GOAJ2

Gold Open Access Journals 2011-2016

Walt Crawford

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This book was prepared entirely in Word 2013, using the licensed typefaces Berkeley Book and Berkeley (bold) for text and Calibri for headings and subheadings. Excel 2013 was used for data gathering and to prepare tables and graphs. The template is a customized version of bk6pv.dotx (modified for different typefaces and slightly different heading practices), a template developed by the author, modified and improved with the cooperation Information Today, Inc. and freely available at waltcrawford.name/bk6pv.dotx. (The template named uses Palatino Linotype for body text and Verdana for headings.) For more about the template and using no-cost methods to produce professional-quality books, read *The Librarian's Guide to Micropublishing*.

Contents

Preface

This book is a sequel of sorts, following on *Gold Open Access Journals 2011-2015*, which continues to be available as a free PDF ebook or a paperback priced to recover production costs ($6 as of this writing).

Thanks to SPARC's continued support, I was able to update the database to include all journals in the *Directory of Open Access Journals* as of very early (UMT) January 1, 2017 and to include 2016 counts (and sometimes refine earlier counts). As noted in "The Biggest Picture" in Chapter 1, I was also able to add 2016 article counts to 2,800 of the journals dropped from *DOAJ* in May 2016—and to do 2012-2016 counts for several thousand "gray OA" journals. Since neither of those extra counts are likely to be repeatable in future years, this volume includes a uniquely broad view of gold OA.

This book follows the pattern of the previous version, omitting Chapters 21-22 (discussing the May 2016 delisting) and with Chapter 20 changed from "Viability Notes" to "Volatility and Predictability."

There will *not* be an updated version of *Gold Open Access Journals 2011-2015: A Subject Approach,* although some of that material may appear in an issue of *Cites & Insights*. There probably *will* be a new country-oriented book, *The Countries of OAWorld 2011-2016*, appearing some weeks or months after this book appears.

Acknowledgments (repeated from previous edition)

Thanks first and foremost to SPARC. Without SPARC's sponsorship, this project would not have happened—and good advice and feedback from Raym Crow and Shawn Daugherty improved the project.

Thanks to Patrick Hogan for publishing *Open-Access Journals: Idealism and Opportunism*, the August/September 2015 *Library Technology Reports* covering some two-thirds of *DOAJ* journals from 2011 through June 2014, which served as a precursor to this project.

Thanks to the good people at *DOAJ* for answering questions and improving the directory—and to Heather Morrison for pointing me to a way to get *DOAJ* metadata into Excel in full Unicode form.

Thanks to Linda Driver for tolerating and even encouraging my ongoing obsession with getting the facts right about real-world open access.

Thanks to loads of LSW folks—John Dupuis, Dorothea Salo, Barbara Fister and many others—for encouraging this work, and to a fair number of people involved with OA who have helped along the way.

The work is my responsibility, as are errors that may have crept in. (See Appendix A for notes on why attempts to replicate this will probably yield different results.)

Links

The data used for this report will be made freely available, always with a Creative Commons BY (attribution) license: you can do what you want with it as long as you properly credit the source. So, too, the PDF version of this book and of planned supplemental books are issued with CC BY licenses.

Links will be found at http://waltcrawford.name/goaj.html.

Availability will also be announced on *Walt at Random*, on my Twitter, Facebook, Google+ and Mokum accounts (I'm waltcrawford pretty much everywhere), and sooner or later in *Cites & Insights*.

1. The Big Picture

How many open access (OA) articles are published each year? How many open access (OA) journals publish how many OA articles? What proportion of those journals and articles involve fees (usually called Article Processing Charges or APCs)? How much did each article cost?

Here are the answers for serious gold OA—journals in the *Directory of Open Access Journals* as of January 1, 2017—noting that these broad numbers may be misleading:

- 523,205 articles in 2016, up from 486,511 in 2015; 461,986 in 2014; 395,056 in 2013; 342,105 in 2012 and 273,734 in 2011. (As with all numbers in this book, the numbers can't be compared directly to those in *Gold Open Access Journals 2011-2015* because 2,861 journals were removed from *DOAJ* in May 2016.).
- 8,992 journals, of which 8.431 published articles in 2016 for an average of 62 articles per journal in 2016.
- 68% of those journals do not charge APCs or other fees—and those free-to-submit journals published 43.0% of the articles in 2016, down slightly from 43.9% in 2015.
- The average cost in 2016 was no more than $803 per article, and probably less.

Those numbers are all far too simple, because they treat all of serious gold OA as one fairly homogeneous field, and that's simply not the case. This book explores the field in some depth, offering a range of ways of looking at gold OA and how it's doing.

The Serious Gold OA Universe

This report is based on an exhaustive study of Gold OA journals as represented by the *Directory of Open Access Journals* (DOAJ) as of 12:30 a.m. UMT on January 1, 2017. I visited (or tried to visit) each journal's home page to determine charges and article counts from 2011 through 2016.

My hope is that this updated report will help answer some or all of the following questions:

- Is gold OA a significant portion of scholarly publishing—and, if so, how big is it and how fast is it growing?
- How do major subject areas differ in terms of gold OA publishing?
- How much money might be involved in gold OA APCs?
- How many articles are published in a typical OA journal (or, realistically, in various sorts of OA journals)?
- Are there useful things to say about claimed country of publication or about regional patterns?
- Are there useful distinctions based on type of publisher?
- Are there important differences between gold OA as practiced by the largest fee-based publishers and all the rest?

Key Definitions

What do I mean by serious gold OA? Gold open access journals that are in the *Directory of Open Access Journals* (DOAJ) as of January 1, 2017, and that aren't excluded for a variety of reasons—see Chapter 3.

Gold Open Access

As a reminder, a gold OA journal is one that makes all peer-reviewed articles freely available for online reading as soon as they're published. I included seven journals that appear to require free instant registration to read articles (but not to explore tables of contents); those journals published just 1,144 articles in 2016, so excluding them would make almost no difference in overall numbers.

This report excludes "hybrid" OA. It also excludes green OA (articles available, frequently not in final published form, from an openly accessible repository) and so-called "delayed open access" (embargoed access).

Other Terms and Data Sources

Journal names, publisher names, starting year and country of publication all come directly from the *Directory of Open Access Journals* as of January 1, 2017.

Subjects were assigned based on *DOAJ* subject and keyword fields, and in some cases refined based on scanning article titles. Some of them are probably erroneous. Subject segments were assigned based on subjects.

Regions were assigned based on country of publication, except for the special "region" APCLand, assigned based on publisher characteristics (see Chapter 2).

Publisher categories were assigned based on publisher names and available online information.

APCs include any normally-mandatory submission or publishing fee (including required society membership), as it would be applied for a U.S. author in the most expensive author category, for a 10-page article in the most expensive article category, in U.S. dollars in early 2017.

Articles per year were determined by direct observation, using shortcuts where available (e.g., publication-year or volume searches for SciELO, J-Stage, MDPI and some others, and year or issue counts for Dove, Elsevier, many Iranian journals and others) and Find counts when feasible (e.g., when each article has "PDF" as a text tag). When manually counted, these counts exclude editorials and other non-reviewed materials; when shortcuts were used, such items may be included.

Revenue is simply APC times the 2016 article count and is always the maximum potential revenue, ignoring waivers, discounts and lower charges for some article or review types. Actual revenues may well be at least 15% lower.

The Big Numbers

You've already seen the biggest numbers—523,205 articles in 8,992 journals in 2016, with 68% of the journals free, publishing 43% of the articles. I did not attempt to count articles in unavailable journals (which might be feasible through *DOAJ* counts); for earlier years, these may total around 5,000 articles. Most of this book (except Chapter 3) also ignores "CA" journals—those that don't state APCs—which published a total of 6,263 articles in 2016; 5,523 in 2015; 5,145 in 2014; 4,046 in 2013; 3,334 in 2012 and 2,373 in 2011.

There are, to be sure, other article and journal counts, discussed in "The Biggest Numbers" near the end of this chapter.

Except for Chapter 3, this book is almost entirely about the biggest group, those coded A or B (discussed below). Table 1.1 shows the key figures for those journals, including the fact that some journals don't publish articles every year.

	Journals	Active 2016	Articles	Art/Jrnl
Free	6,157	5,770	224,808	39
Pay	2,835	2,661	298,397	112
Total	8,992	8,431	523,205	62
Free %	68%	68%	43%	

Table 1.1. Journals and articles, overall

Table 1.2 shows the article counts for each of the past six years and also shows codes for some special categories of journals within the overall serious OA universe.

	Count	2016	2015	2014	2013	2012	2011
A	7,962	490,160	457,314	429,960	365,698	315,119	250,826
B3	11				194	174	277
B4	57			1,463	1,232	1,189	1,155
B5	281		5,385	6,167	4,982	4,242	3,504
BC	267	2,549	2,261	4,327	4,641	3,899	2,442
BF	246	701	1,815	2,076	2,224	2,201	1,707
BR	40	24,408	14,824	13,273	11,279	10,802	9,488
BS	7	1,144	1,206	1,095	1,231	1,455	1,551
BX	121	4,243	3,706	3,617	3,575	3,024	2,784
Total	8,992	523,205	486,511	461,986	395,056	342,105	273,734

Table 1.2. Articles per year and special codes

"A" is the catchall code for journals that didn't get any other code.

B codes are journals in the analysis with special characteristics:

- B3 journals have no articles since 2013, which usually suggests the journal's not very viable.

- B4 journals have no articles since 2014. Most of these are also probably failing.
- B5 journals have articles in 2015 but not in 2016. Some may be failing; others are very late to post articles online; a few operate on an every-other-year schedule.
- BC journals either have no articles later than 2012 (and can generally be assumed to be shut down) or have been explicitly canceled or merged.
- BF journals have very few articles—from one to four articles in 2016 (the average is 2.84).
- BR journals are journals consisting entirely or primarily of reviewed conference papers.
- BS journals are those requiring sign-in (thus the S) or free instant registration to read articles, but not to browse contents. Technically, these journals aren't pure OA (and I don't understand what's gained by adding that speedbump to access), but I chose to include them. Note that it's a tiny group of journals with relatively few articles.
- BX is a new code: journals that were not reachable or had apparent malware via the URL in *DOAJ* but that could be reached through a journal title search.

These codes are not used in the remainder of this book, since none of them imply anything negative about the journals during the years they publish articles. BX was an experiment that proved worthwhile, returning 121 journals to full inclusion—roughly one-quarter of those that would be excluded otherwise.

Overall Growth

If you take a quick look at *Gold Open Access Journals 2011-2015*, you may note that the figures in Table 1.2 are lower than last year. That shrinkage is explained in Chapters 21 and 22 of the earlier work: some 2,861 journals were removed from *DOAJ*—and while hundreds of journals have been restored and added during 2016, the total is still lower.

Enough new journals that began prior to 2016 were added to bring the total with 2015 articles up 18% and the article count for 2015 up a similar 18%.

Serious gold OA shows growth each year: 25% in 2012, 15% in 2013, 17% in 2014, 5% in 2015 and 8% in 2016.

Revenue and Costs

	2016	2015	2014	2013	2012
Revenue	$419,887K	$383,956K	$348,280K	$272,192K	$215,279K
Pay art.	298,397	272,950	260,771	216,783	179,689
$/art	$1,407	$1,407	$1,336	$1,256	$1,198
Tot. art.	523,205	486,511	461,986	395,056	342,105
$/art	$803	$789	$754	$689	$629
Free%	43.0%	43.9%	43.6%	45.1%	47.5%

Table 1.3. Revenue* and cost per article by year, 2012-2016

Table 1.3 shows overall revenue-related figures for each year in this report (with revenues in thousands of dollars to avoid very small type), but the asterisk in the table caption relates to several caveats in this data:

- Revenue (Rev.) assumes no waivers, discounts or less-expensive categories—and for 2011-2016, it's the APC as of early 2017 and the fee status as of that date.
- Given that some journals (usually growing ones) migrate from free to pay status each year (with far fewer abandoning fees) and that many more journals raise APCs than lower them, it's likely that this table overstates not only the revenue but also the pay article counts and cost per article for earlier years.

Here and in some other cases, 2011 data is omitted from the table because of space limitations: including the extra column would require using seven-point type. The 2011 figures for each row are $139,294K; 133,651; $1,192; 273,734; $582; and 51.2%.

Starting Dates

Many later chapters include graphs showing starting dates for currently-free and currently-pay journals, usually with starting years clustered into pre-1981, 1981-1990, and two-year groups from 1991-92 through 2015-2016, largely to provide good clarity in the graphs. (Most of these graphs also show free and pay journals as separate lines.) Figure 1.1 shows starting dates for all of the good journals. Although only half the data points are labeled, there's a point for each year from 1996 on, for every two years 1990-95, for every three years 1981-89, for every five years 1971-80, for every decade 1921-1970, and at the far left one group on or before 1900 and one 1901-1920.

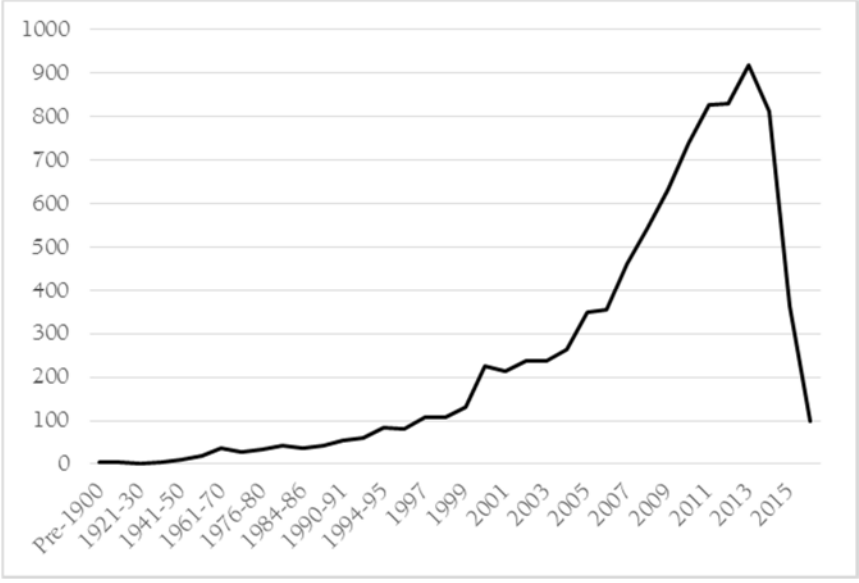

Figure 1.1. OA journals by starting year

Does Figure 1.1 mean that OA journal startups have collapsed entirely? Not really, although they have slowed from the peak years (826 to 917 journals in each year from 2011 through 2014, with 2013 the highest year) to 365 journals in 2015 and 100 in 2016. The drops for 2015 and 2016 are partly artifact—as should be obvious from the fact that 2014, with 507 in last year's report, now shows 813 journals. Most journals aren't submitted to *DOAJ* until they've published a few issues.

Figure 1.2. Free and pay journals by starting date, overall

Figure 1.2 shows starting dates divided into APC-charging and free journals and uses the template that will be used in the rest of the book.

Article Volume per Year, Free and Pay

Figure 1.3 uses the template that will be used for graphic free-and-pay article comparisons throughout the book. It's in chronological order rather than the newest-first order of most tables, and it uses solid OA gold for no-fee articles and cross-hatched dollar green for articles in journals that currently charge fees. As elsewhere, this arrangement may slightly understate the free count in earlier years. The key fact is clear enough: while no-fee OA has grown each year (60% more articles in 2016 than

in 2011), APC-based OA has grown much more rapidly (more than doubling over the six years).

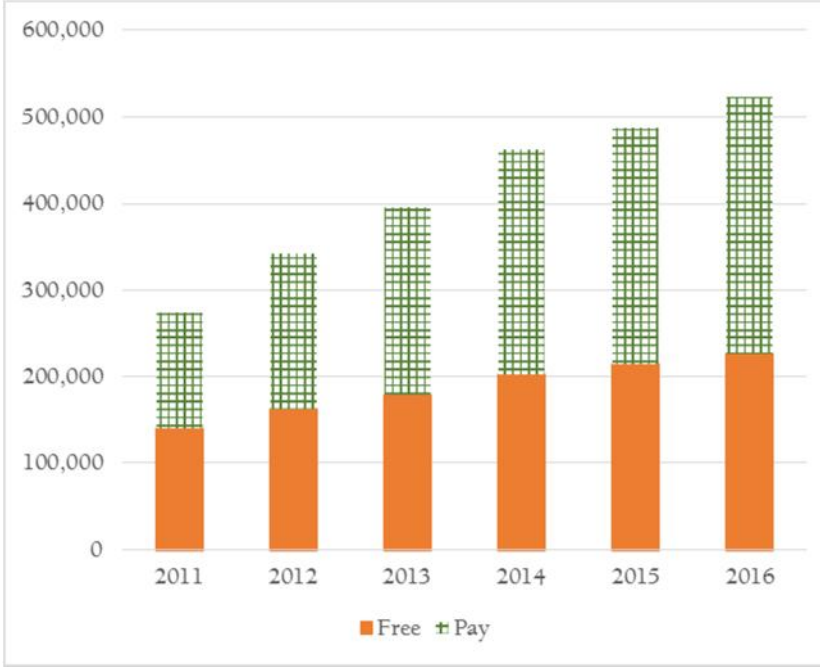

Figure 1.3. Free and pay articles by year, overall

Journal Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	1,537	17.1%	
Grew 25-49.9%	889	9.9%	27.0%
Grew 10-24.99%	1,027	11.4%	38.4%
Even, ±9.99%	2,172	24.2%	62.6%
Shrank 10-24.99%	1,020	11.3%	73.9%
Shrank 25-49.99%	1,107	12.3%	86.2%
Shrank 50%+	1,240	13.8%	

Table 1.4. Growth and shrinkage, overall

Table 1.4 shows how journals grew and shrank in number of articles from 2015 to 2016. Slightly more journals grew than shrank. (The 149 journals that either began in 2016 or had articles in 2016 but not in 2015 are included in "Grew 50% or more"—a change from last year's separate row.)

The Biggest Numbers

There's a lot of gold OA publishing that's *not* represented in *DOAJ*, either because journals don't meet the criteria or haven't applied. I chose to update 2016 counts for those journals removed from *DOAJ* in 2016, and separately looked at OA journals included in certain former blacklists. In the latter case, where original counts only ran through June 2016, I recounted the 2,200 or so that had at least 10 articles in the first half of 2016, found that most had roughly twice as many articles for the full year (as you'd expect), and applied that doubling to the remaining journals with *any* articles in the first half of 2016.

	2016	**2015**	**2014**	**2013**	**2012**
DOAJ	523,205	486,511	461,986	395,056	342,105
Gray 1	141,400	146,785	146,844	136,093	127,105
Gray 2	151,183	134,654	121,241	87,719	60,360
Gray 3	146,382	138,746	109,397	76,584	48,935
Total	962,170	906,696	839,468	695,452	578,505

Table 1.5. All known gold OA articles 2012-2016

Table 1.5 shows the results. Gray 1 is composed of journals that were in *DOAJ* on January 1, 2016 but not on January 1, 2017. Gray 2 is journals included in a blacklist where the blacklisting was not based on any stated evidence at all, and where my casual scan did not reveal an issue. Finally, Gray 3 is journals where some reason was given for blacklisting the publisher or journal or where I saw an issue. (Gray 2 and 3 are probably undercounted by about 10% for 2012-2015 because of the methodology used this time around.)

This is, I believe, a one-time overview: it's hard to see how it could be repeated.

The Megajournals

Finally, a note about two megajournals—ones publishing more than 20,000 articles in 2016 (the next highest figure is under 7,000). Last year, there was only one megajournal, and it was excluded from many discussions and tables. This year, there's no such exclusion.

Those two journals do affect overall figures quite substantially. Table 1.6 shows article counts and free article percentages for 2012 through 2016 with those two journals omitted.

	2016	**2015**	**2014**	**2013**	**2012**
Articles	475,510	445,757	426,083	360,994	317,857
%Free	47%	48%	47%	49%	51%

Table 1.6. Article counts and free percentage without two megajournals

Note that the free percentage jumps from 43% to 47% and that a majority of articles are free as recently as 2012. As for revenues and average maximum cost per article, the remaining journals show a maximum total revenue for 2016 of $344,793,343 and an average article cost of $725, a significant change.

The Rest of the Book

The rest of this book offers a variety of ways to look at the current state of serious gold OA. My purpose here is to describe, not prescribe.

Chapter 2 discusses APCLand and OAWorld, the fundamental split between eleven publishers who put out lots of journals and have APCs for most of them—and everybody else. It also introduces subject segments.

Chapter 3 covers exclusions in some detail: the journals *not* analyzed in the rest of the book.

Chapter 4 discusses the three broad subject segments and looks at journals by article volume.

Chapter 5 looks at journals and articles by APC and revenue.

Chapter 6 looks at journals and articles by type of publisher.

Chapter 7 looks at journals by country of publication (excluding journals in APCLand).

Chapters 9-11 look at journals and articles within each subject segment (Ch. 9-11), with a brief introduction in Chapter 8.

Chapters 12-19 look at journals and articles by geographic region (Ch.12) and within each region (Ch. 13-19). A later supplement will expand this to cover each country (with more than a handful of journals) in more detail.

Chapter 20 looks at predictability based on existing data or, really, whether knowing a journal's pattern for two or more years makes it plausible to project publication levels for the next year.

Appendix A discusses the survey itself, some of the caveats, and some of the changes since the previous study.

Data

The master spreadsheet for this project, including publishers and journal titles but omitting some calculated figures (e.g., revenue) to save space, will be freely available with a CC BY license. For links to the data (and links to the supplements), go to waltcrawford.name/goaj.html.

2. APCLand and OAWorld

I'll continue to split serious gold OA into two groups: APCLand and OAWorld. But the population of APCLand has grown, with BMJ added since total 2016 articles exceed 5,000. The criteria have changed slightly (Elsevier and Springer now publish enough non-APC journals to bring the APC percentage below two-thirds but still a majority: all others are at least 90% APC).

APCLand

APCLand consists of twelve publishers, each with more than 5,000 OA articles in 2016, each with a maximum potential 2016 APC revenue of more than $8.8 million (actual revenue may be lower), and each with a majority of its 2016 articles in OA journals appearing in APC-charging journals.

APCLand accounts for 19% of the fully-analyzed *DOAJ* journals with articles in 2016 and 39% of the 2015 articles in those journals. It also accounts for **83%** of the maximum potential APC revenues.

In other words, although APCLand accounts for one-fifth of the serious gold OA journals and less than two-fifths of the articles, it takes in more than **four-fifths** of the revenue.

APCLand includes these publishers, listed alphabetically and using publisher names used in DOAJ listings: BioMed Central, BMJ Publishing Group, Dove Medical Press, Elsevier, Frontiers Media S.A., Hindawi Publishing Corporation, MDPI AG, Nature Publishing Group, Oxford University Press, Public Library of Science (PLoS), Springer and Wiley.

For 2016, APCLand included 1,571 active gold OA journals publishing 204,318 articles, with a total maximum potential APC revenue of $349.172 million.

Overall, 17% of the APCLand journals publishing 2016 articles did not have APCs when checked in early 2017 (including journals funded through SCOAP[3]), but those journals published only 8% of the articles in APCLand. Average cost per article (assuming no waivers, discounts or less-expensive article categories) was $1,867; including the no-fee journals brings that down to $1,709. The average fee-charging journal published 145 articles and the average free journal published 61 articles, for an overall average of 130 articles per journal.

OAWorld

OAWorld includes thousands of publishers (more than 4,300 names in a list of unique *DOAJ* publisher fields, but it's clear that some of them represent spelling or other minor variations). These publishers accounted for 81% of the active journals and 61% of the articles, but only 17% of the revenues.

OAWorld accounts for 7,276 fully-analyzed active journals in 2016 with 318,887 articles, with a maximum revenue of $70.715 million.

