

First revision

Please read the **Important notes** below, the **Review guidance** on page 2 and our **Standout reviewing tips** on page 3. When ready [submit online](#). The manuscript starts on page 4.

Important notes

Editor and deadline

Yarden Katz / 10 Sep 2017

Files

1 Tracked changes manuscript(s)

1 Rebuttal letter(s)

2 Figure file(s)

3 Table file(s)

Please visit the overview page to [download and review](#) the files not included in this review PDF.

Declarations

No notable declarations are present



Please read in full before you begin

How to review

When ready [submit your review online](#). The review form is divided into 5 sections. Please consider these when composing your review:

1. BASIC REPORTING

2. EXPERIMENTAL DESIGN

3. VALIDITY OF THE FINDINGS






4. General comments

5. Confidential notes to the editor





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To finish, enter your editorial recommendation (accept, revise or reject) and submit.





BASIC REPORTING

-  Clear, unambiguous, professional English language used throughout.
-  Intro & background to show context. Literature well referenced & relevant.
-  Structure conforms to [PeerJ standards](#), discipline norm, or improved for clarity.
-  Figures are relevant, high quality, well labelled & described.
-  Raw data supplied (see [PeerJ policy](#)).

EXPERIMENTAL DESIGN

-  Original primary research within [Scope of the journal](#).
-  Research question well defined, relevant & meaningful. It is stated how the research fills an identified knowledge gap.
-  Rigorous investigation performed to a high technical & ethical standard.
-  Methods described with sufficient detail & information to replicate.

VALIDITY OF THE FINDINGS

-  Impact and novelty not assessed. Negative/inconclusive results accepted. *Meaningful* replication encouraged where rationale & benefit to literature is clearly stated.
-  Conclusions are well stated, linked to original research question & limited to supporting results.
-  Speculation is welcome, but should be identified as such.
-  Data is robust, statistically sound, & controlled.

The above is the editorial criteria summary. To view in full visit <https://peerj.com/about/editorial-criteria/>

7 Standout reviewing tips

3



The best reviewers use these techniques

Tip

Example

Support criticisms with evidence from the text or from other sources

Smith et al (J of Methodology, 2005, V3, pp 123) have shown that the analysis you use in Lines 241-250 is not the most appropriate for this situation. Please explain why you used this method.

Give specific suggestions on how to improve the manuscript

Your introduction needs more detail. I suggest that you improve the description at lines 57- 86 to provide more justification for your study (specifically, you should expand upon the knowledge gap being filled).

Comment on language and grammar issues

The English language should be improved to ensure that your international audience can clearly understand your text. I suggest that you have a native English speaking colleague review your manuscript. Some examples where the language could be improved include lines 23, 77, 121, 128 - the current phrasing makes comprehension difficult.

Organize by importance of the issues, and number your points

1. Your most important issue
2. The next most important item
3. ...
4. The least important points

Give specific suggestions on how to improve the manuscript

Line 56: Note that experimental data on sprawling animals needs to be updated. Line 66: Please consider exchanging "modern" with "cursorial".

Please provide constructive criticism, and avoid personal opinions

I thank you for providing the raw data, however your supplemental files need more descriptive metadata identifiers to be useful to future readers. Although your results are compelling, the data analysis should be improved in the following ways: AA, BB, CC

Comment on strengths (as well as weaknesses) of the manuscript

I commend the authors for their extensive data set, compiled over many years of detailed fieldwork. In addition, the manuscript is clearly written in professional, unambiguous language. If there is a weakness, it is in the statistical analysis (as I have noted above) which should be improved upon before Acceptance.

Growth of hybrid open access, 2009-2016

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Hybrid Open Access is an intermediate form of OA, where authors pay scholarly publishers to make articles freely accessible within journals, in which reading the content otherwise requires a subscription or pay-per-view. Major scholarly publishers have in recent years started providing the hybrid option for the vast majority of their journals. Since the uptake usually has been low per journal and scattered over thousands of journals, it has been very difficult to obtain an overview of how common hybrid articles are. This study, using the results of earlier studies as well as a variety of methods, measures the evolution of hybrid OA over time. The number of journals offering the hybrid option has increased from around 2,000 in 2009 to almost 10,000 in 2016. The number of individual articles has in the same period grown from an estimated 8,000 in 2009 to 45,000 in 2016. The growth in article numbers has clearly increased since 2014, after some major research funders in Europe started to introduce new centralized payment schemes for the OA charges (APCs).

