HEFCE2016_35.pdf; Not only the open access promotion but also the publication of articles are (un)intentionally promoted by the research evaluation scheme. The research evaluation system has been firmly established as a formalized and standardized

system in UK higher education and has strongly influenced other countries (Marques et al., 2017).

22. http://www.scienceeurope.org/wp-content/uploads/2014/05/ScienceEurope_Roadmap.pdf

23. http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

24. https://www.openscience.nl/binaries/content/assets/subsites-evenementen/open-science/national_plan_open_science_the_netherlands_february_2017_en_.pdf

25. http://www.snf.ch/en/theSNSF/research-policies/open-access/Pages/default.aspx#OA%202020%20Policy

26. http://www.science.gc.ca/eic/site/063.nsf/eng/h_F6765465.html

27. http://www.arc.gov.au/arc-open-access-policy-version-20171

28. Funders include Arthritis Research UK, Breast Cancer Now, Bloodwise, British Heart Foundation, Cancer Research UK, Parkinson's UK, and Wellcome. https://wellcome.ac.uk/funding/managing-grant/wellcome-and-coaf-open-access-spend-2015-16

29. An EU research and innovation program with 80 billion euro over 2014–2020.

30. "Information Note: Towards a Horizon 2020 Platform for Open Access." https://ec.europa.eu/research/openscience/pdf/information_note_platform_public.pdf#view=fit&pagemode=none

31. These publishers published 20% of humanities papers.

32. Journals do not necessarily use a single language. For example, English articles and Spanish articles are published at the same time in one issue.

33. JCR accessed on August 6, 2018.

34. The Open Access Directory (OAD) also provides a list of numbers measuring the status/growth of open access. "OA by the numbers" (http://oad.simmons.edu/oadwiki/OA_by_the_numbers)

35. http://oad.simmons.edu/oadwiki/Journals_that_converted_from_TA_to_OA#C)

36. https://www.timeshighereducation.com/news/ucl-launch-open-access-mega-journal

37. In fact, almost all established journals show abstracting and indexing information on their websites.

38. Helmer et al. (2017) and Lerback and Hanson (2017) empirically found gender bias in terms of the selection of referees.

39. Spezi et al. (2018), based on interviews with the publishers and editors of OAMJs, report that as reviewers are not accustomed to soundness-only peer review, they have been unable to change their mindset. As a result, soundness-only peer review has not been strictly enforced. In other words, it is plausible that the filtering of OAMJs has been unintentionally working as a type of review falling in between the traditional selective peer review and a simplistic soundness-based peer review. This is understandable because peer review is inherently humanly and has a non-dichotomous nature.

40. There is one journal to date, *Medicine*, that has changed from a selective TA journal model to an OAMJ model in order to survive in the future. "Tips for Journal Editors Transitioning to Open Access and the Role of Mega-Journals in the Publishing Landscape," *Editage Insights*, May 15, 2015; https://www.editage.com/insights/tips-

for-journal-editors-transitioning-to-open-access-and-the-role-of-mega-journals-in-the-publishing-landscape

41. As of February 14, 2018, 447 organizations across the world have signed DORA, which recommends eliminating the use of journal-based metrics in funding, appointments, and promotion considerations. However, according to a survey of UK research organizations, 75 out of 97 organizations have not signed this declaration and have no research metrics policy to stop the misuse of research metrics in the evaluation of academics' work. While seven UK research-funding councils signed this declaration, only 16 UK universities signed (*Nature* news, February 12, 2018). https://www.nature.com/articles/d41586-018-01874-w?utm_source=briefing-dy&utm_medium=email&utm_campaign=20180213

42. The JIF has a number of well-documented deficiencies as a tool for research assessment. The limitations include (1) citation distributions within journals are highly skewed; (2) the citation culture is quite different among various disciplines; (3) impact factors can be manipulated (or "gamed"); and (4) many studies have pointed out that high citation is not always correlated to high quality. http://www.ascb.org/dora/.

43. The JIF scores are very different among various disciplines. For example, the median JIF of cell biology (190 journals) is 3.31, whereas the figure in mathematics (309 journals) is 0.70 in the 2107JCR.