Here's perhaps the key point: in OAWorld, not only do 80% of the journals active in 2016 *not* charge APCs or equivalent fees, those journals account for 65% of the articles, In other words, in OAWorld *most articles—nearly two-thirds—did not involve author-side charges*.

Another key figure: for those articles that *did* involve fees, the average cost per article was $635, just over one-third the average fee in APCLand. Averaged across *all* articles, the cost per article was $222—barely more than one-eighth (13%) the going rate for APCLand.

Most gold OA articles are published in OAWorld, but most of the gold goes to APCLand.

Just as free journals tend to publish fewer articles than APC-charging journals, so OAWorld journals publish fewer articles than APCLand journals: an average of 81 articles for fee-charging journals, 38 for free journal and 46 overall. The average fee-charging OAWorld journal could have taken in around $51.5 thousand.

APCLand and OAWorld in this book

Gold Open Access Journals 2011-2015 discusses my discovery of APCLand as a significant concept and its significant effect on country ratings; that discussion is not repeated here.

Except for this chapter and Chapter 4, the APCLand-OAWorld distinction plays out primarily in Chapters 7 and beyond.

Year-by-Year Comparison

Table 2.1 shows for each year the journals actually publishing articles, the number of articles, growth since 2011 (*not* year-to-year growth except in 2012) and average articles per journal,

	2016	2015	2014	2013	2012	2011
APCLand/jrnls	1,571	1,607	1,575	1,279	1,025	871
Growth	80%	85%	81%	47%	18%	
Articles	204,318	189,005	175,852	134,619	107,693	76,040
Growth	169%	149%	131%	77%	42%	
Art/J	130	118	112	105	105	87
OAWorld/Jrnls	6,860	7,074	6,861	6,366	5,748	5,048
Growth	36%	40%	36%	26%	14%	
Articles	318,887	297,506	286,134	260,437	234,412	197,694
Growth	61%	50%	45%	32%	19%	
Art/J	46	42	42	41	41	39

Table 2.1. Journals and articles by year, APCLand and OAWorld

For journals, percentage growth is much higher in APCLand than in OAWorld—although actual numbers favor OAWorld. Similarly, APCLand much more than doubled article production in six years as compared to 61% growth for OAWorld. It's interesting that average articles per journal is growing in both cases, but it's more than twice as high and growing much faster in APCLand.

Segment by Segment

As dramatic as the overall differences between APCLand and OAWorld are, the differences within subject segments are even more dramatic.

Biomed

APCLand is, as you'd expect, a big player here, with 39% of the journals and 50% of the articles. Only 11% of the active APCLand biomed journals are free and those journals account for only 6% of the 2016 articles. Average cost per article among APC-charging journals in 2016 was $2,039, coming down to $1,910 overall. APCLand published 93,519 biomed articles in 2016.

In OAWorld, where 94,675 biomed articles appeared in 2016, 67% of the active biomed journals were free and those journals published 54% of the articles: even in the most APC-hungry subject segment, a majority of articles did *not* involve payment. Average cost per article among APC-charging journals was $866; the overall average was $397. Biomed is the smallest segment for OAWorld.

Science, Technology, Engineering and Mathematics (STEM)

STEM is the largest segment overall and—in 2016—for APCLand as well, although APCLand only accounts for 22% of the journals. Those journals published 47% of the STEM OA articles in 2016. There's not a lot of free activity in APCLand: 23% of the journals, publishing 9% of the 2016 articles. Average cost per article among APC-charging journals was $1,709; including free journals brings that down to $1,551. APCLand published 105,415 STEM articles in 2016.

STEM is also the largest segment for OAWorld, with 120,176 articles in 2016; 70% of the journals didn't charge APCs, and those journals account for 59% of the articles. Average cost per article among APC-charging journals was $555; for all journals it was $230.

Humanities and Social Sciences (HSS)

APCLand is almost wholly uninterested in the humanities and social sciences: it accounts for 3% of the active journals and 5% of the articles. Although 56% of those journals don't charge APCs, only 31% of the 5,384 articles in 2016 appeared in free journals. Average cost per article

among APC-charging journals was $1,903; including non-APC journals, the cost per article comes down to $1,306.

OAWorld published 104,036 HSS articles in 2016. Very little of that involved APCs: 90% of the journals, publishing 83% of the articles, didn't charge them. Among the journals that did charge, average cost per article was $302—but the overall average was $53.

There are considerably more active HSS journals than either biomed or STEM: 3,608 in all compared to 2,416 and 2,407 respectively. OAWorld accounts for 3,497 of those 3,608 journals.

A Graphic View of Free and Pay

Figures 2.1 and 2.2, using the same colors and patterns (but different vertical scales), show the difference between APCLand and OAWorld on a year-by-year basis.

Figure 2.1. APCLand articles

The solid-gold Free area grows over the years, but is dominated by the more rapidly growing crosshatched dollar-green area. Overall growth is rapid, as in Table 2.1.

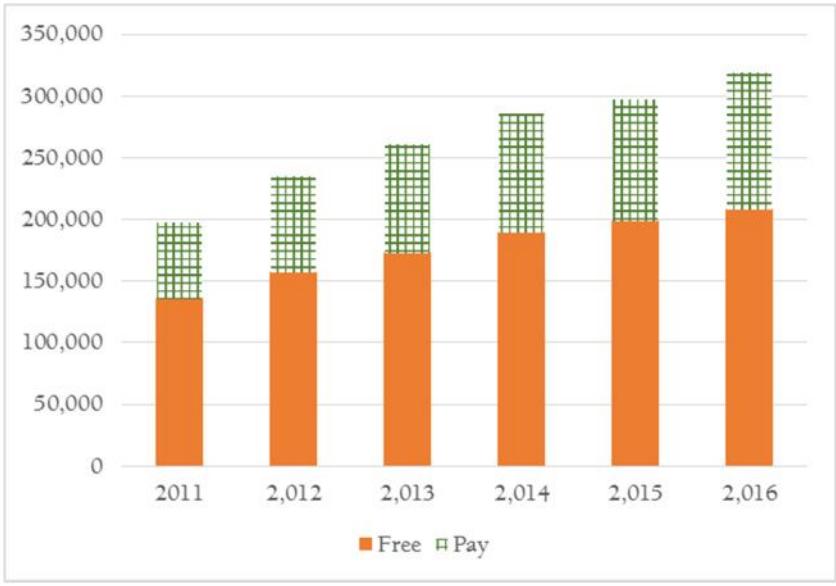

Figure 2.2. OAWorld articles

In Figure 2.2, overall growth is slower, and while the free segment is always larger, growth is faster in the pay segment.

Starting Dates

Patterns of journal starting dates also differ fairly radically between APCLand and OAWorld, especially taking into account pay status. Figures 2.3 and 2.4 show those patterns.

Figure 2.3. APCLand starting dates

Figure 2.4. OAWorld starting dates

I'm not sure these figures require much commentary. It's clear that APCLand has been adding more journals (almost all with fees) most rapidly since 2007, and even more so since 2011, while the substantial growth in OAWorld journals began around the turn of the century. APCLand had 246 surviving journals started before 2007, with 1,470 added since then—six times as many. OAWorld had 2,524 surviving journals started before 2007, with 4,752 added since then.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	343	20.0%	
Grew 25-49.9%	168	9.8%	29.8%
Grew 10-24.99%	180	10.5%	40.3%
Even, ±9.99%	322	18.8%	59.0%
Shrank 10-24.99%	190	11.1%	70.1%
Shrank 25-49.99%	223	13.0%	83.1%
Shrank 50%+	290	16.9%	

Table 2.2. Growth and shrinkage, APCLand

Change 2015-16	Count	Percent	Cum%
Grew 50%+	1,194	16.4%	
Grew 25-49.9%	721	9.9%	26.3%
Grew 10-24.99%	847	11.6%	38.0%
Even, ±9.99%	1,850	25.4%	63.4%
Shrank 10-24.99%	830	11.4%	74.8%
Shrank 25-49.99%	884	12.1%	86.9%
Shrank 50%+	950	13.1%	

Table 2.3. Growth and shrinkage, OAWorld

I don't see significant differences between these two patterns.

What Does It Mean?

I believe looking at APCLand and OAWorld as fundamentally different parts of open access may be helpful in seeing what the future might bring. Beyond that, it's up to readers and those in a position to use this information.

The distinction between APCLand and OAWorld comes into play when we look at appropriate brackets for journal article volume and for APC amounts. We'll consider that further in Chapters 4 and 5 respectively.

3. Exclusions and Special Cases

You might think of this chapter as one giant footnote to the rest of the book—and you could skip over it. It's here to provide transparency on research techniques and to spell out clearly what journals are excluded from this report and why. (Appendix A discusses methodology and changes from the previous report.)

The Basics

I visited each journal's website *at least* once and sometimes up to three times while preparing this survey. The first set of visits took place between January 2, 2017 and March 24, 2017. I marked around 1,400 journals—those flagged as exclusions and journals that might not yet have their final 2016 issues posted—for revisits. I revisited those journals in the second half of April 2017.

Some notes on what visits did and did *not* entail:

- If the Excel-to-default-browser path (Chrome for this project for its translation tools) didn't bring up the site, I copied-and-pasted the URL directly into a new Chrome tab. (One national journal platform doesn't seem to work using the Excel-to-Chrome path.) All sites that didn't work the first time were retried in April 2017.
- The best journal sites have clear statements of APCs or author charges or fees, with a label implying one of those things, either directly on the home page, on the OJS "About" page for journals using Open Journal System software, or in an "About This Journal" or Author Guidelines page. If I was unable to find a clearly-stated fee or an assurance that there was no such fee (a number of OJS-based journals

use the *Fee* link, which I suspect is part of the basic template, to state clearly that there are no fees), I proceeded as follows:

1. I checked *DOAJ* itself. Most recently-verified journals explicitly show the APC or lack thereof. If it was there, I used it.
2. If the journal had text indicating that the author or institution might be expected to pay a fee, I coded the journal as CA with "ANS" (Amount Not Stated) as a note. There were 21 of these.
3. Otherwise, if the journal was published by a university or association/society, or if it had a clear statement of sponsorship, I assumed that the journal was free.
4. Otherwise—published by a commercial publisher and without either a statement on fees or an explicit statement of sponsorship—I assumed a hidden fee, coded the journal as CA and added "NI" (No Information) as a note. Nineteen of these.
5. *All* CA journals were revisited in late April 2016 to search again for information.

- At all times, I ran Malwarebytes Pro, Windows Defender, and McAfee SiteAdvisor. On an earlier investigation, one "journal" managed to hit me with a difficult-to-fix piece of malware and at least four others attempted to do so; this time, I wasn't taking any chances. Nor should readers or authors.

I used Chrome "translate this page" and, in a few obstinate cases, copied-and-pasted text into a Google Translate window. This was overwhelmingly successful; only one journal (*Anusandhan Vigyan Shodh Patrika*) was impossible to analyze.

- I spent even more time trying to count articles in journals I'd previously flagged as opaque or uncountable, eventually eliminating *all* "opaque" cases and leaving five that were impossible to count.
- Between improvements in *DOAJ* standards and the "BX" retries, the total number of excluded journals was reduced by 40%, to less than 4% of all candidate journals (excluding duplicates).

Codes CA and X through XX

Table 3.1 summarizes excluded journals by type.

Code	Count
CA: APC missing or hidden	40
XE: Empty from 2011 through 2016	46
XI: Impossible to count articles by year	5
XM: Malware encountered	67
XN: Not open access	17
XP: Parking or ad page	31
XT: Translation inadequate/impossible	1
XU: Unworkable site	21
XV: Merged with no way to count	30
XX: Unreachable on repeated efforts	116
Total excluded	**374**

Table 3.1. Excluded journals

Compared to last year, CA is down from 112; XE is up from 40; XI and XO combined are down from 21; XM is down from 103; XN is down from 55; XP is down from 44; XT is the same; XU is down from 95; XV is up from 11; and XX is down from 196. These are generally promising figures, especially the reductions in CA and XM.

Code	2016	2015	2014	2013	2012	2011
CA	6,263	5,523	5,145	4,046	3,334	2,373
XP		410	942	920	657	595
XU		575	877	943	1031	295
XV			42	135	154	35
XX		1984	2886	2860	2574	2221
Total		8,492	9,892	8,904	7,750	5,519

Table 3.2. Partial article counts for excluded journals

I did count articles in CA journals and had some numbers for previous years for some X journals. summarized in Table 3.2; as should be clear, omitted journals would never add much to the total.

The following sections offer additional notes on excluded journals.

CA: APC missing or hidden

These journals come from 11 different countries but there only significant groups in two countries: 16 from India and 12 from South Korea. Looking at subjects, 13 of these are in biomed, 21 are in STEM fields and 6 are in the humanities and social sciences. Subjects are clear enough: 13 (with 1,755 articles in 2016) in medicine and 11 (with 2,739 articles in 2016) in computer sciences.

XE: Empty from 2011 through 2016

Some of these were merged into other journals or changed titles.

XI: Impossible to count articles by year

For these journals, there simply aren't any dates, either on tables of contents or the articles themselves. In at least one case, there aren't individual articles as such.

XM: Malware encountered

While there are fewer of these than there used to be, 67 is still far too many. Admittedly, a few of these are really journals with no servers (McAfee Site Adviser sometimes traps these as malware)—but that's not much better.

While XM journals come from 27 countries, there are only six with more than two such journals: Romania with 11, Germany with 10, Indonesia with 8, India with 5, the Russian Federation with 4 and Turkey with three. Only eight biomed journals show signs of malware, compared to 31 STEM and 28 HSS.

Here's a list of the journals apparently infected with malware as of April 2017. These all need to be fixed.

Acta Iassyensia Comparationis, Advanced Computational Techniques in Electromagnetics, Agrárinformatika Folyóirat, Agrisost, AgroLife Scientific Journal, Al-Albab, Alternatives Rurales, Anale : Seria Ştiinţe Economice. Timişoara, Andhra Pradesh Journal of Psychological Medicine, Annals of Research in Antioxidants, Anuario de la Facultad de Ciencias Económicas y Empresariales, Arheologia Moldovei, At-Turats, Basic Research Journal of Agricultural Science and Review, Beder University Journal of Educational

Sciences, Boletim Petróleo, Royalties e Região, Boletín Geográfico, Communications in Numerical Analysis, Cultural Tourism, Currículo sem Fronteiras, Data Envelopment Analysis and Decision Science, Dentino Jurnal Kedokteran Gigi, Dynamic Relationships Management Journal (DRMJ), Earth System Science Data, Enviroscienteae, European Agrophysical Journal , European Journal of Environmental Sciences, European Journal of Investigation in Health, Psychology and Education, Human : Research in Rehabilitation, Hyperion Economic Journal, International Journal of Educational Research and Technology, International Journal of Electronics and Telecommunications, International Journal of Finance & Banking Studies, International Journal of Medical Research and Health Sciences, International Journal of Research In Business and Social Science, Journal of Copyright in Education and Librarianship, Journal of Evidence Based Medicine and Healthcare, Journal of Fuzzy Set Valued Analysis, Journal of Intelligence Studies in Business, Journal of Interpolation and Approximation in Scientific Computing, Journal of Molecular Biochemistry, Journal of Nonlinear Analysis and Application , Journal of Numerical Mathematics and Stochastics, Journal of Soft Computing and Applications, Journal of Wetlands Environmental Management, Jurnal Hutan Tropis, KLIK: Kumpulan jurnaL Ilmu Komputer, Lambung Mangkurat Law Journal, Linguagem: Estudos e Pesquisas, Mathematics Education Trends and Research, Métodos de Información, Nesne Psikoloji Dergisi, Present Environment and Sustainable Development , Revista Portuguesa de Educação Artística, Romanian Journal of Society and Politics, Sanglap: Journal of Literary and Cultural Inquiry, Scientific Bulletin Biotechnology : Series F, Scientific Papers Series : Management, Economic Engineering in Agriculture and Rural Development, Scientific Papers: Series B. Horticulture, Tekhnologiya i Konstruirovanie v Elektronnoi Apparature, Terrestrial, Atmospheric and Oceanic Sciences, The Romanian Economic Journal, Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Seriâ 10. Innovacionnaâ Deâtel'nost', Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Seriâ 2. Âzykoznanie, Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Seriâ 4. Istoriâ, Regionovedenie, Meždunarodnye Otnošeniâ, Vestnik Volgogradskogo Gosudarstvennogo Universiteta. Serija 1. Mathematica. Physica, Zeitschrift für die Welt der Türken.

XN: Not open access

This motley group includes all sorts of possibilities and some of these may be judgment calls. Looking at notes that cover more than one or

two titles, I see four hybrid journals, four magazines (rather than scholarly journals) three blogs and a handful of others.

The BX Saves

Of the journals changed to BX—because a title search yielded a different URL that was countable, but not linked from the original—original situations included 52 with 404 errors, 40 with no DNS, eight that weren't reachable and three that weren't findable from parent directories, six with malware, four parking pages and a handful of others.

4. Journals by Article Volume

Journals, no matter how they're funded, vary wildly in terms of number of articles per year. "Average articles per journal" is almost meaningless as an overall figure, becoming only slightly more meaningful as you narrow the frame of reference.

This chapter looks at journals by article volume, using either 2016 volume or the peak of the period 2011-2016. It should help clarify what's out there and how pay-versus-free varies by article volume.

Gold Open Access Journals 2011-2015 discussed various ways to determine appropriate groups of journals by volume. There's no "best" way, so for the sake of consistency this chapter (and the rest of the book) uses the same five-part breakdown as last year: Largest (600 or more articles in peak year); Large (150 to 599 articles); Medium (60 to 149 articles); Small (20 to 59 articles); Smallest (1 to 19 articles).

Detailed Breakdown of Journals by Peak Volume

Table 4.1 offers a detailed breakdown of journals by peak article volume, showing for each range the number of journals, how many journals published articles in 2016, the percentage of those journals that don't charge APCs (%Free), the number of articles in 2016, the percentage of articles appearing in non-APC journals, and the percentage of all 2016 articles represented in this bracket. The peak number is the *lower* limit of the row—thus, the first row is 20,000 articles and up, while the second is 2,000 to 19,999 (actually 2,000 to 6,731).

Peak	Journals	Act. 16	%Free	Articles	%Free	% of articles
20,000	2	2	0.0%	47,695	0.0%	9.12%
2,000	22	22	18.2%	51,644	31.7%	9.87%
1,000	35	34	17.6%	31,976	19.5%	6.11%
800	24	24	25.0%	16,803	21.1%	3.21%
600	34	33	15.2%	18,090	14.5%	3.46%
400	84	84	17.9%	30,927	15.6%	5.91%
300	97	97	29.9%	24,942	28.3%	4.77%
200	212	210	36.7%	37,443	35.1%	7.16%
150	205	203	40.4%	25,645	40.0%	4.90%
125	199	197	48.2%	18,982	48.3%	3.63%
100	324	312	53.8%	25,162	54.8%	4.81%
80	419	408	54.2%	26,048	54.6%	4.98%
60	718	700	57.1%	36,281	58.9%	6.93%
50	534	523	70.9%	20,754	71.8%	3.97%
40	880	837	73.4%	28,768	74.4%	5.50%
30	1,244	1,188	77.2%	31,320	79.4%	5.99%
20	1,851	1,740	78.2%	32,233	80.7%	6.16%
15	929	836	77.9%	10,731	80.8%	2.05%
10	785	689	79.7%	6,254	82.5%	1.20%
5	373	277	68.2%	1,466	73.9%	0.28%
1	21	15	73.3%	41	78.0%	0.01%

Table 4.1. Journals and articles by detailed peak volume

Non-APC journals tend to be smaller: that's clear. Note the breakpoints: for journals with 400 or more articles, no more than one-quarter of journals are free, while for those with fewer than 124 articles, more than half of journals and articles are free.

The Three Segments

Chapter 2 introduced the three subject segments used throughout, but it's worth adding a few notes about each segment:

- **Biomed**: All of human biology and medicine, the segment with by far the most fee revenue.
- **STEM**: Journals in hard sciences (other than human biology), technology, engineering and mathematics, including multidisciplinary journals primarily dealing with science and medicine. The segment with the most articles.
- **HSS**: Humanities and social sciences, as well as multidisciplinary journals that cross over both scientific and other areas. Fewest articles but most journals of any segment.

Journals and Articles by Segment

To get a sense of the size of each segment, Table 4.2 breaks out the data in Table 1.1 into the three segments.

	Journals	Act. 2016	Articles	Art/Jrnl
Biomed	**2,562**	**2,416**	**188,194**	**78**
Free	1,156	1,099	57,201	52
Pay	1,406	1,317	130,993	99
Free%	45%	45%	30%	
STEM	**2,566**	**2,407**	**225,591**	**94**
Free	1,530	1,446	80,049	55
Pay	1,036	961	145,542	151
Free%	60%	60%	35%	
HSS	**3,864**	**3,608**	**109,420**	**30**
Free	3,471	3,225	87,558	27
Pay	393	383	21,862	57
Free%	90%	89%	80%	

Table 4.1. Journals and articles by segment

Biomed has the lowest percentage of free journals, the only segment with more than half of journals charging APCs, while STEM has the most articles per journal across the board. (Note that the two true mega-journals both fall into STEM.)

Journals by Segment

	Biomed	**STEM**	**HSS**	**Total**
Largest: 600+	50	58	7	115
Free%	8%	22%	57%	18%
Large: 150-599	322	201	71	594
Free%	27%	36%	78%	34%
Medium: 60-149	663	553	401	1,617
Free%	44%	50%	78%	55%
Small: 20-59	1,039	1,135	2,114	4,288
Free%	55%	67%	91%	76%
Smallest: 0-19	342	460	1,015	1,817
Free%	43%	70%	92%	77%

Table 4.3. Journals by segment, 2016

Bigger journals are more likely to have APCs, no matter what the segment: that and a number of other items seem clear in Table 4.3. Note that most HSS journals across the board are free—as are most small journals in all segments.

Article Volume by Segment

	Biomed	STEM	HSS	Total
Largest: 600+	45,796	113,314	7,098	166,208
Free%	5%	21%	32%	17%
Large: 150-599	64,460	42,683	11,814	118,957
Free%	24%	33%	50%	30%
Medium: 60-149	45,621	36,015	24,837	106,473
Free%	45%	52%	77%	55%
Small: 20-59	29,149	29,202	54,724	113,075
Free%	59%	69%	91%	77%
Smallest: 0-19	3,168	4,377	10,947	18,492
Free%	49%	76%	92%	81%

Table 4.4. Articles by segment, 2016

Table 4.4 translates Table 4.3 into articles, since it's not feasible to show both sets of data in a single table. The percentages are similar to those in Table 4.4, except for the largest HSS journals, where two-thirds of articles have fees even though 57% journals are free.

Small journals publish more articles in the humanities and social sciences than do other sizes; that may not be surprising. Perhaps more interesting: large (but not largest) biomed journals stand out—whereas the largest STEM journals would have the most articles *even without the two megajournals*.

APCLand and OAWorld: Journals

Let's look at APCLand and OAWorld separately, using the same layout and data as for Tables 4.3 and 4.4.

	Biomed	**STEM**	**HSS**	**Total**
Largest: 600+	38	26	1	65
Free%	3%	8%	0%	5%
Large: 150-599	159	61	3	223
Free%	5%	16%	33%	9%
Medium: 60-149	254	103	10	367
Free%	11%	22%	50%	16%
Small: 20-59	364	259	65	688
Free%	15%	28%	58%	24%
Smallest: 0-19	121	75	32	228
Free%	7%	17%	56%	17%

Table 4.5. Journals by segment, APCLand

	Biomed	**STEM**	**HSS**	**Total**
Largest: 600+	12	32	6	50
Free%	25%	34%	67%	36%
Large: 150-599	163	140	68	371
Free%	49%	44%	62%	50%
Medium: 60-149	409	450	391	1,250
Free%	64%	57%	79%	66%
Small: 20-59	675	876	2,049	3,600
Free%	76%	79%	93%	86%
Smallest: 0-19	221	385	983	1,589
Free%	63%	80%	93%	86%

Table 4.6. Journals by segment, OAWorld

It may be interesting to compare Table 4.6 to Table 4.3; note the generally higher free-journal percentages for biomed and STEM.