1 Growth of hybrid open access, 2009-2016

2

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5 14.8.2017

6 **Abstract**

7

8 Hybrid Open Access is an intermediate form of OA, where authors pay scholarly publishers
9 to make articles freely accessible within journals, in which reading the content otherwise
10 requires a subscription or pay-per-view. Major scholarly publishers have in recent years
11 started providing the hybrid option for the vast majority of their journals. Since the uptake
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13 difficult to obtain an overview of how common hybrid articles are. This study, using the
14 results of earlier studies as well as a variety of methods, measures the evolution of hybrid
15 OA over time. The number of journals offering the hybrid option has increased from around
16 2,000 in 2009 to almost 10,000 in 2016. The number of individual articles has in the same
17 period grown from an estimated 8,000 in 2009 to 45,000 in 2016. The growth in article
18 numbers has clearly increased since 2014, after some major research funders in Europe
19 started to introduce new centralized payment schemes for the OA charges (APCs).

20 **Introduction**

21

22 Ever since the emergence of the world wide web, a quarter of a century ago, academics and
23 scholarly publishers have experimented with different forms of Open Access (OA), a
24 radically new business model for the dissemination of research publications. The common
25 characteristic of all different forms of OA is that the basic building brick of modern research
26 reporting, the peer reviewed article, is available to anybody with Internet access free of
27 charge and access barriers. The different variations of OA include immediate and delayed
28 access, access just to read versus access with extensive reuse rights. OA can be provided
29 with no charges to the authors and their institutions, or publishing charges can be levied to
30 fund the publication. The abbreviation for such charges is APC, which can be interpreted as
31 article processing or article publication fee. In addition to the articles themselves being
32 made OA by the publishers (gold OA), it is also possible that the authors legally upload
33 manuscript copies to institutional or subject-specific repositories (green OA). And as with
34 many other types of web content, illegal copies can be found for many articles behind
35 subscription paywalls

36 OA content can thus be found through channels which are clear alternatives to subscription
37 journals, or as substitutes for those in the form of manuscript version freely available. But
38 there is one variation, which big commercial and society publishers have eagerly embraced
39 in the last few years, the hybrid OA journal. A hybrid journal is a traditional journal, for
40 which readers need a subscription (or where readers can pay to view individual articles).

41 This essentially means that the revenue for the publisher comes mainly from readers or the
42 organizations they work for. But in addition, the journal offers authors the possibility to
43 open up their individual article as OA immediately upon publication, on condition of the
44 payment of a surcharge similar to the APCs paid in many gold OA journals. The vast
45 majority of subscription journals from the leading scholarly publishers are nowadays
46 hybrid. Due to the price level of typically around 3,000 USD, which many authors and their
47 institutions perceive as high (Tenopir et al, 2017), the actual uptake of the option has
48 however so far remained low, on average only a couple of percentages of all articles in the
49 journals in question. There are however signs that the uptake is on the rise.

50 The first documented hybrid journals were published by the Entomological Society of
51 America in the late 1990s (Walker, 1998). The APCs were low by today's standards, a
52 couple of hundred dollars. David Prosser wrote an interesting analysis in 2003, where he
53 outlined hybrid journals as a risk free transition path towards full OA (Prosser, 2003). Then
54 in a bold move in 2004, Springer announced the hybrid option "Open Choice", for their full
55 portfolio of over 1,000 subscription journals (Springer, 2004). Springer was also the first
56 publisher to experiment with deals bundling together subscription e-licenses for whole
57 universities or consortia, with "free" hybrid OA for articles authored by scholars from these
58 universities (Albandes, 2009).

59 Since around 2010 most big publishers have announced similar schemes and the number
60 of journal offering the hybrid possibility has dramatically increased. Starting a hybrid
61 program for established journals is very inexpensive on the journal level, since making the
62 necessary changes to the web submission and publishing systems can be spread over
63 hundreds of journals sharing the same infrastructure. It is also essentially risk-free, in
64 contrast to starting new full OA journals or converting journals, since the subscription
65 revenue remains. Many academics and research funders have been quite critical of
66 academics paying twice for the same content, a practice pejoratively named "double-
67 dipping" (Cressey, 2009). Publishers have tried to reassure critics that this is not the case,
68 and that they will decrease subscription prices in proportion to the hybrid uptake
69 (Elsevier, 2017). But monitoring this has been very difficult due to the lack of data on the
70 uptake. Publishers have different ways of "tagging" hybrid articles, and counting them
71 manually in almost 10,000 journals is a daunting task. In addition, it would be very useful
72 to see if the hybrid strategy shows any signs of becoming the road towards full conversion
73 to OA that David Prosser had outlined in 2003 (Prosser, 2003).