REFERENCES

AAUP (Association of American University Press) (2013). *Press and Library Collaboration Survey*. http://www.aupresses.org/images/stories/data/librarypresscollaboration_report_corrected.pdf

American Sociological Association (2015). "Financial Statements for the Year Ended December 31, 2015 with Summarized Financial Information for 2013." http://www.asanet.org/sites/default/files/savvy/documents/ASA/pdfs/ASA_2014_Audit.pdf

Anderson, Rick (2017). "The Forbidden Forecast: Thinking about Open Access and Library Subscriptions." Scholarly Kitchen. https://scholarlykitchen.sspnet.org/2017/02/21/forbidden-forecast-thinking-open-access-library-subscriptions/

Archambault, Éric, Didier Amyot, Philippe Deschamps, Aurore Nicol, Françoise Provencher, Lise Rebout, and Guillaume Roberge (2014). "Proportion of Open Access Papers Published in Peer-reviewed Journals at the European and World Levels – 1996–2013." European Commission. http://science-metrix.com/sites/default/files/science-metrix/publications/d_1.8_sm_ec_dg-rtd_proportion_oa_1996-2013_v11p.pdf

Archambault, Éric, Grégoire Côte, Brooke Struck, and Matthieu Voorons (2016). "Research Impact of Paywalled versus Open Access Papers," University of Nebraska-Lincoln. https://digitalcommons.unl.edu/scholcom/29/

Armstrong, Mark (2015). "Opening Access to Research," *Economic Journal* 125 (August): F1–F30. doi:10.1111/ecoj.12254

Björk, Bo-Christer (2016). "The Open Access Movement at a Crossroad: Are the Big Publishers and Academic Social Media Taking Over?," *Learned Publishing* 29(2): 131–134. doi:0.1002/leap.1021

Björk, Bo-Christer (2018). “Evolution of the Scholarly Mega-journal, 2006–2017,” *PeerJ* 6: e4357. doi:10.7717/peerj.4357

Björk, Bo-Christer, Mikael Laakso, Patrik Welling, and Patrik Paetau (2014). “Anatomy of Green Open Access,” *Journal of the Association for Information Science and Technology* 65(2): 237–250. doi:10.1002/asi.22963

Bull, Martin J. (2016a). “Introduction; Open Access in the Social and Political Sciences: Threat or Opportunity?,” *European Political Science* 15(2): 151–157. doi:10.1057/eps.2015.82

Bull, Martin J. (2016b). “Open Access and Academic Associations in the Political and Social Sciences: Threat or Opportunity?,” *European Political Science* 15(2): 201–210. doi:10.1057/eps.2015.88.

Cronin, Blaise, and Gail McKenzie (1992). “The Trajectory of Rejection,” *Journal of Documentation* 48(3): 310–317. doi:10.1108/eb026900

Eve, Martin Paul (2014). *Open Access and the Humanities: Contexts, Controversies and the Future*. Cambridge: Cambridge University Press. doi:10.1017/CBO9781316161012

Fyfe, Aileen, Kelly Coate, Stephen Curry, Stuart Lawson, Noah Moxham, and Camilla Mørk Røstvik (2017). “Untangling Academic Publishing: A History of the Relationship between Commercial Interests, Academic Prestige and the Circulation of Research,” Zenodo. doi:10.5281/zenodo.546100

Fruin, Christine (2017). “Organization and Delivery of Scholarly Communications Services by Academic and Research Libraries in the United Kingdom: Observations from Across the Pond,” *Journal of Librarianship and Scholarly Communication* 5(1): eP2157. doi:10.7710/2162-3309.2157

Gingras, Yves (2014). *Bibliometrics and Research Evaluation: Uses and Abuses*. Cambridge, MA: MIT Press.

Guédon, Jean-Claude (2017). “Open Access: Toward the Internet of the Mind.” http://www.budapestopenaccessinitiative.org/boai15/Untitleddocument.docx. Accessed November 18, 2017.