APCLand and OAWorld: Articles

	Biomed	STEM	HSS	Total
Largest: 600+	31,932	77,395	2,128	111,455
Free%	0%	4%	0%	3%
Large: 150-599	33,932	14,119	473	48,524
Free%	4%	17%	11%	8%
Medium: 60-149	16,996	7,031	685	24,712
Free%	14%	24%	59%	18%
Small: 20-59	9,631	6,366	1,748	17,745
Free%	20%	38%	58%	30%
Smallest: 0-19	1,028	504	350	1,882
Free%	8%	22%	65%	22%

Table 4.7. Articles by segment, APCLand

The 0% for Free%/Largest/Biomed is correct: the single very large free biomed journal published considerably less than one-half of one percent of all the articles for largest biomed journals (0.2%, actually).

	Biomed	STEM	HSS	Total
Largest: 600+	13,864	35,919	4,970	54,753
Free%	17%	58%	46%	47%
Large: 150-599	30,528	28,564	11,341	70,433
Free%	46%	40%	52%	44%
Medium: 60-149	28,625	28,984	24,152	81,761
Free%	64%	59%	78%	66%
Small: 20-59	19,518	22,836	52,976	95,330
Free%	78%	77%	93%	86%
Smallest: 0-19	2,140	3,873	10,597	16,610
Free%	68%	83%	93%	87%

Table 4.8. Articles by segment, OAWorld

These tables may be somewhat redundant, but also provide useful comparisons.

5. Fees and Maximum Revenue

It takes money to publish even the smallest journal: I don't think there's much question about that. For small open access journals run out of a university library or department the costs be may be so small as to be trivial. Quite possibly, the only direct costs are hosting costs absorbed by the institution and a subdomain that doesn't require registration.

Normally, there are costs that require money from some source, even if most costs (managing peer review, editorial oversight, posting articles, maintaining the journal site, etc.) are absorbed by a parent institution or automated—and even if the journal handles layout and typesetting by requiring templates and doesn't do copyediting.

Larger journals almost certainly require more funding: it's hard to believe that a journal publishing hundreds of articles each year can survive entirely based on volunteer labor.

You can easily find long lists of all the things publishers may do and long discussions of what constitutes reasonable pricing. I've engaged in those discussions in the past and will in the future. This book doesn't say "here's what an article *should* cost" but does offer some data on the maximum amount that journals may be getting from APCs.

Revenue Ranges

Table 5.1 shows the number of journals and articles in each of a fairly large range of revenue segments—the only time we'll break out revenues for fee journals beyond four large segments. Except for the first two rows (and slight modifications at the top of ranges to reflect reality), revenue brackets are the same as in *Gold Open Access Journals 2011-2015* to provide some comparability.

Revenue	Journals	Cum J	Articles	Art/J
$18 to $40 million	3		51,381	17,127
$4 to $6 million	6	9	13,052	2,175
$2 to $3.96 million	16	25	23,757	1,485
$1 to $1.88 million	44	69	30,470	693
$750,000 to $999,999	25	94	9,675	387
$500,000 to $749,999	52	146	18,315	352
$400,000 to $499,999	33	179	9,685	293
$300,000 to $399,999	59	238	12,002	203
$250,000 to $299,999	29	267	4,481	155
$200,000 to $249,999	62	329	12,914	208
$150,000 to $199,999	75	404	9,783	130
$100,000 to $149,999	134	538	12,792	95
$75,000 to $99,999	104	642	10,025	96
$50,000 to $74,999	178	820	15,386	86
$40,000 to $49,999	115	935	6,018	52
$30,000 to $39,999	150	1,085	10,617	71
$25,000 to $29,999	98	1,183	5,685	58
$20,000 to $24,999	117	1,300	5,989	51
$15,000 to $19,999	154	1,454	6,633	43
$10,000 to $14,999	221	1,675	6,563	30
$7,500 to $9,999	161	1,836	5,124	32
$5,000 to $7,499	165	2,001	4,872	30
$2,500 to $4,999	230	2,231	5,904	26
$1,000 to $2,499	229	2,460	4,506	20
$40 to $999	201	2,661	2,768	14
$0 (no 2016 articles)	174	2,835	0	0

Table 5.1 Revenue by journal, detailed breakdown

What's clear from Table 5.1 is that APC-based OA publishing isn't an easy way to strike it rich. Only 538 journals could have revenues of

$100,000 or more in 2016, and only 820 could have $50,000 or more. Most APC-charging journals took in less than $20,000 in 2016.

Max. 2016 Revenue	Publishers	Total
APCLand: $8-$66M	12	$341,996,697
$2-$6 Million	10	$27,215,427
$1-$1.9 Million	9	$13,282,276
$500K-$960K	18	$12,681,261
$250K-$498K	20	$7,178,855
$100K-$249K	52	$7,845,713
$50K-$99K	55	$3,852,963
$25K-$49K	74	$2,625,291
$15K-$24K	59	$1,112,667
$10K-$14K	55	$680,931
$5K-$9K	116	$860,767
$2K-$4K	126	$421,554
$40-$1,999	136	$133,045

Table 5.2 Maximum potential 2016 revenue by publisher, unnormalized

What about revenues by publishers? Table 5.2 shows a very rough set of figures and brackets—but publisher names weren't normalized or grouped, which is why the total for the twelve publishers with potential revenues greater than $8 million (that is, APCLand) is lower than the total given in Chapter 2. Even without such normalization and grouping, the results are fairly clear: only 31 publishers with at least $1 million in potential revenues and only 18 more with at least $500,000. More than 3,000 publisher names show no revenue at all.

Detailed APC Breakdown

APCs range from $4 (yes, four dollars) to $5,200. Table 5.3 offers a fairly detailed set of APC ranges. (*All* APC-charging journals are included throughout, a change from last year.)

APC	Journals	Cum J	Articles	Art/J
$4,000-$5,200	14		6,112	437
$3,000-$3,975	38	52	4,076	107
$2,500-$2,975	46	98	10,574	230
$2,250-$2,490	95	193	22,372	235
$2,000-$2,240	264	457	36,732	139
$1,750-$1,995	262	719	27,655	106
$1,500-$1,725	100	819	36,304	363
$1,250-$1,495	92	911	41,707	453
$1,000-$1,235	232	1,143	13,534	58
$750-$997	261	1,404	11,281	43
$600-$749	293	1,697	4,840	17
$400-$599	218	1,915	15,482	71
$300-$399	170	2,085	11,028	65
$200-$299	142	2,227	14,071	99
$100-$199	308	2,535	22,224	72
$1-$99	300	2,835	20,405	68

Table 5.3. APC levels, detailed breakdown

Unlike the reasonably good correlation between journal revenue and articles per journal in Table 5.1, there's no clear correlation in Table 5.3. The highest article-per-journal averages are in the most expensive journals and in medium-priced journals charging $1,250 to $1,725. Journals charging $600 to $1,235 have *fewer* articles per journal than journals charging less than $400.

For consistency, the APC brackets in the remainder of this chapter and the rest of the book are the same as last year:

- High: $1,400 and up (the most articles involving APCs)
- Medium: $600 to $1,399 (the most journals with APCs)
- Low: $200 to $599
- Modest: $2 to $199

Fees and Revenue by Segment

	Biomed	**STEM**	**HSS**
$1,400+	663	145	24
Articles	88,668	83,831	3,272
Revenue	$195,765,728	$157,598,067	$7,560,594
$600-$1.399	321	337	62
Articles	13,998	23,228	2,190
Revenue	$13,146,494	$25,190,933	$2,181,899
$200-$599	208	219	94
Articles	16,909	16,529	7,143
Revenue	$6,183,376	$6,120,951	$2,019,830
$2-$199	125	260	203
Articles	11,418	21,954	9,257
Revenue	$1,141,318	$2,224,048	$754,209
Free	1,099	1,446	3,225
Articles	57,201	80,049	87,558

Table 5.4. Articles and revenue by segment, overall

Table 5.4 shows journals that published articles in 2016 by APC bracket, including number of articles and maximum revenue. As you'd expect, the highest-priced journals account for most of the revenues: 91% in biomed, 82% in STEM and 60% in HSS. Note: some journal counts elsewhere, including Tables 5.5 to 5.9, differ from these (because they include journals with no 2016 articles).

Growth and Shrinkage

Tables 5.5 through 5.8 show article change in each journal from 2015 to 2016 for the five price brackets.

Change 2015-16	Count	Percent	Cum%
Grew 50%+	171	20.3%	
Grew 25-49.9%	88	10.4%	30.7%
Grew 10-24.99%	101	12.0%	42.7%
Even, ±9.99%	174	20.6%	63.3%
Shrank 10-24.99%	105	12.5%	75.8%
Shrank 25-49.99%	126	14.9%	90.7%
Shrank 50%+	78	9.3%	

Table 5.5. Growth and shrinkage, APCs $1,400 and up

Change 2015-16	Count	Percent	Cum%
Grew 50%+	186	21.8%	
Grew 25-49.9%	55	6.4%	28.2%
Grew 10-24.99%	79	9.3%	37.5%
Even, ±9.99%	127	14.9%	52.3%
Shrank 10-24.99%	59	6.9%	59.3%
Shrank 25-49.99%	107	12.5%	71.8%
Shrank 50%+	241	28.2%	

Table 5.6. Growth and shrinkage, APCs $600 to $1,399

The most expensive journals were more likely to grow rapidly or very rapidly from 2015 to 2016 and less likely to shrink rapidly or very rapidly—and, as you can see by comparing Table 5.6 with Tables 5.7-5.9 (next page), medium-priced journals were more likely to shrink than any other category.

Change 2015-16	Count	Percent	Cum%
Grew 50%+	87	16.4%	
Grew 25-49.9%	61	11.5%	27.9%
Grew 10-24.99%	64	12.1%	40.0%
Even, ±9.99%	138	26.0%	66.0%
Shrank 10-24.99%	74	14.0%	80.0%
Shrank 25-49.99%	66	12.5%	92.5%
Shrank 50%+	40	7.5%	

Table 5.7. Growth and shrinkage, APCs $200 to $599

Change 2015-16	Count	Percent	Cum%
Grew 50%+	102	16.8%	
Grew 25-49.9%	41	6.7%	23.5%
Grew 10-24.99%	66	10.9%	34.4%
Even, ±9.99%	156	25.7%	60.0%
Shrank 10-24.99%	83	13.7%	73.7%
Shrank 25-49.99%	90	14.8%	88.5%
Shrank 50%+	70	11.5%	

Table 5.8. Growth and shrinkage, APCs $2 to $199

Change 2015-16	Count	Percent	Cum%
Grew 50%+	991	16.1%	
Grew 25-49.9%	644	10.5%	26.6%
Grew 10-24.99%	717	11.6%	38.2%
Even, ±9.99%	1,577	25.6%	63.8%
Shrank 10-24.99%	699	11.4%	75.2%
Shrank 25-49.99%	718	11.7%	86.8%
Shrank 50%+	811	13.2%	

Table 5.9. Growth and shrinkage, free journals

6. Publisher Category

Do the characteristics of open access journals vary depending on the type of publisher? This chapter explores that question, breaking serious gold OA journals down into five categories, based on the publisher name as it appears in *DOAJ*. The categories are:

- **University, college or institute**: Excluding (as much as possible) "institutes" that don't have educational or research functions. A university press falls into this category even if it seems to function as a traditional publisher.
- **Societies, associations and government agencies**: There aren't that many government-published OA journals, not enough to create a separate category.
- **Traditional publishers**: Companies (or publisher names) that publish subscription journals as well as multiple OA journals.
- **Open access publishers**: Publishers that don't appear to publish subscription journals but do publish multiple OA journals.
- **Miscellaneous**: Publisher names (frequently journal names) that don't obviously fall into the other types and that only have one or two journals.

I searched for information on non-obvious publisher names with more than two journals and assigned categories appropriately. I'm sure there are quite a few miscellaneous journals that are from universities, colleges, societies, associations or government agencies but where the non-English publisher name didn't make that obvious—but never more than a couple for each publisher name.

Category	Journals	%Free	Articles	%Free
Open Access	2,062	29%	174,885	14%
Univ/college	3,962	89%	132,527	77%
Traditional	796	36%	93,357	26%
Miscellaneous	1,441	79%	82,722	62%
Society/govt	731	82%	39,714	57%

Table 6.1. Publisher category, overall

Even in Table 6.1 (sorted by number of articles) it's obvious that there are substantial differences. Open Access publishers have the lowest percentage of non-fee journals (quite a few OA journals from traditional publishers are society-sponsored); universities publish the most journals (not the most articles) and have the highest percentage of free articles and journals; and so on.

The rest of this chapter is five subchapters with comparable tables and graphs, one for each category, in the same order as above. Neither journal nor article counts include excluded journals as defined in Chapter 3, and journal counts in some tables are for journals publishing articles in 2016, rather than the total counts in Table 6.1.

Open Access Publishers

	2016	2015	2014	2013	2012	2011
Journals	1,880	1,946	1,925	1,748	1,437	1,251
%Free	30%	30%	27%	26%	25%	23%
Articles	174,885	169,850	172,881	148,877	125,286	92,927
%Free	14%	14%	13%	14%	15%	16%

Table 6.2. Journals and articles by year, open access publishers

Given that this category (which actually includes 2,062 journals) is startlingly different from the others, remember what it includes: publishers that don't appear to publish subscription journals, that aren't clearly affiliated with societies or universities, and that have more than two journals in *DOAJ*.

Startling? Look at the percentages: 70% of the active journals, publishing 86% of the articles, charge APCs—and the trend toward all-pay, all the time, has gotten slightly worse over time.

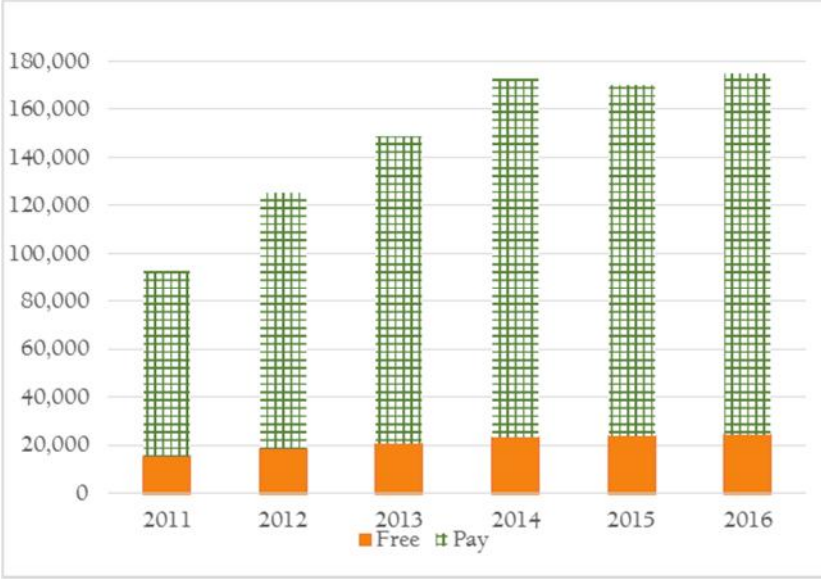

Figure 6.1. Free and pay articles by year, open access publishers

As Figure 6.1 shows, it was also a fairly rapidly growing category through 2014—and nearly all that growth is in pay journals. The slight article drop in 2015 was more than made up for in 2016.

	Journals	%Free	Articles	%Free
Largest: 600+	56	5%	77,486	2%
Large: 150-599	234	16%	49,343	14%
Med.: 60-149	414	23%	25,667	26%
Small: 20-59	796	36%	19,150	41%
Smallest: 0-19	380	37%	3,239	45%

Table 6.3. Article volume, open access publishers

While there are more small journals than any other size bracket, the two largest brackets dominate this category—and even fewer of them don't charge fees. That there is *no* bracket in which free journals or articles are a majority says a lot.

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	573	39%	28%	112,614	75%	64%
$600-$1.399	546	37%	26%	17,951	12%	10%
$200-$599	234	16%	11%	13,533	9%	8%
$2-$199	108	7%	5%	6,259	4%	4%
Free	601		29%	24,528		14%

Table 6.4. APC levels, open access publishers

More than one-third of the fee-charging journals are in the most expensive bracket—and those journals publish nearly two-thirds of *all* articles in this category. You won't be surprised at the very high charges per average article: $1,611 among journals charging fees and $1,385 overall.

Figure 6.2. Starting dates, open access publishers

Figure 6.2 is different from most starting-year graphs because there's so little before 1999 and because it's predominantly OA-charging startups.

	Biomed	STEM	HSS
$1,400+	481	71	14
Articles	62,902	46,903	2,809
Revenue	$134,632,715	$77,347,262	$6,545,255
$600-$1.399	201	191	25
Articles	6,418	10,744	789
Revenue	$6,222,120	$11,262,531	$667,383
$200-$599	104	83	46
Articles	5,689	5,045	2,799
Revenue	$2,170,221	$1,827,710	$889,791
$2-$199	35	48	21
Articles	4,226	1,307	726
Revenue	$358,525	$156,408	$91,836
Free	203	200	157
Articles	11,375	9,643	3,510

Table 6.5. Articles and revenue by segment, open access publishers

Mostly biomed, mostly high fees: that's the story and that's where the money is. That's what I see in Table 6.5—along with general disinterest in HSS (where the money manifestly is *not*).

Region	Journals	%Free	Articles	%Free
APCLand	1,110	5%	123,733	2%
Eastern Europe	344	83%	9,244	75%
Western Europe	231	46%	12,058	45%
Asia	145	54%	14,677	49%
Pacific/English	144	15%	10,390	8%
Middle East	45	53%	2,878	37%
Africa	38	53%	1,639	46%
Latin America	5	100%	266	100%

Table 6.6. Journals by region, open access publishers

While APCLand isn't entirely composed of OA publishers, as seen in Table 6.6, APCLand dominates this category, with more than half of the journals and seven out of ten articles.

Among what's left, Asia has the most articles and Eastern Europe the most journals, but the Pacific/English group has the lowest free percentages. Note Latin America's commitment to free OA even in this category—but there are only a handful of journals and articles.

Universities, Colleges and Institutes

	2016	2015	2014	2013	2012	2011
Journals	3,720	3,866	3,765	3,531	3,235	2,870
%Free	89%	89%	89%	90%	90%	90%
Articles	132,527	133,500	126,620	112,605	103,942	90,886
%Free	77%	77%	76%	79%	77%	78%

Table 6.7. Journals and articles by year, university-published

University and college publishers accounted for 3,962 journals. Table 6.7 counts journals with at least one article in any given year. The very high percentage of free journals and articles has stayed nearly constant over the years.

As Figure 6.3 (next page) shows, these journals grew steadily through 2015 and were essentially flat for 2016; since so many university journals are small with slow production schedules, it's possible that post-April 2017 to 2016 volumes will increase both journals and articles enough to make up the apparent losses.

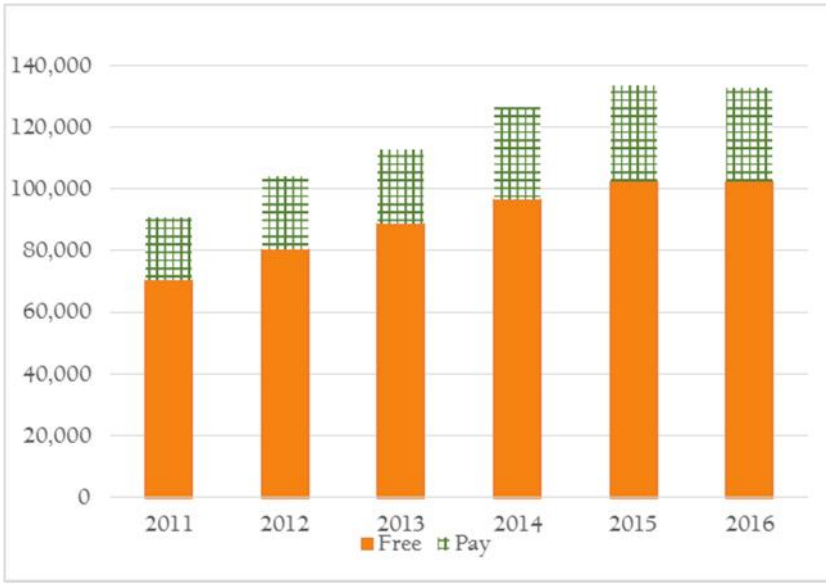

Figure 6.3. Free and pay articles by year, university-published

	Journals	%Free	Articles	%Free
Largest: 600+	11	36%	8,233	15%
Large: 150-599	125	62%	20,536	57%
Med.: 60-149	584	77%	37,546	76%
Small: 20-59	2,118	92%	56,473	92%
Smallest: 0-19	882	94%	9,739	94%

Table 6.8. Article volume, university-published

The percentage changes in Table 6.8 are typical: the largest journals (very few of them) are primarily APC-charging. Most university-published journals are small or very small.

Table 6.9 shows that most APC-charging university-published journals have very low charges—but the most expensive ones also publish by far the most articles per journal. The average cost per article among APC-charging journals is $697; among all journals it's $159.

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	23	5%	1%	6,278	21%	5%
$600-$1.399	32	8%	1%	3,591	12%	3%
$200-$599	95	23%	2%	6,851	23%	5%
$2-$199	271	64%	7%	13,583	45%	10%
Free	3,541		89%	102,224		77%

Table 6.9. APC levels, university-published

Figure 6.4. Starting dates, university-published

The story is that rapid growth began in 2003-2004 and peaked in 2011-2012; that there were quite a few early journals; and that there never were large numbers of pay journals.

Table 6.10 shows that most university-published journals are in the humanities and social sciences (with almost no revenue)—and that the handful of expensive biomed journals could have yielded serious revenue, as is true for expensive and medium-priced STEM journals.

	Biomed	STEM	HSS
$1,400+	12	9	2
Articles	3,205	2,963	110
Revenue	$7,429,869	$6,731,250	$187,594
$600-$1.399	13	18	1
Articles	1,150	2,433	8
Revenue	$1,017,643	$2,556,385	$5,200
$200-$599	23	45	25
Articles	2,328	3,354	1,169
Revenue	$655,568	$1,179,163	$330,040
$2-$199	40	102	123
Articles	2,276	6,022	5,285
Revenue	$247,307	$458,806	$335,314
Free	401	732	2,174
Articles	17,672	26,006	58,546

Table 6.10. Articles and revenue by segment, university-published

Region	Journals	%Free	Articles	%Free
Latin America	1,275	95%	42,111	88%
Western Europe	795	96%	20,457	84%
Eastern Europe	643	86%	24,250	76%
Asia	541	75%	14,547	70%
Middle East	341	87%	15,002	75%
Pacific/English	303	93%	8,463	83%
Africa	35	57%	1,910	57%
APCLand	29	28%	5,787	6%

Table 6.11. Journals by region, university-published

Table 6.11 is arranged by number of articles. It's not surprising that Latin America leads the list.

Traditional Publishers

	2016	2015	2014	2013	2012	2011
Journals	780	769	695	471	385	291
%Free	36%	36%	37%	36%	36%	34%
Articles	93,357	71,559	52,579	34,555	23,542	16,211
%Free	26%	26%	30%	27%	31%	33%

Table 6.12. Journals and articles by year, traditional publishers

The second-smallest group of serious OA journals comes from traditional publishers, companies that also publish subscription journals (and aren't in universities or societies). The group had 796 journals in *DOAJ* at the end of 2016. It's a fast-growing segment, although journal growth slowed in 2016. Not surprisingly, nearly two-thirds of journals and three-quarters of articles involve APCs. (Some journals are sponsored by societies or otherwise funded.)