74 The aim of this study was consequently to study the global number of journals offering the
75 hybrid option and in particular the total number of articles published in them using the
76 option. Due to the fact that the author of this article has carried out two earlier studies of a
77 similar nature, a further aim was to provide reliable estimates of the longitudinal
78 development of both the number of journals and articles since 2009.

79 **Methods**

80

81 The two aggregate parameters for understanding the evolution of over time of the hybrid
82 OA market, are the number of journals offering the hybrid option and the total number of

83 hybrid articles published yearly. Additional interesting parameters include the share of
84 eligible articles for which the the hybrid option has been used.

85 It is very difficult to study the number of articles published in hybrid OA journals. Firstly,
86 there is no general index of hybrid journals, so even identifying which journals are hybrid
87 is challenging. The leading commercial publishers usually offer this option for the journals
88 they own themselves, but the situation is less clear for journals that they publish on behalf
89 of scholarly societies. Secondly, there is no standardized way in which hybrid articles are
90 labelled. Publishers indicate hybrid articles in varying ways in tables of content, and a few
91 have search functions across their journal portfolios, which allow selectively picking out
92 hybrid articles. Manually browsing the tables of content of around 10,000 hybrid journals
93 in order to find the hybrid articles for even a sample of the more than one million “eligible”
94 articles published each year is just not feasible.

95 One option is to find the total numbers from published reports. Many publishers have
96 announced the number of journals on their websites, and occasionally they have
97 announced how many hybrid articles they published in a given year, for instance in press
98 releases. Another option is to count articles using some automated means from the journal
99 websites.

100 In this study the evolution from 2009 until 2016 is studied, using data from a number of
101 published studies as well as new data collected for this study. The earlier studies are listed
102 in Table 1.

103 The Study of Open Access Publishing (SOAP) was carried out with EU funding by a
104 consortium of partners which also included publishers (Dallmeier-Tiessen et al, 2010). The
105 scope of the study was open access broadly, but the results also included an estimate of the
106 number of hybrid journals and articles, based partly on data obtained directly from
107 publishers. My own study of the evolution of hybrid OA from 2009 to 2011 followed in the
108 footsteps of the SOAP study, and also used a mixed method of searching publishers’
109 websites and asking them directly for numbers (Björk, 2012). A later study that I carried
110 out together with Mikael Laakso focused more on finding out the uptake level in individual
111 hybrid journals, but it also produced overall article figures for 2011-2013 (Laakso & Björk,
112 2016). The method differed from the other studies, since it was based on automated
113 identification of hybrid articles, using for instance the labelling of such articles with text
114 like “Creating commons” or “copyright the authors”. The RIN study focused on the OA
115 situation for UK authors, but also produced comparative global figures (RIN, 2015).

116 For the present study 15 leading publishers were asked to provide the hybrid article
117 numbers for 2014-2016. In order to increase the chance of getting answers, we promised
118 only to report the total figures, not the figures for individual publishers. For this reason, the
119 results are presented on the aggregate level..

120 Twelve of the publishers provided the article numbers. For two of the publishers it was
121 impossible to find out an appropriate contact person, and one publisher refused to provide
122 the data. For these three the figures were estimated from their websites using browsing
123 and/or using the search facilities of the publishing platform in question. In a follow-up
124 query seven of the fifteen publishers also provided the current number of hybrid journals.
125 For the rest it was easier to obtain the journal numbers directly from their websites.

126 In addition to these, five further publishers, from which the Open Access Scholarly
127 Publishers Association had independently obtained data, **where** included in the study. The
128 names of all 20 publishers are listed below in Table 2. PNAS is a single journal published by
129 the US National Academy of Sciences, rather than a publisher, but it has been included in
130 the list, since almost a third of the articles are hybrid, implying almost 1,000 hybrid articles
131 per year.

132 The article numbers of 2009 and 2011 were taken from (Björk, 2012) and those of 2014-
133 2016 were collected in this study.