Helmer, Markus, Manuel Schottdorf, Andreas Neef, and Demian Battaglia (2017). “Gender Bias in Scholarly Peer Review,” *eLife* 6: e21718. doi:10.7554/eLife.21718

Hochschild, Jennifer (2016). “Redistributive Implications of Open Access,” *European Political Science* 15(2): 168–176. doi:10.1057/eps.2015.84

Laakso, Mikael, and Bo-Christer Björk (2013). “Delayed Open Access: An Overlooked High-impact Category of Openly Available Scientific Literature,” *Journal of the American Society for Information Science and Technology* 64(7): 1323–1329. doi: 10.1002/asi.22856

Larivière, Vincent, Stefanie Haustein, and Philippe Mongeon (2015). “The Oligopoly of Academic Publishers in the Digital Era,” *PLOS ONE* 10(6): e0127502. doi:10.1371/journal.pone.0127502

Lawson, Stuart (2015). “Fee Waivers for Open Access Journals,” *Publications* 3(3): 155–167. doi:10.3390/publications3030155

Lăzăroiu, George (2017). “Do Mega-journals Constitute the Future of Scholarly Communication?,” *Educational Philosophy and Theory* 49(11): 1047–1050. doi:10.1080/00131857.2017.1300022

Lee, Carole J., Cassidy R. Sugimoto, Guo Zhang, and Blaise Cronin (2013). "Bias in Peer Review," *Journal of the American Society for Information Science and Technology* 64(1): 2–17. doi:10.1002/asi.22784

Lerback, Jory, and Brooks Hanson (2017). "Journals Invite Too Few Women to Referee," *Nature* 541. doi:10.1038/541455a

Mainwaring, David (2016). "Open Access and UK Social and Political Science Publishing," *European Political Science* 15(2): 158–167. doi:10.1057/eps.2015.83.

Marques, Marcelo, Justin J.W. Powell, Mike Zapp, and Gert Biesta (2017). "How Does Research Evaluation Impact Educational Research? Exploring Intended and Unintended Consequences of Research Assessment in the United Kingdom, 1986–2014," *European Educational Research Journal* 16(6): 820–842. doi:10.1177/1474904117730159

Meadows, Jack (2000). "The Growth of Journal Literature: A Historical Perspective," in Blaise Cronin and Helen Barsky Atkins (eds.), *The Web of Knowledge: A Festschrift in Honor of Eugene Garfield*. Medford, NJ: Information Today.

Nicholas, David, Anthony Watkinson, Cherifa Boukacem-Zeghmouri, Blanca Rodríguez-Bravo, Jie Xu, Abdullah Abrizah et al. (2017). "Early Career Researchers: Scholarly Behaviour and the Prospect of Change," *Learned Publishing* 30(2): 157–166.

Okada, Masahiro (2018). "Monographs in Humanities and Social Sciences: Back to the Basics?" IDE Discussion Paper 721. http://hdl.handle.net/2344/00050440

Pinfield, Stephen, Andrew M. Cox, and Sophie Rutter (2017). *Mapping the Future of Academic Libraries: A Report for SCONUL*. Society of College, National & University Libraries. https://www.sconul.ac.uk/sites/default/files/documents/SCONUL%20Report%20Mapping%20the%20Future%20of%20Academic%20Libraries.pdf

Piwowar, Heather, Jason Priem, Vincent Larivière, Juan Pablo Alperin, Lisa Matthias, Bree Norlander et al. (2018). The State of OA: A Large-Scale Analysis of the Prevalence and Impact of Open Access Articles," *PeerJ* 6: e4375. doi:10.7717/peerj.4375

Radom, Rachel, Melanie Feltner-Reichert, and Kynita Stringer-Stanback (2012). "Organization of Scholarly Communication Services," SPEC Kit 332. Washington, DC: Association of Research Libraries. http://publications.arl.org/Organization-of-Scholarly-Communication-Services-SPEC-Kit-332.

Roemer, Robin Chin, and Rachel Borchardt (2015). *Meaningful Metrics: A 21st-Century Librarian's Guide to Bibliometrics, Altmetrics, and Research Impact*. Chicago, IL: Association of College and Research Libraries.

Siler, Kyle (2017). "Future Challenges and Opportunities in Academic Publishing," *Canadian Journal of Sociology* 42(1): 83–114.