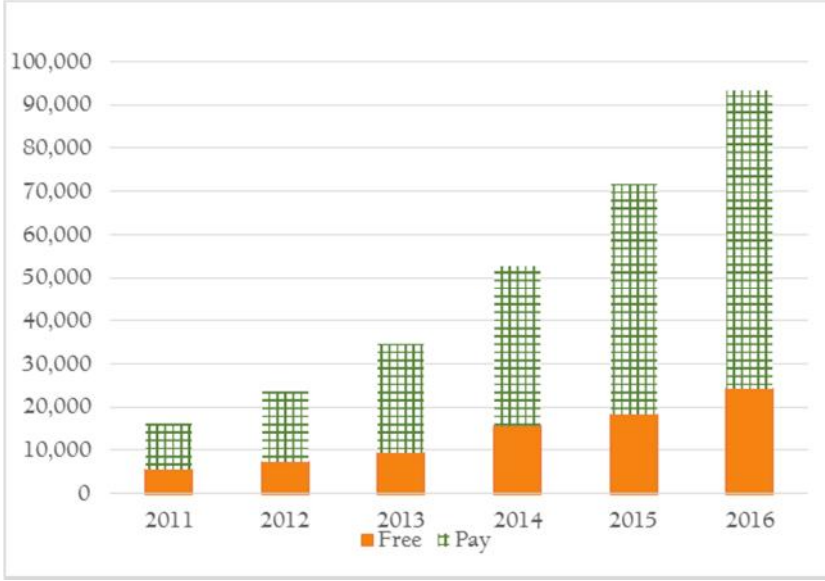

Figure 6.5. Free and pay articles by year, traditional publishers

	Journals	%Free	Articles	%Free
Largest: 600+	21	24%	47,666	20%
Large: 150-599	81	23%	18,045	23%
Med.: 60-149	206	33%	15,658	34%
Small: 20-59	363	42%	10,934	44%
Smallest: 0-19	109	31%	1,054	35%

Table 6.13. Article volume, traditional publishers

Table 6.13 is more or less what you might expect in terms of patterns, with mostly fee-based journals, although there are a healthy number of small non-APC journals.

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	211	41%	27%	49,697	72%	53%
$600-$1.399	225	44%	28%	12,458	18%	13%
$200-$599	61	12%	8%	5,614	8%	6%
$2-$199	15	3%	2%	1,539	2%	2%
Free	284		36%	24,049		26%

Table 6.14. APC levels, traditional publishers

Table 6.14 is what you might expect for traditional publishers: more than two-fifths of APC-charging journals are in the highest price bracket, and those journals publish nearly three-quarters of the fee-charged articles. The average charge per article in fee-charging journals (assuming no waivers, discounts or less expensive article types) is the highest of any category at $1,847—but there are enough no-fee articles to bring the overall average down to a still-high $1,371, just less than OA publishers.

Figure 6.6 is distinctive: nearly all the journals began after 2004 with especially sharp increases in 2011-2014.

Figure 6.6. Starting dates, traditional publishers

	Biomed	STEM	HSS
$1,400+	153	48	6
Articles	18,338	31,191	168
Revenue	$45,038,436	$66,793,971	$297,280
$600-$1.399	86	104	31
Articles	4,898	6,474	1,086
Revenue	$4,448,346	$7,361,894	$1,254,175
$200-$599	28	28	4
Articles	2,402	2,774	438
Revenue	$1,149,174	$1,293,763	$195,616
$2-$199	9	3	2
Articles	733	746	60
Revenue	$72,510	$109,556	$8,440
Free	113	106	59
Articles	6,384	15,928	1,737

Table 6.15. Articles and revenue by segment, traditional publishers

Table 6.15 shows a strong push for expensive journals in biomed and STEM, with almost no low-priced journals in any segment but a fair number of no-fee journals in each. Note that, somewhat atypically, most revenue is in STEM rather than biomed.

Region	Journals	%Free	Articles	%Free
APCLand	576	38%	74,787	20%
Western Europe	108	31%	12,838	63%
Pacific/English	56	4%	1,561	4%
Eastern Europe	28	50%	1,774	30%
Middle East	16	63%	674	35%
Asia	8	25%	1,572	14%
Latin America	3	100%	141	100%
Africa	1	0%	10	0%

Table 6.16. Journals by region, traditional publishers

APCLand accounts for most of the journals and three-quarters of the articles, with Western Europe second for both.

Miscellaneous

	2016	2015	2014	2013	2012	2011
Journals	1,356	1,386	1,346	1,233	1,096	918
%Free	78%	79%	79%	79%	79%	81%
Articles	82,722	74,470	73,178	63,837	56,646	43,651
%Free	62%	61%	60%	62%	64%	70%

Table 6.17. Journals and articles by year, miscellaneous

There are 1,441 miscellaneous journals as Table 6.17 shows, more than three-quarters don't charge APCs—and, consistently, at least three of five articles don't involve APCs. As Figure 6.7 shows, both free and fee growth has continued every year, although growth was minimal from 2014 to 2015.

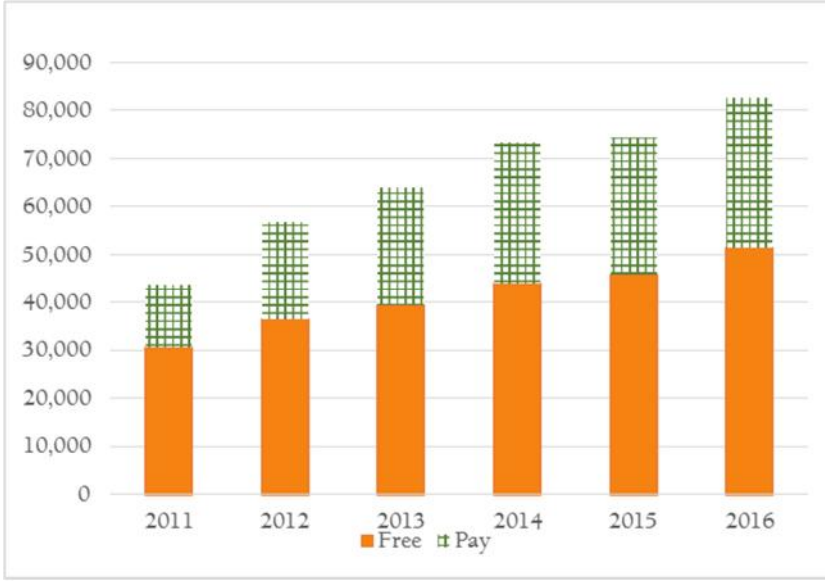

Figure 6.7. Free and pay articles by year, miscellaneous

	Journals	%Free	Articles	%Free
Largest: 600+	21	43%	27,488	60%
Large: 150-599	92	42%	18,476	39%
Med.: 60-149	252	63%	16,449	63%
Small: 20-59	681	86%	17,288	86%
Smallest: 0-19	310	87%	3,021	87%

Table 6.18. Article volume, miscellaneous

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	16	5%	1%	2,990	10%	4%
$600-$1.399	30	10%	2%	2,306	7%	3%
$200-$599	95	31%	7%	10,733	34%	13%
$2-$199	166	54%	12%	15,358	49%	19%
Free	1,134		79%	51,335		62%

Table 6.19. APC levels, miscellaneous

Figure 6.8, free and pay journals by starting year, is fairly typical, which makes sense given the nature of this miscellaneous group.

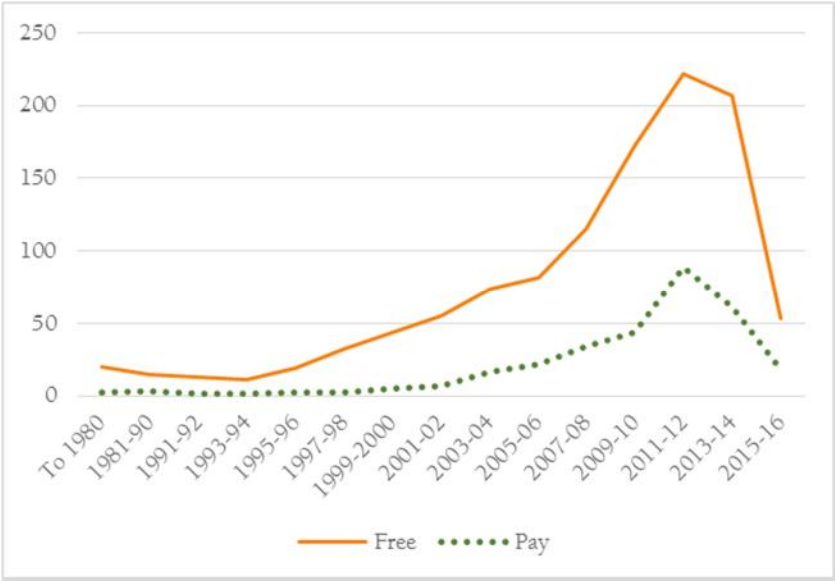

Figure 6.8. Starting dates, miscellaneous

The articles-and-revenue-by-segment table is omitted to save space; in this mostly-free category it doesn't say much anyway.

Region	Journals	%Free	Articles	%Free
Western Europe	456	84%	28,730	85%
Eastern Europe	263	83%	12,664	58%
Asia	247	58%	19,154	31%
Pacific/English	203	78%	8,999	52%
Latin America	124	90%	4,981	81%
Middle East	124	86%	6,623	70%
Africa	24	58%	1,571	18%

Table 6.20. Journals by region, miscellaneous

Finally (for this category), Table 6.20 shows that, after the 2016 delisting, Western Europe has the most journals *and* the most articles.

Societies, Associations and Government Agencies

	2016	2015	2014	2013	2012	2011
Journals	695	714	705	662	620	589
%Free	81%	82%	82%	82%	84%	85%
Articles	39,714	37,132	36,728	35,182	32,689	30,059
%Free	57%	62%	60%	57%	60%	62%

Table 6.21. Journals and articles by year, society-published

The smallest group of serious OA journals includes a small number of journals from government agencies but is primarily journals published directly by societies and associations. (There are also quite a few society-sponsored and sometimes –edited journals published by OA and traditional publishers.) There are 731 journals in this category; journals are predominantly free and articles are mostly free; article volume has continued to grow.

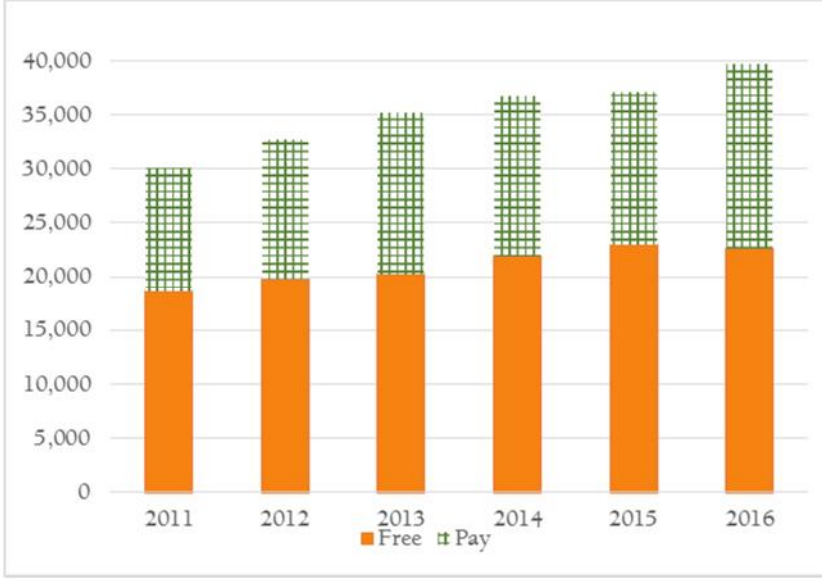

Figure 6.9. Free and pay articles by year, society-published

	Journals	%Free	Articles	%Free
Largest: 600+	6	0%	5,335	0%
Large: 150-599	62	47%	12,557	42%
Med.: 60-149	161	71%	11,153	71%
Small: 20-59	330	89%	9,230	88%
Smallest: 0-19	136	93%	1,439	95%

Table 6.22. Article volume, society-published

Table 6.22 shows that most of these journals are smallish—and that only among larger journals do APCs dominate. It's the usual pattern, however: the larger the journal, the more likely there's an APC.

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	20	15%	3%	4,192	25%	11%
$600-$1.399	21	16%	3%	3,110	18%	8%
$200-$599	45	34%	6%	3,850	23%	10%
$2-$199	48	36%	7%	5,890	35%	15%
Free	597		82%	22,672		57%

Table 6.23. APC levels, society-published

Average cost per article in fee-charging journals is $899 for 2016; including free journals, that comes down to $386.

Figure 6.10 shows not only that now-OA society journals go back a long ways but that they haven't had quite as sharp or short a 2000-2011 growth pattern—especially not APC-charging journals.

Figure 6.10. Starting dates, society-published

	Biomed	STEM	HSS
$1,400+	8	11	1
Articles	1,976	2,128	88
Revenue	$4,199,590	$5,504,750	$167,200
$600-$1.399	7	13	0
Articles	573	2,537	0
Revenue	$477,925	$2,994,706	$0
$200-$599	17	25	2
Articles	1,312	2,463	75
Revenue	$458,973	$840,046	$36,463
$2-$199	10	30	7
Articles	877	4,823	190
Revenue	$73,128	$552,955	$21,238
Free	164	165	235
Articles	9,287	7,059	6,326

Table 6.24. Articles and revenues by segment, society-published

Table 6.24 shows a typically atypical picture. This time, more of the relatively modest amount of potential revenue is in STEM rather than biomed. This is one category where most biomed publishing is free, whether you're counting journals or articles.

Region	Journals	%Free	Articles	%Free
Western Europe	194	89%	7,806	62%
Latin America	165	87%	9,760	80%
Pacific/English	126	74%	9,448	32%
Asia	108	63%	7,191	34%
Eastern Europe	108	86%	4,184	78%
Middle East	26	96%	1,117	100%
Africa	4	75%	208	77%

Table 6.25. Journals by region, society-published

Table 6.25 speaks for itself.

7. Country of Publication

The set of journals covered in this report comes from 117 different countries. A table of those countries takes up four or five pages, and one table doesn't provide much information.

It appears more useful to look at regions—and to split out APCLand, primarily international publishers, as a region all its own. That's what Chapters 12 through 19 do. (A supplemental book, also free in PDF ebook form, will devote a chapter to each country in OAWorld with more than a few journals, grouping those chapters by region and adding a brief discussion of countries within the region with too few journals for chapters of their own.)

This chapter offers some partial lists: a list of countries in APCLand with journal and article counts, a table showing all countries in OAWorld alphabetically with journal and article counts, and partial lists of countries ranked in different ways.

APCLand by Country

Table 7.1 shows the 32 countries represented in APCLand. Some APCLand publishers use the same country for most or all of their journals. Others distribute country names, possibly because the publishers operate in many countries.

As you'd expect, there are six primary countries in APCLand. In descending order by 2016 article volume, they are the United Kingdom, the United States, Switzerland, Egypt, Germany and the Netherlands. Only two of the six countries, Netherlands and Germany, have a significant number of free journals.

Country	Journals	%Free	Articles	%Free
Australia	4	50%	172	77%
Brazil	1	100%	50	100%
Chile	1	0%	13	0%
China	29	69%	1,797	65%
Colombia	1	100%	16	100%
Egypt	533	5%	20,210	9%
France	1	0%	120	0%
Georgia	1	100%	44	100%
Germany	148	39%	11,190	41%
Hong Kong	6	67%	579	83%
India	2	100%	106	100%
Iran, Islamic Republic of	7	86%	234	89%
Ireland	1	0%	110	0%
Italy	4	75%	81	77%
Japan	3	33%	303	27%
Korea, Republic of	13	92%	556	91%
Lithuania	1	100%	59	100%
Netherlands	116	36%	10,606	34%
New Zealand	3	33%	87	29%
Peru	1	100%	12	100%
Poland	2	100%	62	100%
Qatar	1	100%	30	100%
Russian Federation	1	100%	22	100%
Saudi Arabia	13	100%	973	100%
Singapore	3	100%	96	100%
South Africa	1	0%	62	0%
Spain	13	92%	516	76%
Switzerland	197	18%	38,302	3%
Taiwan, Province of China	6	83%	313	88%
Thailand	1	0%	8	0%
United Kingdom	529	6%	80,809	2%
United States	73	3%	36,780	0%

Table 7.1. Countries in APCLand

OAWorld: The Complete List

Table 7.2 shows all countries in OAWorld.

Country	Jour	%Fre	Art.	%Fre
Albania	3	33%	193	15%
Algeria	8	100%	793	100%
Argentina	126	94%	2,485	92%
Armenia	2	100%	42	100%
Australia	77	84%	2,738	56%
Austria	45	87%	1,362	68%
Azerbaijan	2	100%	49	100%
Bahamas	1	100%	9	100%
Bangladesh	17	71%	677	70%
Barbados	1	100%	30	100%
Belarus	5	100%	267	100%
Belgium	30	97%	642	94%
Bolivia, Plurinational State of	3	100%	55	100%
Bosnia and Herzegovina	13	69%	300	60%
Brazil	879	92%	39,60	82%
British Virgin Islands	1	100%	11	100%
Brunei Darussalam	1	100%	22	100%
Bulgaria	36	58%	1,867	32%
Cambodia	1	100%	11	100%
Cameroon	1	0%	88	0%
Canada	137	75%	4,892	53%
Chile	80	94%	2,119	81%
China	35	51%	4,130	27%
Colombia	220	99%	5,377	99%
Congo, the Democratic Republic of the	1	100%	109	100%
Costa Rica	38	100%	1,086	100%
Croatia	86	94%	2,706	93%
Cuba	29	100%	1,398	100%
Cyprus	4	100%	67	100%
Czech Republic	82	76%	2,132	65%
Denmark	25	96%	313	93%
Ecuador	21	100%	544	100%

Country	Jour	%Fre	Art.	%Fre
Egypt	7	71%	141	71%
El Salvador	1	100%	35	100%
Estonia	16	100%	259	100%
Ethiopia	3	100%	91	100%
Finland	24	79%	564	64%
France	167	92%	10,80	97%
Georgia	1	100%	66	100%
Germany	182	74%	13,09	57%
Ghana	1	100%	24	100%
Greece	27	85%	738	83%
Guam	1	100%	5	100%
Guatemala	3	100%	12	100%
Hong Kong	31	45%	2,725	41%
Hungary	26	96%	812	90%
Iceland	5	100%	360	100%
India	282	53%	29,88	36%
Indonesia	473	73%	11,43	67%
Iran	1	100%	39	100%
Iran, Islamic Republic of	281	82%	12,15	70%
Iraq	15	60%	1,008	28%
Ireland	13	92%	173	100%
Israel	5	80%	71	100%
Italy	273	83%	7,526	79%
Jamaica	1	0%	7	0%
Japan	21	52%	899	29%
Jordan	2	50%	593	6%
Kazakhstan	1	100%	15	100%
Kenya	5	60%	128	19%
Korea, Republic of	33	79%	1,757	73%
Kosova	2	0%	39	0%
Kyrgyzstan	2	100%	29	100%
Latvia	9	78%	304	59%

Country	Jour	%Fre	Art.	%Fre
Lebanon	1	100%	19	100%
Libya	2	50%	78	42%
Lithuania	35	86%	748	78%
Luxembourg	2	100%	21	100%
Macedonia, the Former Yugoslav Republic	10	60%	307	28%
Madagascar	1	100%	11	100%
Malaysia	44	86%	1,028	81%
Malta	1	100%	9	100%
Mauritius	2	50%	107	11%
Mexico	97	92%	2,623	91%
Moldova, Republic of	15	67%	531	61%
Montenegro	3	100%	130	100%
Morocco	5	80%	114	63%
Nepal	10	90%	277	71%
Netherlands	42	81%	2,085	91%
New Zealand	62	18%	821	19%
Nicaragua	4	100%	57	100%
Nigeria	7	29%	540	12%
Norway	51	88%	756	82%
Oman	2	100%	157	100%
Pakistan	45	62%	2,798	37%
Palestine, State of	1	100%	0	
Paraguay	4	100%	117	100%
Peru	30	100%	742	100%
Philippines	11	91%	345	72%
Poland	380	84%	12,31	71%
Portugal	75	89%	1,980	81%
Qatar	6	67%	261	82%
Romania	273	82%	8,415	71%
Russian Federation	145	90%	9,972	64%
Saudi Arabia	2	50%	156	79%
Serbia	73	92%	2,677	72%

Country	Jour	%Fre	Art.	%Fre
Singapore	1	100%	18	100%
Slovakia	40	90%	957	89%
Slovenia	44	93%	1,243	81%
South Africa	63	48%	2,376	43%
Spain	484	96%	12,15	93%
Sri Lanka	7	100%	80	100%
Sweden	65	54%	2,136	35%
Switzerland	34	44%	1,995	25%
Taiwan, Province of China	18	78%	356	64%
Thailand	16	88%	610	91%
Tunisia	2	100%	15	100%
Turkey	221	90%	11,45	77%
Uganda	1	0%	864	0%
Ukraine	80	75%	5,701	71%
United Arab Emirates	6	17%	222	0%
United Kingdom	238	53%	25,16	63%
United States	556	68%	30,41	37%
Uruguay	11	100%	208	100%
Venezuela, Bolivarian Republic of	21	90%	739	97%
Viet Nam	1	0%	58	0%
Yemen	2	50%	26	69%

Table 7.2. Countries in OAWorld, alphabetic

Countries with the Most Journals and Articles

Table 7.3 shows OAWorld countries with at least four serious OA journals, from the most journals to the fewest. Table 7.4 shows the same data, arranged from highest to lowest percentage of free journals. Table 7.5 shows countries with more than 200 OA articles in 2016, from most articles to fewest. Finally, Table 7.6 shows the same data as Table 7.5, but in order by percentage appearing in free journals.

No comments; the tables should yield their own messages.