134 For some of years studied (2010, 2012, 2013), there were no estimates of the total article
135 numbers of all twenty publishers. However, previous studies have provided estimates for
136 the years in question for the five biggest publishers. Furthermore, the ratio of the number
137 of hybrid articles from the big five to all twenty publishers could be calculated from the
138 available estimates for both for 2009, 2011 and 2014-2016. That share has over the years
139 varied between 68 and 80 %. Estimates for all twenty for the remaining years could then be
140 extrapolated using approximated longitudinal evolution of the ratio as a basis.

141
142 It is not possible to retrospectively estimate the growth in the number of journals on a year
143 to year basis. But the existing earlier estimates can be combined with the new data
144 collected be combined to provide an approximate timeline. The SOAP study (Dallmeier-
145 Tiessen, 2010) and the earlier study by this author (Björk, 2012) provide figures for
146 October 2009 and February 2012. The RIN study (2016) provides a figure for
147 approximately the end of 2014. The data for this study was collected in June 2017.

148 There are many smaller publishers who also have hybrid journals, so the results we report
149 must be understood as lower boundaries. For instance, the RIN study (2015) estimates that
150 49 % of all Scopus indexed journals were hybrid in 2014, which would indicate around
151 11,000 journals. This can be compared to their estimate for the leading 32 publishers in
152 whose journals UK authors published, which was 8,230. Due to the difficulty in data
153 collection, and since it would be difficult anyway to obtain historical data for the early
154 years, no attempt was made in this study to go beyond the 20 publishers listed.

155 Results

156

157 The evolution of the number of journals offering the hybrid option is shown in Figure 1.
158 The data is only available for four discrete points, indicated in the graph.

159

160

161 The figure shows a period of rapid growth between 2009 and 2014, after which the trend
162 has slowed down, probably because most big publishers have already converted the
163 majority of their subscription journals to hybrid journals, reaching a saturation point. The
164 estimate of this study is that twenty leading publishers had 9,678 hybrid journals in June

165 2017. Data in table 2 of the RIN study (RIN, 2015, p. 17), can be used to calculate that at the
166 end of 2014 73 % of the journals of the big 5 publishers were hybrid.

167 The evolution of the number of articles published in these journals (Figure 2) also shows a
168 sustained growth, but a slightly different pattern.

169 Compared to the number of journals, the growth rate of articles was slower in the period
170 2009-2013. But from 2014 onwards, the growth has been faster, meaning that the average
171 number of hybrid articles per journal offering the option has started to grow. By 2016 the
172 total number of articles had reached an estimated 44,395.

173 All in all the scholarly publishing market has seen an increasing market concentration with
174 the five leading publishers in 2013 accounting for nearly fifty % of Web of Science indexed
175 articles (Larivière et al 2013). Their market share of hybrid articles is even more
176 pronounced.

177 Discussion

178

179 As long as the authors of hybrid articles have had to secure the funding of the APCs from
180 either personal funds, departmental funds, or external research grants, the uptake levels
181 have remained very low for the vast majority of journals. The rather uniform price level of
182 around 3,000 USD for the extra feature of open access to an article which in any case will be
183 published, seems to most authors like an expensive luxury, unless the journal in question is
184 a very prestigious one. There are many journals with zero articles per year, and the average
185 annual hybrid article share for journals with at least one hybrid article per year was during
186 the period 2011-2013 only 3,8 % (Laakso & Björk, 2016). But there are interesting cases of
187 journals with a high uptake which have been able to use hybrid as a stepping stone to
188 converting into full OA journals. For instance, Nature Communications was launched as a
189 hybrid and electronic only journal in 2010 and converted to full OA from the start of 2016.
190

191 The accelerating growth in hybrid article numbers in 2014-2016 is in addition to the
192 increased number of journals, probably mainly due to two major changes in the funding
193 infrastructure. Firstly, several leading research funders have set up centralized funds for
194 paying APCs and secondly, a new type of consortial electronic subscription licenses which
195 also include the payment of hybrid APCs has started to emerge.

196 The centralized funding scheme makes a break with the earlier practice of making APCs
197 (both for full OA and for hybrid journals) allowable costs in externally funded research
198 grants. That idea has not worked well, because it essentially means that if a researcher does
199 use grant funds for APCs, that correspondingly decreases uses for other items, such as a
200 research assistants or conference trips. The new scheme was pioneered by Wellcome Trust
201 and received considerable UK governmental support following the Finch report (Finch,
202 2013). In the budgets of research funding organizations like the UK research councils and
203 the Austrian Science Fund (FWF), the money is separately budgeted for just APCs on a
204 central level, and payment is more or less automatic. An additional advantage is that the

205 transaction costs of handling APC payments is usually much lower, than in the allowable
206 cost option.