Solomon, David J., Mikael Laakso, and Bo-Christer Björk (2016). "Converting Scholarly Journals to Open Access: A Review of Approaches and Experiences," Harvard Library. http://nrs.harvard.edu/urn-3:HUL.InstRepos:27803834

Spezi, Valerie, Simon Wakeling, Stephen Pinfield, Claire Creaser, Jenny Fry, and Peter Willett (2017). "Open-Access Mega-Journals: The Future of Scholarly Communication or Academic Dumping Ground? A Review," *Journal of Documentation* 73(2): 263–283. doi:10.1108/JD-06-2016-0082

Spezi, Valerie, Simon Wakeling, Stephen Pinfield, Claire Creaser, Jenny Fry, and Peter Willett (2018). "Let the Community Decide? The Vision and Reality of Soundness-only Peer Review in Open-Access Mega-Journals," *Journal of Documentation* 74(1): 137–161. doi:10.1108/JD-06-2017-0092

Suber, Peter (2012). *Open Access*. Cambridge, MA: MIT Press.

Tennant, Jonathan P., François Waldner, Damien C. Jacques, Paola Masuzzo, Lauren B. Collister, and Chris H. J. Hartgerink (2016). "The Academic, Economic and Societal Impacts of Open Access: An Evidence-based Review," *F1000Research* 5: 632. doi:10.12688/f1000research.8460.1

Tenopir, Carol, Elizabeth Dalton, Allison Fish, Lisa Christian, Misty Jones, and MacKenzie Smith (2016). "What Motivates Authors of Scholarly Articles? The Importance of Journal Attributes and Potential Audience on Publication Choice," *Publications* 4(3): 22. doi:10.3390/publications4030022

Togia, Aspasia, and Stella Korobili (2014). "Attitudes towards Open Access: A Meta-Synthesis of the Empirical Literature," *Information Services & Use* 34(3/4): 221–231. doi:10.3233/ISU-140742

Wakeling, Simon, Peter Willett, Claire Creaser, Jenny Fry, Stephen Pinfield, and Valérie Spezi (2016). "Open-Access Mega-Journals: A Bibliometric Profile," *PLOS ONE* 11(11): e0165359. doi:10.1371/journal.pone.0165359

Wakeling, Simon, Peter Willett, Claire Creaser, Jenny Fry, Stephen Pinfield, and Valérie Spezi (2017a). "Open Access Megajournals: The Publisher Perspective (Part 1: Motivations)," *Learned Publishing* 30(4): 301–311. doi:10.1002/leap.1117

Wakeling, Simon, Peter Willett, Claire Creaser, Jenny Fry, Stephen Pinfield, and Valérie Spezi (2017b). "Open Access Megajournals: The Publisher Perspective (Part 2: Operational Realities)," *Learned Publishing* 30(4): 313–322. doi:10.1002/leap.1118

Wakeling, Simon, Peter Willett, Claire Creaser, Jenny Fry, Stephen Pinfield, and Valérie Spezi (2017c). "Transitioning from a Conventional to a 'Mega' Journal: A Bibliometric Case Study of the Journal *Medicine*," *Publications* 5(2): 7. doi:10.3390/publications5020007

Wellen, Richard (2013). "Open Access, Megajournals, and MOOCs: On the Political Economy of Academic Unbundling," *SAGE Open* 3(4). doi:10.1177/2158244013507271

Wilsdon, James, Liz Allen, Eleonora Belfiore, Philip Campbell, Stephen Curry, Steven Hill et al. (2015). *The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management*. doi:10.13140/RG.2.1.4929.1363

Wolff, Christine, Alisa B. Rod, and Roger C. Schonfeld (2016a). "US Faculty Survey 2015," Ithaka S+R. doi:10.18665/sr.277685

Wolff, Christine, Alisa B. Rod, and Roger C. Schonfeld (2016b). "UK Survey of Academics 2015," Ithaka S+R, Jisc, RLUK. doi: 10.18665/sr.282736

Wolff, Christine (2017). "US Library Survey 2016," Ithaka S+R. doi:10.18665/sr.303066