Country	Journals	%Free
Brazil	879	92%
United States	556	68%
Spain	484	96%
Indonesia	473	73%
Poland	380	84%
India	282	53%
Iran, Islamic Republic of	281	82%
Italy	273	83%
Romania	273	82%
United Kingdom	238	53%
Turkey	221	90%
Colombia	220	99%
Germany	182	74%
France	167	92%
Russian Federation	145	90%
Canada	137	75%
Argentina	126	94%
Mexico	97	92%
Croatia	86	94%
Czech Republic	82	76%
Chile	80	94%
Ukraine	80	75%
Australia	77	84%
Portugal	75	89%
Serbia	73	92%
Sweden	65	54%
South Africa	63	48%
New Zealand	62	18%
Norway	51	88%

Country	Journals	%Free
Austria	45	87%
Pakistan	45	62%
Malaysia	44	86%
Slovenia	44	93%
Netherlands	42	81%
Slovakia	40	90%
Costa Rica	38	100%
Bulgaria	36	58%
China	35	51%
Lithuania	35	86%
Switzerland	34	44%
Korea, Republic of	33	79%
Hong Kong	31	45%
Belgium	30	97%
Peru	30	100%
Cuba	29	100%
Greece	27	85%
Hungary	26	96%
Denmark	25	96%
Finland	24	79%
Ecuador	21	100%
Japan	21	52%
Venezuela, Bolivarian Republic of	21	90%
Taiwan, Province of China	18	78%
Bangladesh	17	71%
Estonia	16	100%
Thailand	16	88%
Iraq	15	60%
Moldova, Republic of	15	67%

Country	Journals	%Free
Bosnia and Herzegovina	13	69%
Ireland	13	92%
Philippines	11	91%
Uruguay	11	100%
Macedonia, the Former Yugoslav Republic of	10	60%
Nepal	10	90%
Latvia	9	78%
Algeria	8	100%
Egypt	7	71%
Nigeria	7	29%
Sri Lanka	7	100%
Qatar	6	67%
United Arab Emirates	6	17%
Belarus	5	100%
Iceland	5	100%
Israel	5	80%
Kenya	5	60%
Morocco	5	80%
Cyprus	4	100%
Nicaragua	4	100%
Paraguay	4	100%

Table 7.3. OAWorld countries with four or more journals, ranked by journals

Country	Journals	%Free
Costa Rica	38	100%
Peru	30	100%
Cuba	29	100%
Ecuador	21	100%
Estonia	16	100%
Uruguay	11	100%
Algeria	8	100%
Sri Lanka	7	100%
Belarus	5	100%
Iceland	5	100%
Cyprus	4	100%
Nicaragua	4	100%
Paraguay	4	100%
Colombia	220	99%
Belgium	30	97%
Spain	484	96%
Hungary	26	96%
Denmark	25	96%
Croatia	86	94%
Chile	80	94%
Argentina	126	94%
Slovenia	44	93%
Ireland	13	92%
France	167	92%
Brazil	879	92%
Serbia	73	92%
Mexico	97	92%
Philippines	11	91%
Turkey	221	90%

Country	Journals	%Free
Venezuela, Bolivarian Republic of	21	90%
Russian Federation	145	90%
Slovakia	40	90%
Nepal	10	90%
Portugal	75	89%
Norway	51	88%
Thailand	16	88%
Austria	45	87%
Malaysia	44	86%
Lithuania	35	86%
Greece	27	85%
Australia	77	84%
Poland	380	84%
Italy	273	83%
Romania	273	82%
Iran, Islamic Republic of	281	82%
Netherlands	42	81%
Israel	5	80%
Morocco	5	80%
Finland	24	79%
Korea, Republic of	33	79%
Taiwan, Province of China	18	78%
Latvia	9	78%
Czech Republic	82	76%
Canada	137	75%
Ukraine	80	75%
Germany	182	74%
Indonesia	473	73%
Egypt	7	71%

Country	Journals	%Free
Bangladesh	17	71%
Bosnia and Herzegovina	13	69%
United States	556	68%
Moldova, Republic of	15	67%
Qatar	6	67%
Pakistan	45	62%
Iraq	15	60%
Macedonia, the Former Yugoslav Republic of	10	60%
Kenya	5	60%
Bulgaria	36	58%
Sweden	65	54%
India	282	53%
United Kingdom	238	53%
Japan	21	52%
China	35	51%
South Africa	63	48%
Hong Kong	31	45%
Switzerland	34	44%
Nigeria	7	29%
New Zealand	62	18%
United Arab Emirates	6	17%

Table 7.4. Countries with four or more OA journals ranked by free journal %

Country	Articles	%Free
Brazil	39,600	82%
United States	30,410	37%
India	29,886	36%
United Kingdom	25,163	63%
Germany	13,091	57%
Poland	12,317	71%
Spain	12,157	93%
Iran, Islamic Republic of	12,150	70%
Turkey	11,451	77%
Indonesia	11,435	67%
France	10,807	97%
Russian Federation	9,972	64%
Romania	8,415	71%
Italy	7,526	79%
Ukraine	5,701	71%
Colombia	5,377	99%
Canada	4,892	53%
China	4,130	27%
Pakistan	2,798	37%
Australia	2,738	56%
Hong Kong	2,725	41%
Croatia	2,706	93%
Serbia	2,677	72%
Mexico	2,623	91%
Argentina	2,485	92%
South Africa	2,376	43%
Sweden	2,136	35%
Czech Republic	2,132	65%
Chile	2,119	81%

Country	Articles	%Free
Netherlands	2,085	91%
Switzerland	1,995	25%
Portugal	1,980	81%
Bulgaria	1,867	32%
Korea, Republic of	1,757	73%
Cuba	1,398	100%
Austria	1,362	68%
Slovenia	1,243	81%
Costa Rica	1,086	100%
Malaysia	1,028	81%
Iraq	1,008	28%
Slovakia	957	89%
Japan	899	29%
Uganda	864	0%
New Zealand	821	19%
Hungary	812	90%
Algeria	793	100%
Norway	756	82%
Lithuania	748	78%
Peru	742	100%
Venezuela, Bolivarian Republic of	739	97%
Greece	738	83%
Bangladesh	677	70%
Belgium	642	94%
Thailand	610	91%
Jordan	593	6%
Finland	564	64%
Ecuador	544	100%
Nigeria	540	12%

Country	Articles	%Free
Moldova, Republic of	531	61%
Iceland	360	100%
Taiwan, Province of China	356	64%
Philippines	345	72%
Denmark	313	93%
Macedonia, the Former Yugoslav Republic of	307	28%
Latvia	304	59%
Bosnia and Herzegovina	300	60%
Nepal	277	71%
Belarus	267	100%
Qatar	261	82%
Estonia	259	100%
United Arab Emirates	222	0%
Uruguay	208	100%

Table 7.5. OAWorld countries with 200+ 2016 articles, ranked by article count

Country	Articles	%Free
Cuba	1,398	100%
Costa Rica	1,086	100%
Algeria	793	100%
Peru	742	100%
Ecuador	544	100%
Iceland	360	100%
Belarus	267	100%
Estonia	259	100%
Uruguay	208	100%
Colombia	5,377	99%
France	10,807	97%
Venezuela, Bolivarian Republic of	739	97%
Belgium	642	94%
Spain	12,157	93%
Croatia	2,706	93%
Denmark	313	93%
Argentina	2,485	92%
Mexico	2,623	91%
Thailand	610	91%
Netherlands	2,085	91%
Hungary	812	90%
Slovakia	957	89%
Greece	738	83%
Qatar	261	82%
Norway	756	82%
Brazil	39,600	82%
Chile	2,119	81%
Malaysia	1,028	81%
Slovenia	1,243	81%

Country	Articles	%Free
Portugal	1,980	81%
Italy	7,526	79%
Lithuania	748	78%
Turkey	11,451	77%
Korea, Republic of	1,757	73%
Philippines	345	72%
Serbia	2,677	72%
Poland	12,317	71%
Romania	8,415	71%
Nepal	277	71%
Ukraine	5,701	71%
Bangladesh	677	70%
Iran, Islamic Republic of	12,150	70%
Austria	1,362	68%
Indonesia	11,435	67%
Czech Republic	2,132	65%
Finland	564	64%
Taiwan, Province of China	356	64%
Russian Federation	9,972	64%
United Kingdom	25,163	63%
Moldova, Republic of	531	61%
Bosnia and Herzegovina	300	60%
Latvia	304	59%
Germany	13,091	57%
Australia	2,738	56%
Canada	4,892	53%
South Africa	2,376	43%
Hong Kong	2,725	41%
United States	30,410	37%

Country	Articles	%Free
Pakistan	2,798	37%
India	29,886	36%
Sweden	2,136	35%
Bulgaria	1,867	32%
Japan	899	29%
Macedonia, the Former Yugoslav Republic of	307	28%
Iraq	1,008	28%
China	4,130	27%
Switzerland	1,995	25%
New Zealand	821	19%
Nigeria	540	12%
Jordan	593	6%
Uganda	864	0%
United Arab Emirates	222	0%

Table 7.6. OAWorld countries with 200+ 2016 articles, ranked by free %

8. Subject Segments

Since the three broad subject segments were introduced in Chapter 2 and play roles in Chapters 4, 5 and 6, there's no need to spend much space introducing them. A few notes:

- The subject segments came about while I was writing *Open-Access Journals: Idealism and Opportunism* (ALA, 2015), one of the partial-survey precursors to this report. It seemed like a meaningful way to show substantial differences in OA practice in different subject areas—differences that grew more distinct as the survey became more complete.
- Assignment of journals to one of 28 subjects is tricky and partly subjective. The subject summaries at the end of each chapter provide more information on what's included in each subject; you can also find that information in *Gold Open Access Journals 2011-2015: A Subject Approach*.
- Assignment of subjects to segments may also be arguable, at least in the cases of anthropology and psychology, which some might argue belong in STEM and biomed respectively.
- I've used a consistent set of tables and graphs in each of the next three chapters, based on tables and graphs also used in earlier chapters. The hope is to provide varied perspectives without taking up too much space.
- Because there won't be a full subject-by-subject book (an issue of *Cites & Insights* may provide briefer chapters on each subject), I've added subject pages to each chapter, providing three tables for each subject without commentary.

9. Biology and Medicine

Biomed—subjects related to human biology and the many subjects related to human medicine, including pharmacy, some aspects of nutrition and most aspects of sports and sports medicine—is where the money is.

Of the three segments, this one has the fewest articles and is roughly tied with STEM for journal count—but it has the lowest percentage of free articles and is the only segment where *most* journals have APCs. Maximum potential revenue is more than HSS and STEM combined.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	1,156	1,099	57,201	52
Pay	1,406	1,317	130,993	99
Total	2,562	2,416	188,194	78
Free%	45%	45%	30%	

Table 9.1. Journals and articles, biomed

Table 9.1 shows that just under half of biomed journals in *DOAJ* are free, but they published less than one-third of the articles in 2016. On average, fee-charging journals have just under twice as many articles per year as free ones.

	2016	2015	2014	2013	2012	2011
Journals	2,416	2,474	2,390	2,114	1,864	1,631
%Free	45%	46%	45%	44%	45%	44%
Articles	188,194	181,979	172,463	138,818	121,449	101,023
%Free	30%	31%	31%	34%	36%	38%

Table 9.2. Journals and articles by year, biomed

The segment keeps growing, dramatically from 2011 through 2014—along with a substantial drop in the percentage of articles without APCs. Figure 9.1 shows free and pay articles graphically.

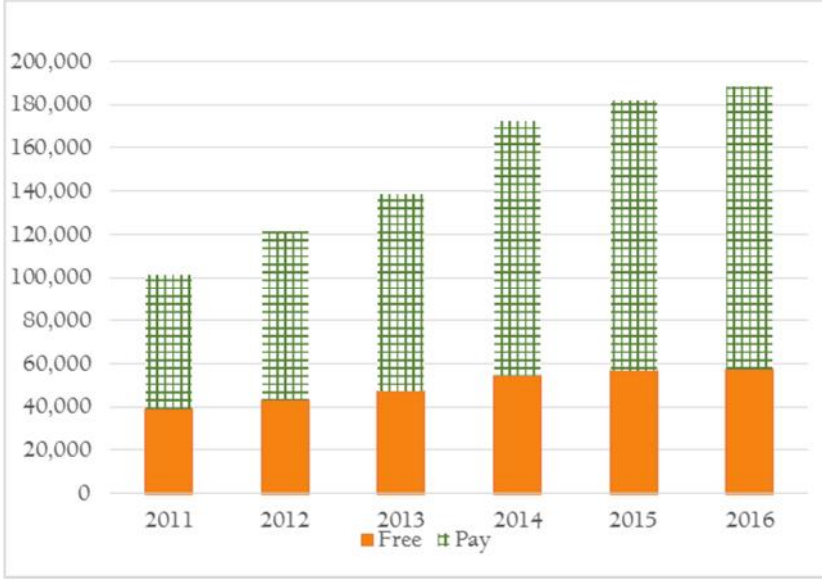

Figure 9.1. Free and pay articles by year, biomed

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	50	8%	45,796	5%
Large: 150-599	322	27%	64,460	24%
Med.: 60-149	663	44%	45,621	45%
Small: 20-59	1,039	55%	29,149	59%
Smallest: 0-19	342	43%	3,168	49%

Table 9.3. Article volume, biomed

The biggest journals are rarely free: that's much truer for biomed than for other segments. The most articles are in large journals and the most journals (and only mostly-free row) are small, not smallest.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	674	48%	26%	88,668	68%	47%
$600-$1.399	390	28%	15%	13,998	11%	7%
$200-$599	211	15%	8%	16,909	13%	9%
$2-$199	131	9%	5%	11,418	9%	6%
Free	1,156		45%	57,201		30%

Table 9.4. APC levels, biomed

The first row in Table 9.4 fairly screams "Biomed: it's where the OA money is." The most articles, the most APC-charging journals, and a much larger portion of the whole than in other segments are in the most expensive bracket. Not surprisingly, the average charge per article is also very high: $1,651 among articles in APC-charging journals, $1,149 per article overall.

Starting Date

Figure 9.2. Starting dates, biomed

Figure 9.2 shows a fair number of early journals that are now no-fee OA (98 before 1999)—and an early boomlet in fee-based OA that returns as a boom in 2007-2014, much exceeding the growth in no-fee startups.

Regions

Table 9.5 separates out APCLand—the biggest factor in biomed by far—and shows journals and articles by region of OAWorld, sorted by 2015 articles. The free% numbers are interesting, setting aside the fact that nearly all biomed journals in APCLand charge fees: even biomed publishing is predominantly free in Latin America, the Middle East and Eastern Europe, while the minority of APC-charging journals in Asia and Africa publish most of the articles. (Reminder: Pacific/English is Australia, New Zealand, Canada and the United States.)

Region	Journals	%Free	Articles	%Free
APCLand	1,014	10%	93,519	6%
Asia	312	66%	25,539	47%
Pacific/English	243	34%	16,545	21%
Latin America	243	87%	15,209	77%
Western Europe	268	57%	14,229	52%
Middle East	252	89%	11,856	81%
Eastern Europe	202	76%	8,957	68%
Africa	28	68%	2,340	33%

Table 9.5. Journals by region, biomed

Publisher Category

Category	Journals	%Free	Articles	%Free
Open Access	1,109	19%	90,610	13%
Traditional	398	29%	32,755	19%
Univ/college	510	82%	26,631	66%
Miscellaneous	327	71%	24,173	52%
Society/govt	218	80%	14,025	66%

Table 9.6. Publisher categories, biomed

Table 9.6 is also arranged by number of articles. Multijournal OA publishers predominantly charge APCs, while more than one-quarter of journals from traditional publishers don't (many of these are society-sponsored). Not surprisingly, university and institute journals are predominantly free, as are society-published journals.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	415	16.2%	
Grew 25-49.9%	239	9.3%	25.5%
Grew 10-24.99%	278	10.9%	36.4%
Even, ±9.99%	615	24.0%	60.4%
Shrank 10-24.99%	345	13.5%	73.8%
Shrank 25-49.99%	334	13.0%	86.9%
Shrank 50%+	336	13.1%	

Table 9.7. Growth and shrinkage, biomed

Subjects

Someone with an understanding of medicine could probably break that subject down into a small number of coherent subgroups, but I lack that understanding. Table 9.8 offers a rough breakdown.

Subject	Journals	%Free	Articles	%Free
Biology	373	34%	31,713	19%
Medicine	2,189	47%	156,481	33%

Table 9.8. Subjects, biomed

Countries in OAWorld (partial)

Table 9.9 shows the countries with the most biomed articles (leaving out APCLand), arranged by number of 2015 articles. This partially fleshes out Table 9.5.

Country	Journals	%Free	Articles	%Free
India	171	60%	18,281	44%
United States	144	40%	12,781	23%
Brazil	151	81%	11,865	74%
Iran, Islamic Republic of	175	87%	8,223	74%
United Kingdom	63	44%	4,160	47%
Poland	79	70%	3,454	54%
Turkey	61	100%	2,873	100%
Canada	34	41%	1,958	15%
Indonesia	59	76%	1,829	75%
Switzerland	21	14%	1,776	16%
Russian Federation	38	100%	1,753	100%
Italy	58	52%	1,696	42%
China	10	50%	1,636	12%
Spain	38	89%	1,610	84%
Australia	17	59%	1,177	27%
Sweden	17	24%	1,138	20%
Pakistan	18	67%	1,116	53%
Netherlands	4	50%	1,058	96%
Ukraine	15	67%	1,009	75%
Colombia	26	100%	939	100%
Germany	17	65%	865	48%
Uganda	1	0%	864	0%
Korea, Republic of	11	73%	671	60%
South Africa	16	69%	645	72%
Romania	21	90%	642	86%
New Zealand	48	2%	629	1%

Table 9.9. Countries with more than 600 articles, biomed

Biology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	351	355	353	314	276	231
%Free	34%	35%	33%	32%	31%	32%
Articles	31,713	31,934	29,225	23,239	19,606	16,649
%Free	19%	18%	18%	19%	18%	18%

Table 9.10. Journals and articles by year, biology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	128	52%	34%	20,855	81%	66%
$600-$1.399	63	26%	17%	1,944	8%	6%
$200-$599	32	13%	9%	1,746	7%	6%
$2-$199	23	9%	6%	1,060	4%	3%
Free	127		34%	6,108		19%

Table 9.11. APC levels, biology

Region	Journals	%Free	Articles	%Free
APCLand	172	7%	20,488	4%
Western Europe	31	42%	3,128	50%
Latin America	28	64%	2,106	47%
Pacific/English	38	34%	1,917	16%
Asia	36	53%	1,736	40%
Eastern Europe	45	78%	1,676	75%
Middle East	21	76%	619	83%
Africa	2	50%	43	58%

Table 9.12. Journals by region, biology

Average cost per article: APC journals $1,976, overall $1,595. All aspects of human biology and biochemistry. Areas such as marine biology are included in zoology (in STEM).

Medicine: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	2,065	2,119	2,037	1,800	1,588	1,400
%Free	47%	48%	47%	47%	47%	46%
Articles	156,481	150,045	143,238	115,579	101,843	84,374
%Free	33%	34%	34%	37%	39%	42%

Table 9.13. Journals and articles by year, medicine

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	546	47%	25%	67,813	64%	43%
$600-$1.399	327	28%	15%	12,054	11%	8%
$200-$599	179	15%	8%	15,163	14%	10%
$2-$199	108	9%	5%	10,358	10%	7%
Free	1,029		47%	51,093		33%

Table 9.14. APC levels, medicine

Region	Journals	%Free	Articles	%Free
APCLand	842	11%	73,031	7%
Asia	276	68%	23,803	48%
Pacific/English	205	34%	14,628	22%
Latin America	215	90%	13,103	82%
Middle East	231	90%	11,237	81%
Western Europe	237	59%	11,101	53%
Eastern Europe	157	75%	7,281	67%
Africa	26	69%	2,297	33%

Table 9.15. Journals by region, medicine

Average cost per article: APC journals $1,572, overall $1,059. All aspects of human health including exercise and some aspects of nutrition. Veterinary medicine is included in zoology.

10. Science, Technology, Engineering and Math

STEM—in this case, excluding human biology and medicine, as well as social sciences—includes slightly more gold OA journals than biomed, considerably more 2016 articles, but somewhat less revenue. Note that, unlike last year's analysis, this chapter *does* include megajournals.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	1,530	1,446	80,049	55
Pay	1,036	961	145,542	151
Total	2,566	2,407	225,591	94
Free%	60%	60%	35%	

Table 10.1. Journals and articles, STEM

Table 10.1 shows that six out of ten STEM journals in *DOAJ* are free—but the APC-charging journals publish almost two-thirds of the articles. On average, fee-charging journals published nearly three times as many articles per journal in 2016 as free ones did.

	2016	2015	2014	2013	2012	2011
Journals	2,407	2,464	2,411	2,171	1,864	1,621
%Free	60%	60%	60%	60%	63%	64%
Articles	225,591	198,027	189,603	165,297	139,704	103,738
%Free	35%	35%	35%	34%	37%	41%

Table 10.2. Journals and articles by year, STEM

STEM article count keeps growing fairly rapidly in both free and pay categories. Figure 10.1 shows free and pay articles graphically.

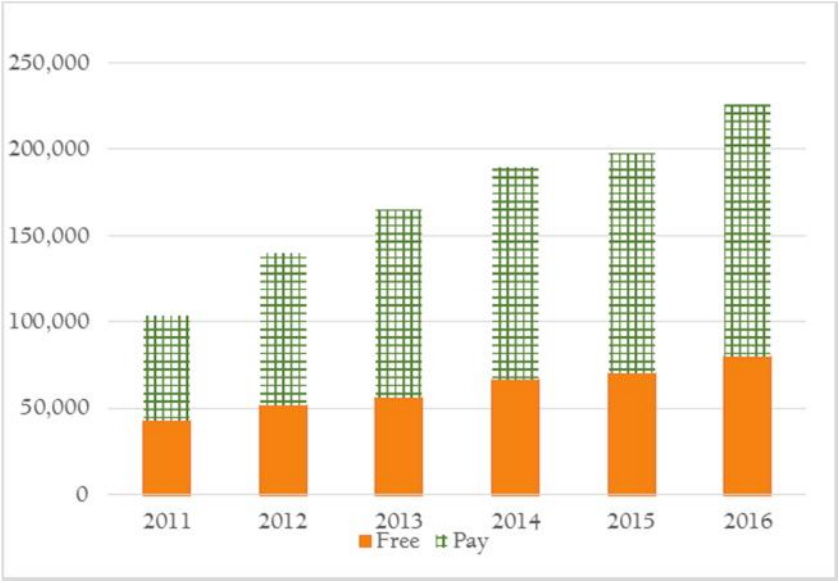

Figure 10.1. Free and pay articles by year, STEM

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	58	22%	113,314	21%
Large: 150-599	201	36%	42,683	33%
Med.: 60-149	553	50%	36,015	52%
Small: 20-59	1,135	67%	29,202	69%
Smallest: 0-19	460	70%	4,377	76%

Table 10.3. Article volume, STEM

Free journals dominate the smaller categories as usual, and are still in the majority for medium-sized journals.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	145	14%	6%	83,831	58%	37%
$600-$1.399	401	39%	16%	23,228	16%	10%
$200-$599	221	21%	9%	16,529	11%	7%
$2-$199	269	26%	10%	21,954	15%	10%
Free	1,530		60%	80,049		35%

Table 10.4. APC levels, STEM

Unlike biomed, STEM has relatively few very expensive journals—but those journals publish *most* of the articles in fee journals. Average cost per article in APC-charging journals is $1,313; for all journals it's $847.

Starting Date

Figure 10.2. Starting dates, STEM

Figure 10.2 shows steady growth among free journals in most of the late 1990s through 2014, with modest growth in fee-charging journals until a dramatic rise from 2007 through 2014.

Regions

Region	Journals	%Free	Articles	%Free
APCLand	589	21%	105,415	9%
Western Europe	374	67%	41,572	70%
Asia	391	57%	23,530	35%
Eastern Europe	529	82%	20,254	71%
Latin America	358	85%	14,816	72%
Pacific/English	163	52%	12,050	27%
Middle East	131	73%	6,367	57%
Africa	31	58%	1,587	73%

Table 10.5. Journals by region, STEM

APCLand publishes by far the most articles, although Eastern Europe has almost as many journals, mostly free.

Publisher Category

Category	Journals	%Free	Articles	%Free
Open Access	673	32%	73,642	13%
Traditional	292	37%	57,113	28%
Univ/college	951	81%	40,778	64%
Miscellaneous	398	66%	35,048	61%
Society/govt	252	68%	19,010	37%

Table 10.6. Publisher categories, STEM

Table 10.6, also arranged by 2016 article count, shows a very different picture than for biomed, with universities and colleges publishing the most journals (predominantly free) while OA multijournal publishers publish the most articles (predominantly APC). The article difference is entirely due to the two megajournals.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	466	18.2%	
Grew 25-49.9%	270	10.5%	28.7%
Grew 10-24.99%	285	11.1%	39.8%
Even, ±9.99%	612	23.9%	63.6%
Shrank 10-24.99%	284	11.1%	74.7%
Shrank 25-49.99%	286	11.1%	85.9%
Shrank 50%+	363	14.1%	

Table 10.7. Growth and shrinkage, STEM

Subjects

Subject	Journals	%Free	Articles	%Free
Agriculture	354	55%	21,819	35%
Chemistry	144	49%	13,376	27%
Computer Science	274	57%	15,152	31%
Earth Sciences	299	72%	11,491	59%
Ecology	233	61%	14,328	44%
Engineering	330	58%	24,211	47%
Mathematics	212	63%	8,323	45%
Other Sciences	168	64%	68,680	9%
Physics	131	43%	20,809	68%
Technology	207	74%	17,473	70%
Zoology	214	52%	9,929	33%

Table 10.8. Subjects, STEM

Countries in OAWorld (partial)

Table 10.9 shows countries with more than 600 2016 STEM articles.