207 After the introduction of such mechanisms several research funders have started to publish
208 breakdowns of their APC expenditures. For instance Jisc, FWF and Wellcome Trust together
209 funded 5,612 hybrid articles in 2014 and 5,912 articles in 2015 (Jahn & Tullney, 2016).
210 Some of these funders have, however, been alarmed by the fact that they are paying more
211 APCs for hybrid than full OA journals, and at higher prices. For this reason, they
212 commissioned a report in 2014 outlining different ways for capping APC levels, in
213 particular for hybrid journals (Björk & Solomon 2014).

214 The other option, an extension to the subscription e-license to also include APCs for OA
215 articles in hybrid journals, which had been piloted already around 2008-2009 by Springer,
216 is now again becoming popular. Many national library consortia are very keen to negotiate
217 such deals, which also an increasing number of major publishers seem willing to make. The
218 boost to hybrid uptake is demonstrated by for instance the Springer "Compact" deal with a
219 consortium representing 32 Swedish universities (Neidenmark 2016). In 2015 only 157
220 articles with Swedish corresponding authors were published in Springer hybrid journals.
221 But in 2016 after the new deal was in place, 236 articles in Springer subscription journals
222 automatically became OA already in the first three months of the year. That would mean an
223 estimated almost 1,000 articles per annum.

224 Due to institutional arrangements such as these the uptake of hybrid OA has started to vary
225 a lot between countries. Some European countries with centralized research funding and
226 strong OA strategies, seem to be leading the development. For instance, UK authors in
227 2014 published 6,4 % of their Scopus-indexed articles as hybrid OA, when the
228 corresponding global average was 2,4 % (RIN, 2014).

229
230 Hybrid OA publishing is just a part of the overall changing OA picture. Another important
231 type of gold OA publishing consists of the OA megajournals, which have rapidly emerged in
232 the wake of the phenomenal success of PLOS ONE (Spezi et al, 2016). Starting megajournals
233 is for major established publishers another strategic way of gradually increasing their OA
234 presence, a way in which they can leverage their prestige and infrastructure. Although the
235 number of such journals is low, their combined article volumes and growth rate is quite
236 similar to hybrid OA. Our on-going research shows that the article volume of 16 leading
237 megajournals has increased from 6,913 in 2010 to 73,703 in 2016 (extended from Björk,
238 2015). Together hybrid OA and megajournal articles constituted around 5,5 % of all
239 scholarly articles indexed in Scopus in 2016 the share of articles made OA immediately by
240 the publisher is currently around 20 %, and a large part of the growth in the past five years
241 has come via the two above categories (our on-going research).

242

243

244 Acknowledgements

245

246 This study would have been difficult to carry out without the co-operation of the twelve
247 publishers, which were kind enough to provide the hybrid article counts for 2014-2016.
248 Very useful additional data was provided by Claire Redhead, from the Open Access
249 Scholarly Publisher's Association.

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325

Figure 1(on next page)