Country	Journals	%Free	Articles	%Free
United Kingdom	52	25%	17,942	68%
Brazil	192	81%	10,766	65%
India	85	34%	10,601	20%
United States	124	47%	10,527	21%
Germany	86	57%	9,766	49%
France	40	78%	7,899	98%
Poland	171	80%	5,375	68%
Indonesia	169	64%	4,751	57%
Iran, Islamic Republic of	66	71%	2,882	58%
Romania	92	83%	2,722	71%
Ukraine	33	88%	2,539	89%
China	25	52%	2,494	37%
Turkey	47	81%	2,438	71%
Italy	53	74%	2,048	77%
Spain	69	94%	1,791	94%
Hong Kong	21	43%	1,770	36%
Russian Federation	34	91%	1,735	85%
Pakistan	19	42%	1,493	16%
Serbia	36	92%	1,402	65%
Czech Republic	35	63%	1,340	49%
Bulgaria	19	63%	1,318	29%
Croatia	31	87%	1,200	89%
Colombia	50	98%	1,195	98%
Canada	25	64%	1,098	64%
Mexico	29	79%	793	81%
Algeria	5	100%	730	100%
Korea, Republic of	14	71%	713	71%

Table 10.9. Countries in OAWorld (partial), STEM

Agriculture: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	344	346	340	312	281	254
%Free	55%	55%	55%	54%	53%	54%
Articles	21,819	19,362	18,082	14,492	13,302	12,077
%Free	35%	37%	38%	43%	43%	43%

Table 10.10. Journals and articles by year, agriculture

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	19	12%	5%	6,336	45%	29%
$600-$1.399	36	23%	10%	1,900	13%	9%
$200-$599	40	25%	11%	2,118	15%	10%
$2-$199	64	40%	18%	3,758	27%	17%
Free	195		55%	7,707		35%

Table 10.11. APC levels, agriculture

Region	Journals	%Free	Articles	%Free
APCLand	48	17%	7,019	4%
Latin America	90	67%	5,241	53%
Eastern Europe	82	70%	3,465	55%
Western Europe	42	69%	2,206	56%
Asia	48	50%	1,922	39%
Middle East	24	42%	1,329	45%
Pacific/English	16	31%	488	28%
Africa	4	50%	149	30%

Table 10.12. Journals by region, agriculture

Average cost per article: APC journals $1,111, overall $719. Includes aquaculture, fisheries, other aspects of raising and processing plants and food, including some aspects of nutrition.

Chemistry: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	130	133	133	120	94	76
%Free	52%	52%	47%	48%	53%	54%
Articles	13,376	11,933	13,627	13,471	12,442	9,320
%Free	27%	27%	23%	21%	21%	20%

Table 10.13. Journals and articles by year, chemistry

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	11	15%	8%	5,310	55%	40%
$600-$1.399	39	53%	27%	1,654	17%	12%
$200-$599	8	11%	6%	307	3%	2%
$2-$199	15	21%	10%	2,432	25%	18%
Free	71		49%	3,673		27%

Table 10.14. APC levels, chemistry

Region	Journals	%Free	Articles	%Free
APCLand	60	20%	7,160	13%
Western Europe	11	36%	2,475	19%
Eastern Europe	29	79%	1,308	75%
Pacific/English	5	40%	937	19%
Asia	19	63%	708	53%
Latin America	9	89%	364	95%
Middle East	9	100%	351	100%
Africa	2	50%	73	42%

Table 10.15. Journals by region, chemistry

Average cost per article: APC journals $1,173, overall $851. Biochemistry is included in biology.

Computer Science: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	263	268	252	230	201	175
%Free	56%	56%	58%	56%	56%	58%
Articles	15,152	14,865	12,643	12,418	12,620	8,499
%Free	31%	32%	42%	40%	36%	36%

Table 10.16. Journals and articles by year, computer science

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	14	12%	5%	1,401	13%	9%
$600-$1.399	31	26%	11%	931	9%	6%
$200-$599	29	24%	11%	3,305	32%	22%
$2-$199	45	38%	16%	4,843	46%	32%
Free	155		57%	4,672		31%

Table 10.17. APC levels, computer science

Region	Journals	%Free	Articles	%Free
Asia	77	49%	4,471	33%
APCLand	55	11%	3,324	5%
Pacific/English	24	54%	3,090	21%
Western Europe	35	77%	2,004	25%
Eastern Europe	51	86%	1,423	86%
Latin America	18	100%	494	100%
Middle East	8	75%	207	60%
Africa	6	50%	139	11%

Table 10.18. Journals by region, computer science

Average cost per article: APC journals $494, overall $342. Includes software, data processing, AI, robotics and parts of information science.

Earth Sciences: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	277	290	286	257	228	202
%Free	72%	72%	72%	75%	79%	81%
Articles	11,491	10,525	9,787	8,424	7,381	6,123
%Free	59%	60%	65%	70%	73%	76%

Table 10.19. Journals and articles by year, earth sciences

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	11	13%	4%	1,727	36%	15%
$600-$1.399	40	47%	13%	1,926	41%	17%
$200-$599	22	26%	7%	774	16%	7%
$2-$199	12	14%	4%	315	7%	3%
Free	214		72%	6,749		59%

Table 10.20. APC levels, earth sciences

Region	Journals	%Free	Articles	%Free
Western Europe	87	71%	4,096	63%
APCLand	54	24%	3,226	16%
Latin America	59	93%	1,820	92%
Eastern Europe	64	94%	1,395	92%
Asia	16	69%	547	76%
Middle East	8	75%	219	84%
Pacific/English	11	64%	188	45%

Table 10.21. Journals by region, earth sciences

Average cost per article: APC journals $1,065, overall $439. Includes geography, geology, oceanography, some place-related fields (e.g., parts of tourism) and astronomy.

Ecology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	219	224	214	195	157	138
%Free	61%	61%	62%	63%	64%	67%
Articles	14,328	12,254	11,966	9,840	8,531	6,925
%Free	44%	46%	50%	50%	52%	51%

Table 10.22. Journals and articles by year, ecology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	19	21%	8%	1,612	20%	11%
$600-$1.399	33	37%	14%	3,933	49%	27%
$200-$599	21	23%	9%	1,712	21%	12%
$2-$199	17	19%	7%	738	9%	5%
Free	143		61%	6,333		44%

Table 10.23. APC levels, ecology

Region	Journals	%Free	Articles	%Free
Western Europe	47	70%	6,023	53%
APCLand	47	23%	3,889	13%
Eastern Europe	39	77%	1,226	57%
Latin America	42	90%	1,205	77%
Pacific/English	29	41%	1,079	46%
Asia	17	53%	580	32%
Middle East	8	88%	222	94%
Africa	4	75%	104	96%

Table 10.24. Journals by region, ecology

Average cost per article: APC journals $982, overall $548. Includes environmental fields and any journal where most coverage seems devoted to ecological issues.

Engineering: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	309	316	309	277	235	205
%Free	58%	59%	58%	58%	62%	62%
Articles	24,211	20,976	20,017	18,748	14,955	11,544
%Free	47%	46%	36%	35%	36%	46%

Table 10.25. Journals and articles by year, engineering

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	11	8%	3%	3,374	26%	14%
$600-$1.399	63	45%	19%	2,322	18%	10%
$200-$599	37	27%	11%	3,419	27%	14%
$2-$199	28	20%	8%	3,691	29%	15%
Free	191		58%	11,405		47%

Table 10.26. APC levels, engineering

Region	Journals	%Free	Articles	%Free
Asia	62	53%	6,727	20%
APCLand	89	24%	5,320	24%
Western Europe	27	44%	5,302	79%
Eastern Europe	75	83%	3,264	73%
Pacific/English	16	38%	1,344	9%
Latin America	37	95%	1,186	95%
Middle East	21	95%	909	95%
Africa	3	67%	159	52%

Table 10.27. Journals by region, engineering

Average cost per article: APC journals $775, overall $410. Distinguished from technology primarily based on journal titles and specific subject headings.

Mathematics: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	191	201	207	186	147	125
%Free	68%	65%	63%	65%	71%	70%
Articles	8,323	8,978	11,560	9,868	8,104	5,380
%Free	45%	41%	30%	32%	34%	40%

Table 10.28. Journals and articles by year, mathematics

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	3	4%	1%	1,373	30%	16%
$600-$1.399	58	73%	27%	2,315	51%	28%
$200-$599	8	10%	4%	636	14%	8%
$2-$199	10	13%	5%	244	5%	3%
Free	133		63%	3,755		45%

Table 10.29. APC levels, mathematics

Region	Journals	%Free	Articles	%Free
APCLand	63	10%	3,151	5%
Eastern Europe	56	91%	1,602	85%
Middle East	16	88%	1,277	31%
Pacific/English	20	90%	842	96%
Asia	24	75%	682	76%
Western Europe	23	74%	538	54%
Latin America	9	100%	224	100%
Africa	1	0%	7	0%

Table 10.30. Journals by region, mathematics

Average cost per article: APC journals $1,190, overall $653. Includes statistics.

Other Sciences: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	161	161	160	138	120	102
%Free	62%	63%	65%	66%	68%	68%
Articles	68,680	58,073	54,154	46,668	33,877	20,998
%Free	9%	9%	9%	6%	8%	10%

Table 10.31. Journals and articles by year, other sciences

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	11	18%	7%	53,711	86%	78%
$600-$1.399	15	25%	9%	5,019	8%	7%
$200-$599	14	23%	8%	910	1%	1%
$2-$199	21	34%	13%	2,897	5%	4%
Free	107		64%	6,143		9%

Table 10.32. APC levels, other sciences

Region	Journals	%Free	Articles	%Free
APCLand	30	33%	57,576	2%
Asia	40	53%	3,262	25%
Western Europe	21	67%	2,005	69%
Pacific/English	14	57%	1,921	4%
Eastern Europe	20	80%	1,213	73%
Middle East	15	67%	1,049	41%
Latin America	25	100%	868	100%
Africa	3	100%	786	100%

Table 10.33. Journals by region, other sciences

Average cost per article: APC journals $1,763, overall $1,581. Includes megajournals and multidisciplinary journals that appear to be mostly biomed and STEM, a small group of journals publishing conference reports, and some fields that don't appear to fit anywhere else.

Physics: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	116	122	123	108	88	72
%Free	43%	45%	42%	44%	51%	47%
Articles	20,809	19,054	17,710	13,330	11,932	9,920
%Free	68%	68%	72%	71%	76%	78%

Table 10.34. Journals and articles by year, physics

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	15	20%	11%	4,013	61%	19%
$600-$1.399	45	60%	34%	1,827	28%	9%
$200-$599	6	8%	5%	442	7%	2%
$2-$199	9	12%	7%	316	5%	2%
Free	56		43%	14,211		68%

Table 10.35. APC levels, physics

Region	Journals	%Free	Articles	%Free
Western Europe	12	42%	9,775	90%
APCLand	64	19%	8,144	47%
Pacific/English	10	40%	1,107	24%
Eastern Europe	23	91%	862	84%
Asia	13	54%	602	50%
Latin America	4	75%	181	96%
Middle East	4	100%	132	100%
Africa	1	0%	6	0%

Table 10.36. Journals by region, physics

Average cost per article: APC journals $1,490, overall $472. Includes optics.

Technology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	193	198	189	162	140	115
%Free	74%	74%	73%	76%	76%	78%
Articles	17,473	12,626	10,990	9,522	8,126	5,585
%Free	70%	65%	65%	66%	68%	65%

Table 10.37. Journals and articles by year, technology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	14	26%	7%	3,795	71%	22%
$600-$1.399	22	41%	11%	538	10%	3%
$200-$599	8	15%	4%	558	10%	3%
$2-$199	10	19%	5%	435	8%	2%
Free	153		74%	12,147		70%

Table 10.38. APC levels, technology

Region	Journals	%Free	Articles	%Free
Western Europe	33	64%	6,135	95%
APCLand	45	38%	5,037	20%
Eastern Europe	48	90%	2,741	83%
Asia	36	83%	1,493	84%
Latin America	28	100%	1,224	100%
Pacific/English	12	75%	737	62%
Middle East	3	100%	64	100%
Africa	2	100%	42	100%

Table 10.39. Journals by region, technology

Average cost per article: APC journals $1,489, overall $454. Distinguished from engineering (and chemistry and physics) by journal titles and specific subjects: it's a fuzzy distinction.

Zoology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	204	205	198	186	173	157
%Free	51%	52%	53%	54%	56%	58%
Articles	9,929	9,381	9,067	8,516	8,434	7,367
%Free	33%	35%	34%	39%	42%	43%

Table 10.40. Journals and articles by year, zoology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	17	17%	8%	1,179	18%	12%
$600-$1.399	19	19%	9%	863	13%	9%
$200-$599	28	27%	13%	2,348	35%	24%
$2-$199	38	37%	18%	2,285	34%	23%
Free	112		52%	3,254		33%

Table 10.41. APC levels, zoology

Region	Journals	%Free	Articles	%Free
Asia	39	49%	2,536	27%
Latin America	37	70%	2,009	39%
Eastern Europe	42	64%	1,755	34%
APCLand	34	15%	1,569	12%
Western Europe	36	72%	1,013	62%
Middle East	15	47%	608	47%
Pacific/English	6	0%	317	0%
Africa	5	40%	122	52%

Table 10.42. Journals by region, zoology

Average cost per article: APC journals $646, overall $435. Includes veterinary medicine and marine biology.

11. Humanities and Social Sciences

The humanities and social sciences (HSS) have more gold OA journals than other segments (more than 3,800 in all), but they're mostly smaller journals—and very few charge APCs. Total potential revenue is a tiny fraction of the other segments, less than one-seventeenth that of biomed.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	3,471	3,225	87,558	27
Pay	393	383	21,862	57
Total	3,864	3,608	109,420	30
Free%	90%	89%	80%	

Table 11.1. Journals and articles, HSS

APC-charging journals tended to publish twice times as many articles per journal as free journals—but only one out of ten HSS journals charges APCs, and only one of five 2016 articles appeared in those journals.

	2016	2015	2014	2013	2012	2011
Journals	3,608	3,743	3,635	3,360	3,045	2,667
%Free	89%	90%	90%	91%	91%	92%
Articles	109,420	106,505	99,920	90,941	80,952	68,973
%Free	80%	81%	81%	82%	83%	86%

Table 11.2. Journals and articles by year, HSS

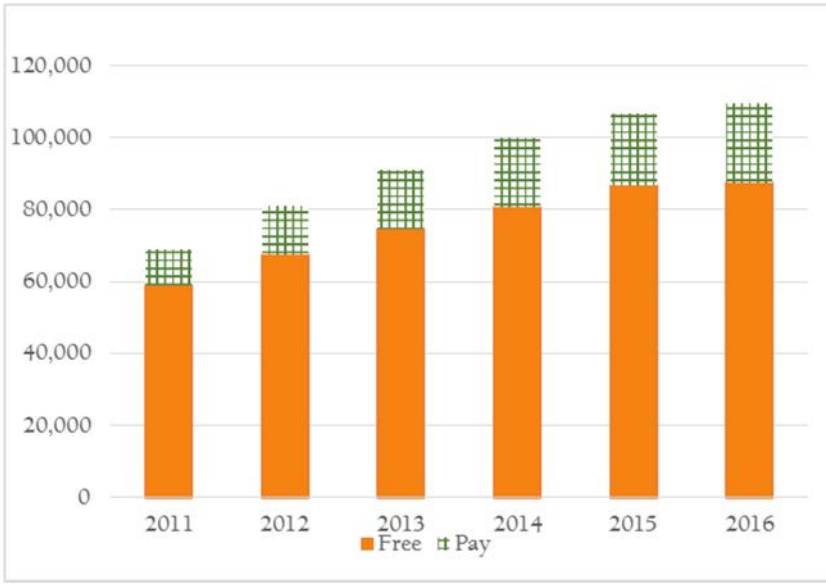

Figure 11.1. Free and pay articles by year, HSS

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	7	57%	7,098	32%
Large: 150-599	71	61%	11,814	50%
Med.: 60-149	401	78%	24,837	77%
Small: 20-59	2,114	91%	54,724	91%
Smallest: 0-19	1,015	92%	10,947	92%

Table 11.3. Article volume, HSS

While the percentage patterns are typical, smallish journals dominate HSS even at the article level.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	24	6%	1%	3,272	15%	3%
$600-$1.399	63	16%	2%	2,190	10%	2%
$200-$599	98	25%	3%	7,143	33%	7%
$2-$199	208	53%	5%	9,257	42%	8%
Free	3,471		90%	87,558		80%

Table 11.4. APC levels, HSS

The bulk of the small percentage of APC-charging HSS journals have low or nominal fees. Average cost per article for articles in fee-charging journals was $573 for 2016—but the average for all HSS articles was $114.

Starting Date

Figure 11.2. Starting dates, HSS

Lots of early free journals (369 before 1999) and a pattern of growth starting in the mid-1990s and continuing until 2012.

Regions

Region	Journals	%Free	Articles	%Free
Latin America	971	99%	27,234	98%
Western Europe	1,141	92%	26,077	89%
Eastern Europe	655	88%	22,905	70%
Pacific/English	426	92%	10,266	86%
Asia	346	78%	8,072	70%
Middle East	169	83%	8,071	63%
APCLand	113	56%	5,384	31%
Africa	43	47%	1,411	24%

Table 11.5. Journals by region, HSS

Table 11.5 is another example of how sharply humanities and social sciences differ from other segments. The largest number of articles come from Latin America, with only 1% APC-charging journals—and Western Europe isn't far behind.

Publisher Category

Category	Journals	%Free	Articles	%Free
Univ/college	2,501	94%	65,118	90%
Miscellaneous	716	90%	23,501	74%
Open Access	280	61%	10,633	33%
Society/govt	260	96%	6,668	95%
Traditional	107	58%	3,500	50%

Table 11.6. Publisher categories, HSS

Universities and colleges dominate HSS OA publishing, with more articles (and *many* more journals) than all other categories combined.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	656	17.0%	
Grew 25-49.9%	380	9.8%	26.8%
Grew 10-24.99%	464	12.0%	38.8%
Even, ±9.99%	945	24.5%	63.3%
Shrank 10-24.99%	391	10.1%	73.4%
Shrank 25-49.99%	487	12.6%	86.0%
Shrank 50%+	541	14.0%	

Table 11.7. Growth and shrinkage, HSS

Subjects

Subject	Journals	%Free	Articles	%Free
Anthropology	259	89%	6,478	84%
Arts & Architecture	213	93%	5,019	88%
Economics	510	82%	15,128	67%
Education	551	88%	15,234	83%
History	277	96%	8,289	90%
Language & Literature	474	95%	11,967	92%
Law	203	93%	5,292	87%
Library Science	111	96%	2,276	96%
Media & Communications	137	93%	3,88	94%
Miscellany	113	83%	6,270	54%
Philosophy	136	96%	3,045	97%
Political Science	217	92%	5,808	87%
Psychology	153	84%	6,282	56%
Religion	135	87%	3,639	75%
Sociology	375	87%	10,809	79%

Table 11.8. Subjects, HSS

Countries in OAWorld (partial)

Country	Jour.	%Free	Art.	%Free
Brazil	536	99%	16,969	98%
Spain	377	97%	8,756	95%
United States	288	91%	7,102	88%
Russian Federation	73	85%	6,484	48%
Turkey	113	89%	6,140	68%
Romania	160	81%	5,051	69%
Indonesia	245	77%	4,855	74%
Italy	162	98%	3,782	97%
Poland	130	97%	3,488	93%
Colombia	144	99%	3,243	99%
United Kingdom	123	68%	3,061	56%
France	123	98%	2,644	99%
Germany	79	94%	2,460	93%
Ukraine	32	66%	2,153	47%
Canada	78	94%	1,836	87%
Mexico	64	97%	1,667	96%
Argentina	86	100%	1,616	100%
Portugal	57	91%	1,414	81%
South Africa	33	33%	1,237	17%
Croatia	50	98%	1,233	95%
Australia	52	90%	1,195	72%
Chile	55	100%	1,124	100%
Iran, Islamic Republic of	40	75%	1,045	68%
India	26	65%	1,004	58%
Netherlands	32	88%	911	89%
Serbia	31	97%	713	92%

Table 11.9. Countries in OAWorld with 700 or more 2016 articles, HSS

Anthropology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	243	253	244	220	198	171
%Free	88%	89%	89%	89%	90%	91%
Articles	6,478	6,772	6,241	5,343	5,131	4,206
%Free	84%	85%	84%	86%	86%	86%

Table 11.10. Journals and articles by year, anthropology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	5	17%	2%	313	30%	5%
$600-$1.399	1	3%	0%	17	2%	0%
$200-$599	10	34%	4%	210	20%	3%
$2-$199	13	45%	5%	505	48%	8%
Free	230		89%	5,433		84%

Table 11.11. APC levels, anthropology

Region	Journals	%Free	Articles	%Free
Eastern Europe	63	92%	1,926	77%
Western Europe	93	89%	1,864	88%
Latin America	57	96%	1,370	95%
Middle East	7	86%	428	79%
Asia	17	76%	330	78%
Pacific/English	13	85%	325	86%
APCLand	8	38%	229	54%
Africa	1	100%	6	100%

Table 11.12. Journals by region, anthropology

Average cost per article: APC journals $814, overall $131. Includes archæology and sports sciences (but not sports medicine).

Arts & Architecture: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	189	202	200	182	167	146
%Free	93%	93%	93%	94%	95%	95%
Articles	5,019	5,077	4,961	4,202	3,594	3,106
%Free	88%	89%	89%	88%	90%	93%

Table 11.13. Journals and articles by year, arts & architecture

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	1	7%	0%	22	4%	0%
$600-$1.399	1	7%	0%	82	14%	2%
$200-$599	6	43%	3%	296	51%	6%
$2-$199	6	43%	3%	185	32%	4%
Free	199		93%	4,434		88%

Table 11.14. APC levels, arts & architecture

Region	Journals	%Free	Articles	%Free
Western Europe	99	95%	1,992	87%
Latin America	40	98%	1,242	98%
Eastern Europe	29	97%	693	88%
Pacific/English	19	95%	387	79%
Middle East	8	88%	284	100%
Asia	13	69%	229	66%
APCLand	5	80%	192	72%

Table 11.15. Journals by region, arts & architecture

Average cost per article: APC journals $432, overall $50. Includes most journals related to the fine arts and some related to architecture and urban planning—but note two other subjects: language & literature and media & communications.

Economics: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	477	495	476	440	392	335
%Free	81%	82%	83%	83%	85%	84%
Articles	15,128	14,472	14,059	13,317	12,386	10,781
%Free	67%	71%	72%	72%	69%	69%

Table 11.16. Journals and articles by year, economics

	Jour.	%APC	%All	Art.	%APC	%All
$600-$1.399	11	12%	2%	437	9%	3%
$200-$599	21	23%	4%	1,697	34%	11%
$2-$199	58	64%	11%	2,878	57%	19%
Free	420		82%	10,116		67%

Table 11.17. APC levels, economics

Region	Journals	%Free	Articles	%Free
Eastern Europe	158	75%	5,692	58%
Latin America	131	99%	2,724	100%
Middle East	31	71%	2,147	32%
Asia	65	85%	2,061	89%
Western Europe	55	84%	958	71%
Pacific/English	33	70%	777	56%
APCLand	31	71%	602	67%
Africa	6	50%	167	32%

Table 11.18. Journals by region, economics

Average cost per article: APC journals $235, overall $78. Includes most business and management topics.

Education: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	527	541	518	477	426	352
%Free	88%	88%	89%	90%	91%	91%
Articles	15,234	14,410	13,107	12,033	10,814	8,366
%Free	83%	83%	83%	85%	85%	90%

Table 11.19. Journals and articles by year, education

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	5	8%	1%	193	7%	1%
$600-$1.399	7	11%	1%	307	12%	2%
$200-$599	15	23%	3%	700	27%	5%
$2-$199	38	58%	7%	1,431	54%	9%
Free	486		88%	12,603		83%

Table 11.20. APC levels, education

Region	Journals	%Free	Articles	%Free
Latin America	127	98%	4,464	95%
Western Europe	134	90%	3,333	82%
Middle East	56	88%	2,167	70%
Asia	85	72%	1,711	61%
Pacific/English	83	94%	1,710	88%
Eastern Europe	49	92%	1,471	94%
APCLand	11	55%	225	57%
Africa	6	50%	153	41%

Table 11.21. Journals by region, education

Average cost per article: APC journals $465, overall $63.

History: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	255	269	262	246	228	206
%Free	96%	96%	96%	96%	96%	96%
Articles	8,289	7,494	7,767	7,070	7,038	6,124
%Free	90%	88%	90%	93%	93%	95%

Table 11.22. Journals and articles by year, history

	Jour.	%APC	%All	Art.	%APC	%All
$600-$1.399	1	9%	0%	22	3%	0%
$200-$599	2	18%	1%	153	18%	2%
$2-$199	8	73%	3%	694	80%	8%
Free	266		96%	7,420		90%

Table 11.23. APC levels, history

Region	Journals	%Free	Articles	%Free
Western Europe	118	98%	3,441	99%
Latin America	71	100%	1,894	100%
Eastern Europe	36	86%	1,375	48%
Pacific/English	36	100%	1,273	100%
Middle East	8	88%	157	66%
Asia	7	57%	149	54%
Africa	1	100%	0	

Table 11.24. Journals by region, history

Average cost per article: APC journals $181, overall $19. Includes most aspects of cultural research focused on the past and a number of local and regional journals.

Language & Literature: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	430	456	447	405	375	335
%Free	94%	95%	95%	95%	95%	96%
Articles	11,967	11,948	10,192	9,564	8,678	7,567
%Free	92%	92%	92%	94%	93%	95%

Table 11.25. Journals and articles by year, language & literature

	Jour.	%APC	%All	Art.	%APC	%All
$600-$1.399	4	15%	1%	43	4%	0%
$200-$599	7	27%	1%	423	43%	4%
$2-$199	15	58%	3%	513	52%	4%
Free	448		95%	10,988		92%

Table 11.26. APC levels, language & literature

Region	Journals	%Free	Articles	%Free
Western Europe	198	99%	3,932	98%
Latin America	84	100%	2,722	100%
Eastern Europe	86	93%	1,965	86%
Pacific/English	55	95%	1,441	83%
Middle East	10	80%	1,172	95%
Asia	31	81%	519	68%
Africa	7	43%	189	34%
APCLand	3	0%	27	0%

Table 11.27. Journals by region, language & literature

Average cost per article: APC journals $235, overall $19. Includes linguistics and a number of other fields as well as author-specific journals.

Law: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	188	197	192	173	152	135
%Free	94%	93%	93%	92%	92%	93%
Articles	5,292	4,893	4,824	4,075	3,305	3,099
%Free	87%	85%	84%	88%	88%	87%

Table 11.28. Journals and articles by year, law

	Jour.	%APC	%All	Art.	%APC	%All
$600-$1.399	2	14%	1%	10	1%	0%
$200-$599	3	21%	1%	54	8%	1%
$2-$199	9	64%	4%	644	91%	12%
Free	189		93%	4,584		87%

Table 11.29. APC levels, law

Region	Journals	%Free	Articles	%Free
Latin America	76	100%	2,060	100%
Western Europe	52	96%	1,218	98%
Eastern Europe	29	93%	911	81%
Asia	20	75%	609	38%
APCLand	7	71%	220	80%
Pacific/English	14	93%	134	100%
Africa	3	67%	93	41%
Middle East	2	50%	47	23%

Table 11.30. Journals by region, law

Average cost per article: APC journals $145, overall $19. Includes forensics and criminology.

Library Science: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	106	108	107	101	95	84
%Free	96%	96%	96%	96%	96%	95%
Articles	2,276	2,269	2,163	1,903	1,942	1,603
%Free	96%	96%	95%	96%	96%	95%

Table 11.31. Journals and articles by year, library science

	Jour.	%APC	%All	Art.	%APC	%All
$200-$599	2	50%	2%	28	34%	1%
$2-$199	2	50%	2%	55	66%	2%
Free	107		96%	2,193		96%

Table 11.32. APC levels, library science

Region	Journals	%Free	Articles	%Free
Western Europe	32	94%	655	96%
Pacific/English	29	100%	564	100%
Latin America	24	100%	505	100%
Eastern Europe	10	100%	182	100%
Asia	7	86%	167	74%
Middle East	7	100%	159	100%
APCLand	1	100%	33	100%
Africa	1	0%	11	0%

Table 11.33. Journals by region, library science

Average cost per article: APC journals $143, overall $5. Includes bibliography, archives, museums and some aspects of information science that don't seem specifically akin to computer science.

Media & Communications: Select tables

	2016	2015	2014	2013	2012	2011
Journals	132	133	127	126	109	99
%Free	93%	93%	93%	94%	94%	94%
Articles	3,884	3,685	3,186	2,955	2,526	2,322
%Free	94%	94%	93%	95%	93%	93%

Table 11.34. Journals and articles by year, media & communications

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	1	11%	1%	30	13%	1%
$600-$1.399	2	22%	1%	55	23%	1%
$2-$199	6	67%	4%	155	65%	4%
Free	128		93%	3,644		94%

Table 11.35. APC levels, media & communications

Region	Journals	%Free	Articles	%Free
Western Europe	53	94%	1,351	91%
Latin America	43	98%	1,272	99%
Pacific/English	19	100%	754	100%
Eastern Europe	11	100%	173	100%
APCLand	3	33%	117	72%
Middle East	2	100%	77	100%
Asia	4	50%	76	54%
Africa	2	50%	64	30%

Table 11.36. Journals by region, media & communications

Average cost per article: APC journals $487, overall $30. Includes film, journalism, communication theory and some related fields.

Miscellany: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	110	111	109	98	89	74
%Free	83%	84%	84%	86%	88%	89%
Articles	6,270	5,917	6,209	5,904	3,769	2,806
%Free	54%	65%	52%	50%	67%	79%

Table 11.37. Journals and articles by year, miscellany

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	1	5%	1%	16	1%	0%
$600-$1.399	3	16%	3%	115	4%	2%
$200-$599	4	21%	4%	2,279	79%	36%
$2-$199	11	58%	10%	484	17%	8%
Free	94		83%	3,376		54%

Table 11.38. APC levels, miscellany

Region	Journals	%Free	Articles	%Free
Eastern Europe	22	68%	3,177	25%
Latin America	39	100%	1,577	100%
Western Europe	24	88%	603	75%
Asia	8	38%	318	24%
Middle East	7	100%	303	100%
APCLand	4	50%	178	34%
Pacific/English	8	75%	114	96%
Africa	1	100%	0	

Table 11.39. Journals by region, miscellany

Average cost per article: APC journals $236, overall $109. Includes multidisciplinary and interdisciplinary journals that appear to have strong HSS components and a few journals that didn't fit anywhere else.

Philosophy: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	125	132	128	115	111	103
%Free	95%	95%	95%	96%	95%	95%
Articles	3,045	2,895	2,706	2,419	2,505	2,232
%Free	97%	97%	97%	97%	98%	97%

Table 11.40. Journals and articles by year, philosophy

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	2	33%	1%	31	33%	1%
$600-$1.399	1	17%	1%	15	16%	0%
$2-$199	3	50%	2%	47	51%	2%
Free	130		96%	2,952		97%

Table 11.41. APC levels, philosophy

Region	Journals	%Free	Articles	%Free
Latin America	42	100%	901	100%
Western Europe	40	95%	882	97%
Eastern Europe	25	96%	716	96%
Pacific/English	18	100%	357	100%
Middle East	4	75%	74	92%
Asia	4	100%	72	100%
APCLand	3	33%	43	28%

Table 11.42. Journals by region, philosophy

Average cost per article: APC journals $878, overall $27. Includes specific philosophies and philosophers—but note that religion is a separate and larger subject.

Political Science: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	204	210	204	190	170	150
%Free	92%	92%	92%	93%	92%	93%
Articles	5,808	6,026	5,751	5,090	4,065	3,437
%Free	87%	85%	85%	87%	87%	89%

Table 11.43. Journals and articles by year, political science

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	2	12%	1%	50	7%	1%
$600-$1.399	3	18%	1%	86	12%	1%
$200-$599	3	18%	1%	27	4%	0%
$2-$199	9	53%	4%	566	78%	10%
Free	200		92%	5,079		87%

Table 11.44. APC levels, political science

Region	Journals	%Free	Articles	%Free
Eastern Europe	56	95%	1,982	88%
Latin America	52	98%	1,298	99%
Western Europe	66	88%	1,279	84%
Asia	12	75%	552	54%
Pacific/English	20	90%	400	94%
APCLand	5	100%	182	100%
Middle East	4	100%	63	100%
Africa	2	100%	52	100%

Table 11.45. Journals by region, political science

Average cost per article: APC journals $298, overall $37. Includes military and defense topics and most of governmental affairs.

Psychology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	147	150	150	143	130	122
%Free	84%	85%	85%	86%	88%	89%
Articles	6,282	6,298	5,720	5,162	4,269	3,733
%Free	56%	59%	63%	69%	77%	80%

Table 11.46. Journals and articles by year, psychology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	4	17%	3%	2,263	81%	36%
$600-$1.399	8	33%	5%	158	6%	3%
$200-$599	8	33%	5%	309	11%	5%
$2-$199	4	17%	3%	56	2%	1%
Free	129		84%	3,496		56%

Table 11.47. APC levels, psychology

Region	Journals	%Free	Articles	%Free
APCLand	13	46%	2,486	6%
Latin America	51	98%	1,505	99%
Western Europe	42	79%	980	71%
Eastern Europe	23	100%	774	100%
Pacific/English	14	57%	265	57%
Asia	7	100%	203	100%
Middle East	2	100%	36	100%
Africa	1	0%	33	0%

Table 11.48. Journals by region, psychology

Average cost per article: APC journals $2,088, overall $926. Includes a few journals that might be psychiatry (and in medicine), and you could make a case for including all of this in either STEM or biomed.

Religion: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	128	125	121	110	102	86
%Free	86%	86%	85%	85%	83%	84%
Articles	3,639	3,597	3,059	2,587	2,339	2,007
%Free	75%	76%	73%	74%	76%	73%

Table 11.49. Journals and articles by year, religion

	Jour.	**%APC**	**%All**	**Art.**	**%APC**	**%All**
$600-$1.399	2	11%	1%	336	37%	9%
$200-$599	8	44%	6%	398	43%	11%
$2-$199	8	44%	6%	185	20%	5%
Free	117		87%	2,720		75%

Table 11.50. APC levels, religion

Region	**Journals**	**%Free**	**Articles**	**%Free**
Western Europe	27	93%	839	97%
Asia	48	85%	752	80%
Latin America	21	95%	655	94%
Africa	7	14%	535	0%
Eastern Europe	11	100%	317	100%
Pacific/English	14	100%	302	100%
APCLand	2	50%	166	9%
Middle East	5	80%	73	73%

Table 11.51. Journals by region, religion

Average cost per article: APC journals $452, overall $114. Includes journals devoted to specific religions, religious leaders, and other subjects where the religious aspect is key; also aspects of religious and non-religious thought (e.g. atheism).

Sociology: Selected tables

	2016	2015	2014	2013	2012	2011
Journals	347	361	350	334	301	269
%Free	87%	89%	89%	90%	90%	91%
Articles	10,809	10,752	9,975	9,317	8,591	7,584
%Free	79%	79%	80%	81%	80%	83%

Table 11.52. Journals and articles by year, sociology

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	3	6%	1%	354	15%	3%
$600-$1.399	17	36%	5%	507	22%	5%
$200-$599	9	19%	2%	569	25%	5%
$2-$199	18	38%	5%	859	38%	8%
Free	328		87%	8,520		79%

Table 11.53. APC levels, sociology

Region	Journals	%Free	Articles	%Free
Latin America	113	100%	3,045	100%
Western Europe	108	85%	2,750	82%
Eastern Europe	47	89%	1,551	90%
Pacific/English	51	92%	1,463	74%
Middle East	16	69%	884	29%
APCLand	17	35%	684	26%
Asia	18	83%	324	81%
Africa	5	40%	108	41%

Table 11.54. Journals by region, sociology

Average cost per article: APC journals $630, overall $113. Includes gender studies, social science and some journals that didn't fit elsewhere.

12. Regions and APCLand

Several earlier chapters have mentioned regions: groupings of countries, usually based on geography. There's good reason to believe that there are regional differences in OA publishing, especially once the dozen publishers in APCLand are removed from the picture.

Region	Journals	%Free	Articles	%Free
APCLand	1,716	17%	204,318	8%
Africa	102	56%	5,338	43%
Asia	1,049	67%	57,141	45%
Eastern Europe	1,386	84%	52,116	70%
Latin America	1,572	94%	57,259	86%
Middle East	552	84%	26,294	70%
Pacific/English	832	67%	38,861	40%
Western Europe	1,783	82%	81,878	73%

Table 12.1. Journals and articles by region

Table 12.1 shows the overall picture, including huge differences in extent of open access and prevalence of fees.

Chapters 13 through 19 focus on each region of OAWorld, using essentially the same format as Chapters 9 through 11, except that there's no region table, there is a segment table, and there are no subject selected-tables in each chapter.

Regions (other than APCLand) are arranged alphabetically.

APCLand

Some discussion, some of the tables and both figures for this imaginary Region of the Money have already appeared. The rest of this chapter provides the remaining tables.

	Journals	Active 2016	Articles	Art/Jrnl
Free	288	283	17,326	61
Pay	1,428	1,288	186,992	145
Total	1,716	1,571	204,318	130
Free%	17%	18%	8%	

Table 12.2. Journals and articles, APCLand

To the extent that there are free journals in APCLand, they have less than half as many articles (on average) as APC-charging ones.

	2016	2015	2014	2013	2012	2011
Journals	1,571	1,607	1,575	1,279	1,025	871
%Free	18%	17%	15%	11%	11%	8%
Articles	204,318	189,005	175,852	134,619	107,693	76,040
%Free	8%	8%	7%	5%	5%	6%

Table 12.3. Journals and articles by year, APCLand

As Table 12.3 shows, APCLand keeps growing every year, with some small growth in non-APC (typically society-sponsored) journals.

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	65	5%	111,455	3%
Large: 150-599	223	9%	48,524	8%
Med.: 60-149	367	16%	24,712	18%
Small: 20-59	688	24%	17,745	30%
Smallest: 0-19	228	17%	1,882	22%

Table 12.4. Article volume, APCLand

Even in APCLand, most journals are small or very small. The scant presence of no-fee journals is mostly in the small range—and the smallest journals are *very* small (an average of eight articles per journal, compared to 26 for small journals).

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	681	48%	40%	156,778	84%	77%
$600-$1.399	595	42%	35%	20,849	11%	10%
$200-$599	142	10%	8%	8,935	5%	4%
$2-$199	10	1%	1%	430	0%	0%
Free	288		17%	17,326		8%

Table 12.5. APC levels, APCLand

The most expensive journals publish three-quarters of all articles and make up nearly half of the fee-charging journals. The average cost per article in APC-charging journals is $1,867; including free journals brings that down to $1,709.

Publisher Category

Category	Journals	%Free	Articles	%Free
Open Access	1,110	5%	123,733	2%
Traditional	577	38%	74,798	20%
Univ/college	29	28%	5,787	6%

Table 12.6. Publisher categories, APCLand

There are no real surprises in Table 12.6.

Segments

	Biomed	STEM	HSS
$1,400+	548	113	10
Articles	75,053	79,043	2,682
Revenue	$169,556,225	$147,026,781	$6,394,285
$600-$1.399	207	235	24
Articles	7,181	13,227	441
Revenue	$6,860,129	$15,008,054	$423,396
$200-$599	72	54	15
Articles	5,015	3,350	570
Revenue	$2,205,448	$1,439,556	$211,180
$2-$199	8	2	0
Articles	368	62	0
Revenue	$40,375	$7,220	$0
Free	101	120	62
Articles	5,902	9,733	1,691

Table 12.7. Articles and revenue by segment, APCLand

Biomed is where the big money is, as Table 12.7 reminds us, even though the two megajournals are both included in STEM. In some ways it's amazing that APCLand can dig more than $7 million out of HSS ($5.3 million of which is one very large psychology journal).

Subjects

Table 12.8 shows APCLand publishing by subject (the country list appears in Chapter 7), sorted by 2016 article count. There's a fair amount of interesting but possibly trivial stuff, such as the subjects where non-APC publishing dominates, all of them in HSS, all very small.

Subject	Journals	%Free	Articles	%Free
Medicine	842	11%	73,031	7%
Other Sciences	30	33%	57,576	2%
Biology	172	7%	20,488	4%
Physics	64	19%	8,144	47%
Chemistry	60	20%	7,160	13%
Agriculture	48	17%	7,019	4%
Engineering	89	24%	5,320	24%
Technology	45	38%	5,037	20%
Ecology	47	23%	3,889	13%
Computer Science	55	11%	3,324	5%
Earth Sciences	54	24%	3,226	16%
Mathematics	63	10%	3,151	5%
Psychology	13	46%	2,486	6%
Zoology	34	15%	1,569	12%
Sociology	17	35%	684	26%
Economics	31	71%	602	67%
Anthropology	8	38%	229	54%
Education	11	55%	225	57%
Law	7	71%	220	80%
Arts & Architecture	5	80%	192	72%
Political Science	5	100%	182	100%
Miscellany	4	50%	178	34%
Religion	2	50%	166	9%
Media & Communications	3	33%	117	72%
Philosophy	3	33%	43	28%
Library Science	1	100%	33	100%
Language & Literature	3	0%	27	0%

Table 12.8. Subjects, APCLand

13. Africa

Africa (excluding the Middle East) has a fairly long history of open access publishing, but it's on a small scale (at least in *DOAJ* as of 1/1/2017), with by far the fewest journals and articles of any region.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	57	53	2,283	43
Pay	45	45	3,055	68
Total	102	98	5,338	54
Free%	56%	54%	43%	

Table 13.1. Journals and articles, Africa

Most journals don't charge APCs, but most articles appear in those that do. The average APC-charging journals published 57% more articles in 2016 than the average free journal.

	2016	2015	2014	2013	2012	2011
Journals	98	99	98	90	85	76
%Free	54%	56%	56%	52%	53%	53%
Articles	5,338	5,226	5,288	3,792	4,214	3,330
%Free	43%	36%	33%	36%	31%	30%

Table 13.2. Journals and articles by year, Africa

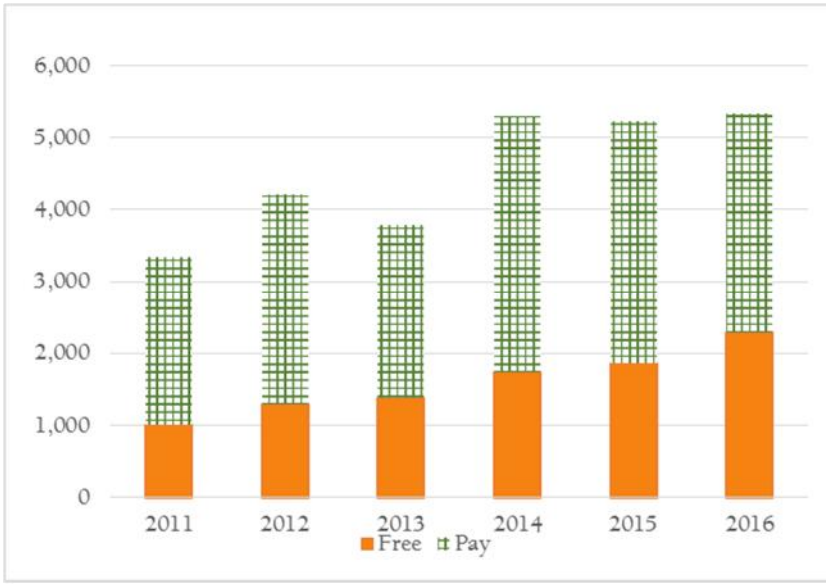

Figure 13.1. Free and pay articles by year, Africa

The percentage of free articles has increased in recent years—an unusual pattern—as free activity continues to rise every year, unlike activity in APC-charging journals, which peaked in 2014.

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	3	33%	1,566	39%
Large: 150-599	4	50%	946	33%
Med.: 60-149	25	36%	1,478	37%
Small: 20-59	46	59%	1,121	58%
Smallest: 0-19	20	70%	227	70%

Table 13.3. Article volume, Africa

Two of the three largest journals charge fees, as do most medium-size journals.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$600-$1.399	11	24%	11%	590	19%	11%
$200-$599	17	38%	17%	955	31%	18%
$2-$199	17	38%	17%	1,510	49%	28%
Free	57		56%	2,283		43%

Table 13.4. APC levels, Africa

There are no high-priced African OA journals, and journals with nominal APCs publish almost as many articles as those with low or medium APCs combined (but free journals publish even more). Average cost per article: APC journals $350, overall $200.

Starting Date

Figure 13.2. Starting dates, Africa

Africa's had journals that are now OA for decades, with more activity this century.

Segments

	Biomed	STEM	HSS
$600-$1.399	4	1	6
Articles	166	16	408
Revenue	$143,235	$13,312	$316,204
$200-$599	2	8	7
Articles	376	212	367
Revenue	$95,950	$90,864	$164,650
$2-$199	3	4	10
Articles	1,021	194	295
Revenue	$176,764	$30,280	$37,880
Free	28	31	39
Articles	2,340	1,587	1,411

Table 13.5. Articles and revenue by segment, Africa

Thanks to the small number of journals, we have the curious situation of *more* potential revenue in HSS than in either biomed or STEM. That's largely due to a trio of South African theology/religion journals.

Publisher Category

Category	Journals	%Free	Articles	%Free
Univ/college	35	57%	1,910	57%
Open Access	38	53%	1,639	46%
Miscellaneous	24	58%	1,571	18%
Society/govt	4	75%	208	77%
Traditional	1	0%	10	0%

Table 13.6. Publisher categories, Africa

Not a lot to say here, other than the very small role of societies and traditional publishers.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	15	14.7%	
Grew 25-49.9%	11	10.8%	25.5%
Grew 10-24.99%	15	14.7%	40.2%
Even, ±9.99%	24	23.5%	63.7%
Shrank 10-24.99%	10	9.8%	73.5%
Shrank 25-49.99%	15	14.7%	88.2%
Shrank 50%+	12	11.8%	

Table 13.7. Growth and shrinkage, Africa

More growth than shrinkage, always a good sign.