The evolution of the number of hybrid journals 2009-2017

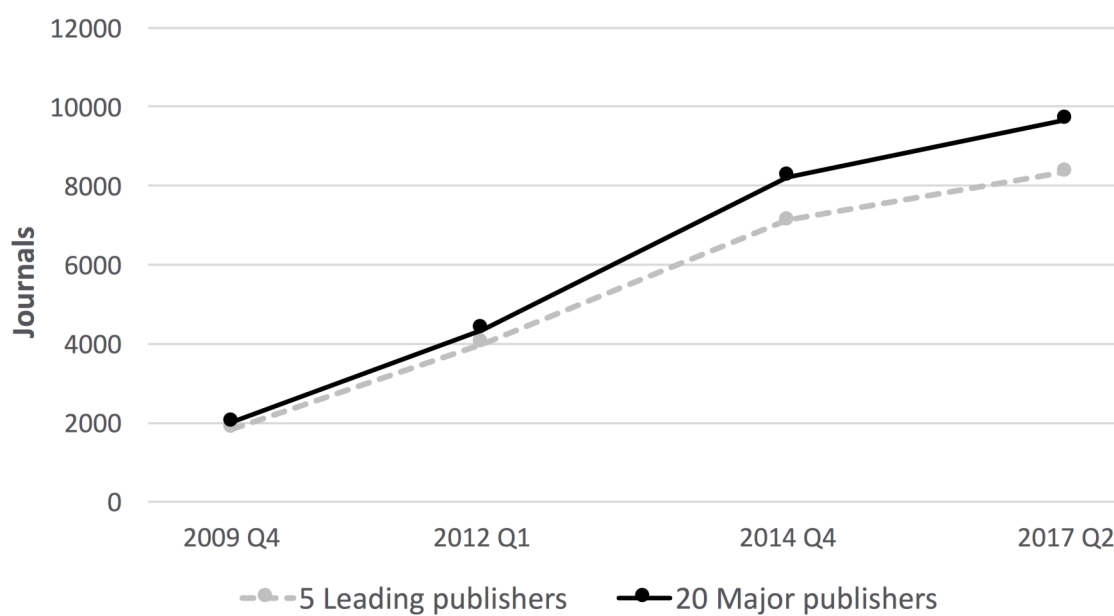


Figure 2 (on next page)

The evolution of the number of hybrid articles 2009-2016

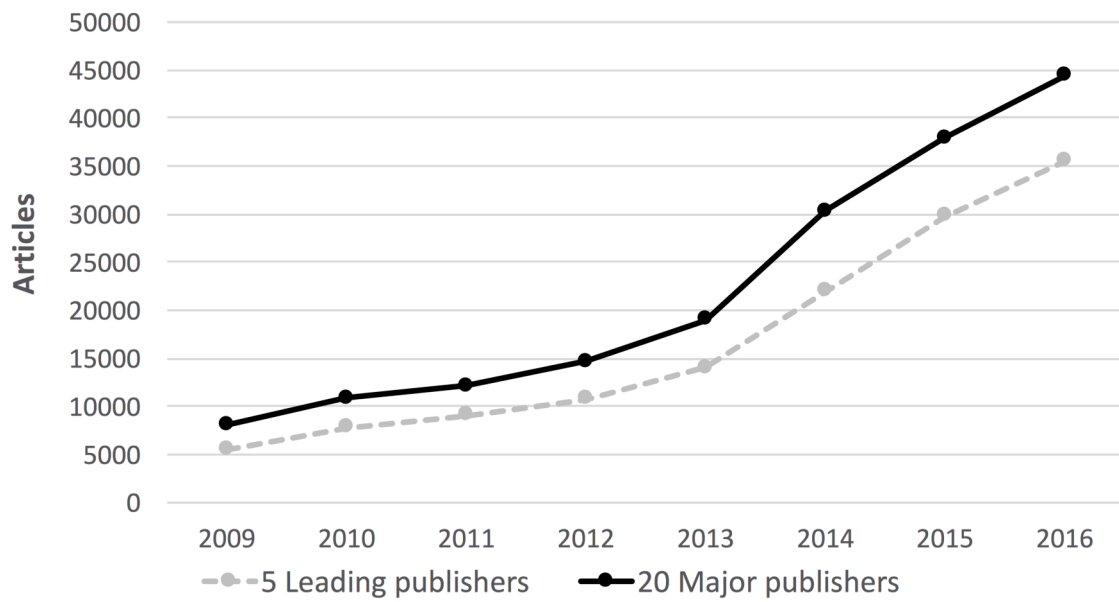


Table 1 (on next page)

Earlier studies incorporated in the results

1

	No. of Journals (when studied)	No. of Articles (when studied)	No of Publishers studied
Dallmeier, et al 2010	Oct. 2009	2009	12
Björk 2012	Febr. 2012	2009, 2011	15
Laakso & Björk 2016	Not directly studied	2011-2013	5
RIN 2015	2012, 2014	2012, 2014	32

2

3

Table 2 (on next page)

The hybrid publishers included in the study

1

5 biggest:	Elsevier
	Springer Nature Group
	Wiley-Blackwell
	Taylor & Francis
	Sage
15 other:	Emerald
	Oxford University Press
	Cambridge University Press
	BMJ Group
	Royal Society
	Royal Society of Chemistry
	American Physical Society
	American Institute of Physics
	American Chemical Society
	Proceeding of the National Academy of Sciences (PNAS)
	International Union of Crystallography
	Institute of Physics (IOP)
	Company of Biologists
	Portland Press
	Brill

2

3