Countries

Country	Jour.	%Free	Art.	%Free
South Africa	63	48%	2,376	43%
Uganda	1	0%	864	0%
Algeria	8	100%	793	100%
Nigeria	7	29%	540	12%
Kenya	5	60%	128	19%
Morocco	5	80%	114	63%
Congo, the Democratic Republic of the	1	100%	109	100%
Mauritius	2	50%	107	11%
Ethiopia	3	100%	91	100%
Cameroon	1	0%	88	0%
Libya	2	50%	78	42%
Ghana	1	100%	24	100%
Tunisia	2	100%	15	100%
Madagascar	1	100%	11	100%

Table 13.8. Country of publication, Africa

Subjects

Subject	Journals	%Free	Articles	%Free
Medicine	26	69%	2,297	33%
Other Sciences	3	100%	786	100%
Religion	7	14%	535	0%
Language & Literature	7	43%	189	34%
Economics	6	50%	167	32%
Engineering	3	67%	159	52%
Education	6	50%	153	41%
Agriculture	4	50%	149	30%
Computer Science	6	50%	139	11%
Zoology	5	40%	122	52%
Sociology	5	40%	108	41%
Ecology	4	75%	104	96%
Law	3	67%	93	41%
Chemistry	2	50%	73	42%
Media & Communications	2	50%	64	30%
Political Science	2	100%	52	100%
Biology	2	50%	43	58%
Technology	2	100%	42	100%
Psychology	1	0%	33	0%
Library Science	1	0%	11	0%
Mathematics	1	0%	7	0%
Anthropology	1	100%	6	100%
Physics	1	0%	6	0%
History	1	100%	0	
Miscellany	1	100%	0	

Table 13.9. Subjects, Africa

14. Asia

More than half of Asia's *DOAJ* 2016 articles come from India.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	698	649	25,880	40
Pay	351	338	31,261	92
Total	1,049	987	57,141	58
Free%	67%	66%	45%	

Table 14.1. Journals and articles, Asia

Two-thirds of journals don't charge APCs, but those that do average 2.3 times as many articles as those that don't, so most articles involve APCs.

	2016	2015	2014	2013	2012	2011
Journals	987	1,013	977	896	802	626
%Free	66%	66%	66%	66%	66%	66%
Articles	57,141	55,037	54,893	49,506	42,074	31,569
%Free	45%	45%	45%	46%	46%	48%

Table 14.2. Journals and articles by year, Asia

Free journals grow in article count each year, but journals with APCs have grown more rapidly. Figure 14.1 shows this pattern graphically.

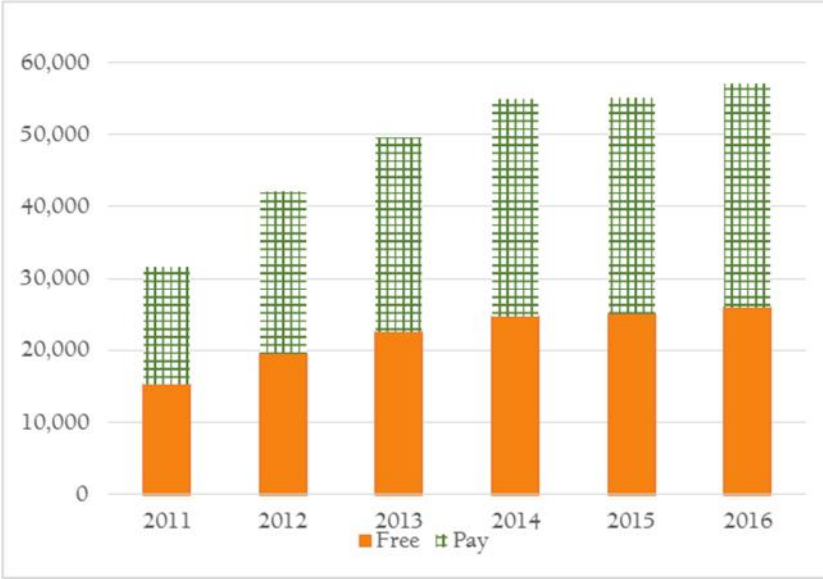

Figure 14.1. Free and pay articles by year, Asia

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	14	0%	10,615	0%
Large: 150-599	94	46%	18,995	45%
Med.: 60-149	205	52%	13,521	54%
Small: 20-59	439	70%	11,216	70%
Smallest: 0-19	235	81%	2,794	81%

Table 14.3. Article volume, Asia

All of the largest journals charge, as do most large ones.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	4	1%	0%	1,250	4%	2%
$600-$1.399	11	3%	1%	737	2%	1%
$200-$599	85	24%	8%	9,934	32%	17%
$2-$199	251	72%	24%	19,340	62%	34%
Free	698		67%	25,880		45%

Table 14.4. APC levels, Asia

It's somewhat unusual for more expensive journals to publish so few articles. The average cost per article in APC-charging journals is a relatively low $248; including all journals, it's $136.

Starting Date

Figure 14.2. Starting dates, Asia

Segments

	Biomed	STEM	HSS
$1,400+	4	0	0
Articles	1,250	0	0
Revenue	$2,204,963	$0	$0
$600-$1.399	3	7	0
Articles	273	464	0
Revenue	$220,461	$425,470	$0
$200-$599	33	42	7
Articles	4,887	4,801	246
Revenue	$1,488,940	$1,631,671	$59,302
$2-$199	60	113	69
Articles	7,057	10,091	2,192
Revenue	$613,907	$937,008	$179,300
Free	196	208	245
Articles	12,072	8,174	5,634

Table 14.5. Articles and revenues by segment, Asia

All the expensive journals are in biomed; most STEM revenue is from relatively inexpensive journals.

Publisher Category

Category	**Journals**	**%Free**	**Articles**	**%Free**
Miscellaneous	247	58%	19,154	31%
Open Access	145	54%	14,677	49%
Univ/college	541	75%	14,547	70%
Society/govt	108	63%	7,191	34%
Traditional	8	25%	1,572	14%

Table 14.6. Publisher categories, Asia

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	159	15.2%	
Grew 25-49.9%	81	7.7%	22.9%
Grew 10-24.99%	104	9.9%	32.8%
Even, ±9.99%	316	30.1%	62.9%
Shrank 10-24.99%	122	11.6%	74.5%
Shrank 25-49.99%	120	11.4%	86.0%
Shrank 50%+	147	14.0%	

Table 14.7. Growth and shrinkage, Asia

More journals shrank than grew.

Countries

India has by far the most articles, mostly in APC-charging journals, while Indonesia has by far the most journals, mostly free. China is a distant third, with an even lower percentages of free articles than India.

Country	Journals	%Free	Articles	%Free
India	282	53%	29,886	36%
Indonesia	473	73%	11,435	67%
China	35	51%	4,130	27%
Pakistan	45	62%	2,798	37%
Hong Kong	31	45%	2,725	41%
Korea, Republic of	33	79%	1,757	73%
Malaysia	44	86%	1,028	81%
Japan	21	52%	899	29%
Bangladesh	17	71%	677	70%
Thailand	16	88%	610	91%
Taiwan, Province of China	18	78%	356	64%
Philippines	11	91%	345	72%
Nepal	10	90%	277	71%
Sri Lanka	7	100%	80	100%
Viet Nam	1	0%	58	0%
Kyrgyzstan	2	100%	29	100%
Brunei Darussalam	1	100%	22	100%
Singapore	1	100%	18	100%
Cambodia	1	100%	11	100%

Table 14.8. Country of publication, Asia

Subjects

Finally, Table 14.9 shows subjects in order by 2016 title count. Somewhat typically, medicine has by far the most journals and articles—but while nearly half of the medical articles are in no-APC journals, at least two-thirds of the articles in the next four largest subjects, all STEM, involve fees.

Subject	Journals	%Free	Articles	%Free
Medicine	276	68%	23,803	48%
Engineering	62	53%	6,727	20%
Computer Science	77	49%	4,471	33%
Other Sciences	40	53%	3,262	25%
Zoology	39	49%	2,536	27%
Economics	65	85%	2,061	89%
Agriculture	48	50%	1,922	39%
Biology	36	53%	1,736	40%
Education	85	72%	1,711	61%
Technology	36	83%	1,493	84%
Religion	48	85%	752	80%
Chemistry	19	63%	708	53%
Mathematics	24	75%	682	76%
Law	20	75%	609	38%
Physics	13	54%	602	50%
Ecology	17	53%	580	32%
Political Science	12	75%	552	54%
Earth Sciences	16	69%	547	76%
Language & Literature	31	81%	519	68%
Anthropology	17	76%	330	78%
Sociology	18	83%	324	81%
Miscellany	8	38%	318	24%
Arts & Architecture	13	69%	229	66%
Psychology	7	100%	203	100%
Library Science	7	86%	167	74%
History	7	57%	149	54%
Media & Communications	4	50%	76	54%
Philosophy	4	100%	72	100%

Table 14.9. Subjects, Asia

15. Eastern Europe

Eastern Europe is roughly in the middle in terms of OA articles published, and 70% of those articles are in free journals. What fees there are, are usually low. Growth seems to have stalled, with declining article totals since 2014.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	1,164	1,081	36,399	34
Pay	222	218	15,717	72
Total	1,386	1,299	52,116	40
Free%	84%	83%	70%	

Table 15.1. Journals and articles, Eastern Europe

APC-charging journals published an average of 2.1 times as many articles per journal as free journals, but there aren't many of them.

	2016	2015	2014	2013	2012	2011
Journals	1,299	1,350	1,304	1,198	1,031	903
%Free	83%	84%	84%	84%	84%	84%
Articles	52,116	53,490	53,636	51,553	45,017	38,427
%Free	70%	72%	70%	70%	71%	72%

Table 15.2. Journals and articles by year, Eastern Europe

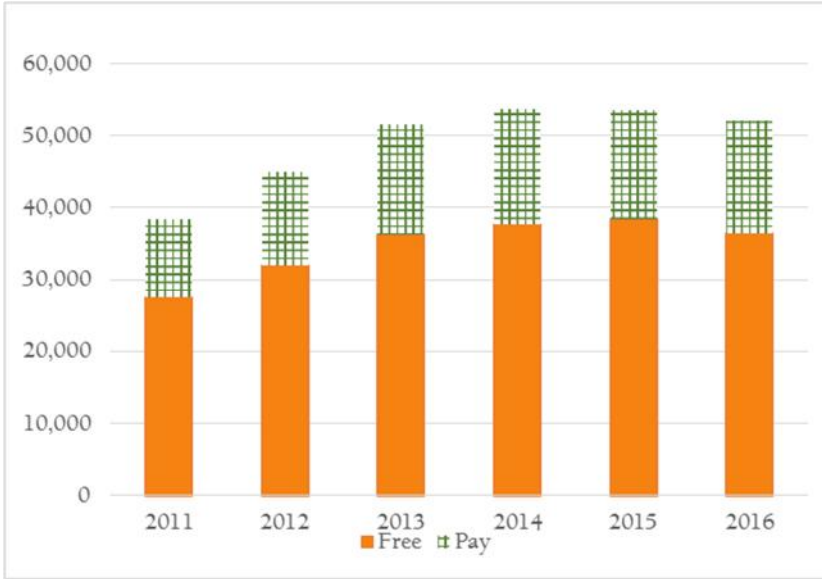

Figure 15.1. Free and pay articles by year, Eastern Europe

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	4	50%	3,626	26%
Large: 150-599	66	52%	9,286	50%
Med.: 60-149	293	69%	18,811	67%
Small: 20-59	694	89%	17,826	89%
Smallest: 0-19	242	92%	2,567	91%

Table 15.3. Article volume, Eastern Europe

There are few very large OA journals in Eastern Europe, with most articles in small and medium-size journals. The usual correlation between journal size and free percentage holds true.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	3	1%	0%	178	1%	0%
$600-$1.399	12	5%	1%	699	4%	1%
$200-$599	63	28%	5%	6,542	42%	13%
$2-$199	144	65%	10%	8,298	53%	16%
Free	1,164		84%	36,399		70%

Table 15.4. APC levels, Eastern Europe

When it comes to APCs, the third and fourth lines of Table 15.4 may say it all: more than half of all APC-based articles involved nominal fees, and almost all the rest involved modest fees. Average cost per article for APC-based journals in 2016 was a low $235, dropping to $71 including all journals.

Starting Date

Figure 15.2. Starting dates, Eastern Europe

Quite a few early journals are now open access, new journal introductions began growing in the late 1990s and, with a blip in 2002-2003, continued growing through 2014—and there never was much growth in APC-charging journals.

Segments

	Biomed	**STEM**	**HSS**
$1,400+	3	0	0
Articles	178	0	0
Revenue	$283,781	$0	$0
$600-$1.399	4	8	0
Articles	270	429	0
Revenue	$188,382	$412,922	$0
$200-$599	24	35	4
Articles	1,458	2,646	2,438
Revenue	$531,163	$1,025,877	$508,761
$2-$199	17	50	73
Articles	917	2,849	4,532
Revenue	$91,943	$274,844	$377,175
Free	146	400	535
Articles	6,134	14,330	15,935

Table 15.5. Articles and revenue by segment, Eastern Europe

Table 15.5 shows how unusual fee-based OA is in Eastern Europe: what little revenue there is, is mostly in low-priced STEM journals, not in biomed—and there are more APC-based articles in HSS than in STEM, with more than twice as many in STEM as in biomed.

Publisher Category

Category	Journals	%Free	Articles	%Free
Univ/college	643	86%	24,250	76%
Miscellaneous	263	83%	12,664	58%
Open Access	344	83%	9,244	75%
Society/govt	108	86%	4,184	78%
Traditional	28	50%	1,774	30%

Table 15.6. Publisher categories, Eastern Europe

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	186	13.4%	
Grew 25-49.9%	128	9.2%	22.7%
Grew 10-24.99%	169	12.2%	34.8%
Even, ±9.99%	346	25.0%	59.8%
Shrank 10-24.99%	187	13.5%	73.3%
Shrank 25-49.99%	190	13.7%	87.0%
Shrank 50%+	180	13.0%	

Table 15.7. Growth and shrinkage, Eastern Europe

Table 15.7 shows significantly more shrinkage than growth.

Countries

Table 15.8, arranged in descending order by 2016 articles, provides some interesting items—for example, Poland's status as publishing more open access than any of the others, mostly free. Also mildly interesting: the mostly-pay status of OA in Bulgaria, Macedonia and—with very few journals—Albania and Kosova.

Country	Jour.	%Free	Art.	%Free
Poland	380	84%	12,317	71%
Russian Federation	145	90%	9,972	64%
Romania	273	82%	8,415	71%
Ukraine	80	75%	5,701	71%
Croatia	86	94%	2,706	93%
Serbia	73	92%	2,677	72%
Czech Republic	82	76%	2,132	65%
Bulgaria	36	58%	1,867	32%
Slovenia	44	93%	1,243	81%
Slovakia	40	90%	957	89%
Hungary	26	96%	812	90%
Lithuania	35	86%	748	78%
Moldova, Republic of	15	67%	531	61%
Macedonia, the Former Yugoslav Republic of	10	60%	307	28%
Latvia	9	78%	304	59%
Bosnia and Herzegovina	13	69%	300	60%
Belarus	5	100%	267	100%
Estonia	16	100%	259	100%
Albania	3	33%	193	15%
Montenegro	3	100%	130	100%
Cyprus	4	100%	67	100%
Georgia	1	100%	66	100%
Azerbaijan	2	100%	49	100%
Armenia	2	100%	42	100%
Kosova	2	0%	39	0%
Kazakhstan	1	100%	15	100%

Table 15.8. Country of publication, Eastern Europe

Subjects

Subject	Journals	%Free	Articles	%Free
Medicine	157	75%	7,281	67%
Economics	158	75%	5,692	58%
Agriculture	82	70%	3,465	55%
Engineering	75	83%	3,264	73%
Miscellany	22	68%	3,177	25%
Technology	48	90%	2,741	83%
Political Science	56	95%	1,982	88%
Language & Literature	86	93%	1,965	86%
Anthropology	63	92%	1,926	77%
Zoology	42	64%	1,755	34%
Biology	45	78%	1,676	75%
Mathematics	56	91%	1,602	85%
Sociology	47	89%	1,551	90%
Education	49	92%	1,471	94%
Computer Science	51	86%	1,423	86%
Earth Sciences	64	94%	1,395	92%
History	36	86%	1,375	48%
Chemistry	29	79%	1,308	75%
Ecology	39	77%	1,226	57%
Other Sciences	20	80%	1,213	73%
Law	29	93%	911	81%
Physics	23	91%	862	84%
Psychology	23	100%	774	100%
Philosophy	25	96%	716	96%
Arts & Architecture	29	97%	693	88%
Religion	11	100%	317	100%
Library Science	10	100%	182	100%
Media & Communications	11	100%	173	100%

Table 15.9. Subjects, Eastern Europe

16. Latin America

Latin America, including the Caribbean, has the highest percentage of free OA publishing of any region. It's also a prolific region, with the second highest number of journals and 2016 articles. It's a region where one country stands out: Brazil, with two-thirds of all articles.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	1,476	1,397	49,161	35
Pay	96	96	8,098	84
Total	1,572	1,493	57,259	38
Free%	94%	94%	86%	

Table 16.1. Journals and articles, Latin America

While the average APC-charging journal publishes 2.4 times as many articles as the average free journal, there are so few journals with APCs that it doesn't make much difference.

	2016	2015	2014	2013	2012	2011
Journals	1,493	1,545	1,524	1,475	1,386	1,304
%Free	94%	94%	94%	94%	94%	93%
Articles	57,259	57,320	54,840	51,586	50,061	46,652
%Free	86%	85%	84%	84%	83%	82%

Table 16.2. Journals and articles by year, Latin America

Article volume has been strong for some time and growing slowly, but fee-based publishing has slipped since a 2014 peak.

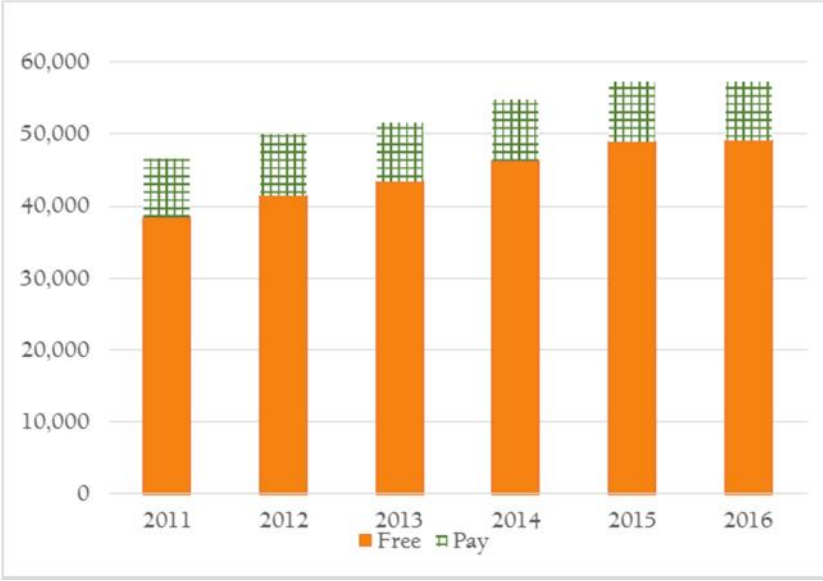

Figure 16.1. Free and pay articles by year, Latin America

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	1	0%	240	0%
Large: 150-599	61	66%	9,598	63%
Med.: 60-149	284	82%	19,605	81%
Small: 20-59	901	98%	24,965	98%
Smallest: 0-19	246	96%	2,851	97%

Table 16.3. Article volume, Latin America

There are no *currently* very large OA journals in Latin America (the single journal in the first row was very large in 2012, but not since). The biggest group is small journals, nearly all free.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	2	2%	0%	210	3%	0%
$600-$1.399	15	16%	1%	1,623	20%	3%
$200-$599	30	31%	2%	2,753	34%	5%
$2-$199	49	51%	3%	3,512	43%	6%
Free	1,476		94%	49,161		86%

Table 16.4. APC levels, Latin America

So few expensive journals that they and their articles round off to 0%; the few fee journals are mostly inexpensive. The average cost per article in APC-charging journals is $351—but the overall average is just $50.

Starting Date

Figure 16.2. Starting dates, Latin America

As Figure 16.2 shows, OA has deep roots in Latin America, with 71 now-OA journals by 1990 and generally increasing growth through 2010—and never many fee-charging startups.

Segments

	Biomed	STEM	HSS
$1,400+	2	0	0
Articles	210	0	0
Revenue	$294,000	$0	$0
$600-$1.399	9	6	0
Articles	969	654	0
Revenue	$776,047	$580,665	$0
$200-$599	9	15	6
Articles	1,218	1,272	263
Revenue	$384,961	$415,881	$64,960
$2-$199	12	32	5
Articles	1,051	2,288	173
Revenue	$85,632	$226,663	$13,714
Free	203	286	908
Articles	11,761	10,602	26,798

Table 16.6. Articles and revenue by segment, Latin America

Table 16.6 is interesting for what isn't there: *any* expensive STEM journals or any million-dollar revenue cells.

Publisher Category

Category	Journals	%Free	Articles	%Free
Univ/college	1,275	95%	42,111	88%
Society/govt	165	87%	9,760	80%
Miscellaneous	124	90%	4,981	81%
Open Access	5	100%	266	100%
Traditional	3	100%	141	100%

Table 16.6. Publisher categories, Latin America

Mostly universities and colleges: that's the picture in Table 16.6, with society publications a distant second.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	207	13.2%	
Grew 25-49.9%	152	9.7%	22.8%
Grew 10-24.99%	219	13.9%	36.8%
Even, ±9.99%	466	29.6%	66.4%
Shrank 10-24.99%	170	10.8%	77.2%
Shrank 25-49.99%	182	11.6%	88.8%
Shrank 50%+	176	11.2%	

Table 16.7. Growth and shrinkage, Latin America

Relatively strong stability marks this region, with nearly 30% of journals roughly even and more growing journals than shrinking ones.

Subjects and Countries

The next two pages show journals and articles by subject and by country of publication.

Subject	Journals	%Free	Articles	%Free
Medicine	215	90%	13,103	82%
Agriculture	90	67%	5,241	53%
Education	127	98%	4,464	95%
Sociology	113	100%	3,045	100%
Economics	131	99%	2,724	100%
Language & Literature	84	100%	2,722	100%
Biology	28	64%	2,106	47%
Law	76	100%	2,060	100%
Zoology	37	70%	2,009	39%
History	71	100%	1,894	100%
Earth Sciences	59	93%	1,820	92%
Miscellany	39	100%	1,577	100%
Psychology	51	98%	1,505	99%
Anthropology	57	96%	1,370	95%
Political Science	52	98%	1,298	99%
Media & Communications	43	98%	1,272	99%
Arts & Architecture	40	98%	1,242	98%
Technology	28	100%	1,224	100%
Ecology	42	90%	1,205	77%
Engineering	37	95%	1,186	95%
Philosophy	42	100%	901	100%
Other Sciences	25	100%	868	100%
Religion	21	95%	655	94%
Library Science	24	100%	505	100%
Computer Science	18	100%	494	100%
Chemistry	9	89%	364	95%
Mathematics	9	100%	224	100%
Physics	4	75%	181	96%

Table 16.9. Subjects, Latin America

Country	Jour.	%Free	Art.	%Free
Brazil	879	92%	39,600	82%
Colombia	220	99%	5,377	99%
Mexico	97	92%	2,623	91%
Argentina	126	94%	2,485	92%
Chile	80	94%	2,119	81%
Cuba	29	100%	1,398	100%
Costa Rica	38	100%	1,086	100%
Peru	30	100%	742	100%
Venezuela, Bolivarian Republic of	21	90%	739	97%
Ecuador	21	100%	544	100%
Uruguay	11	100%	208	100%
Paraguay	4	100%	117	100%
Nicaragua	4	100%	57	100%
Bolivia, Plurinational State of	3	100%	55	100%
El Salvador	1	100%	35	100%
Barbados	1	100%	30	100%
Guatemala	3	100%	12	100%
British Virgin Islands	1	100%	11	100%
Bahamas	1	100%	9	100%
Jamaica	1	0%	7	0%
Guam	1	100%	5	100%

Table 16.9. Country of publication, Latin America

Admittedly, a few of these countries (island nations) are Anglophone or Francophone, but there are too few journals to justify separate coverage.

17. Middle East

This region is second smallest in terms of both OA journals and articles. Most OA is free, similarly to Eastern Europe but not as much so as in Latin America. Two countries with similar 2016 article counts dominate OA in this region: Iran and the slightly less prolific Turkey.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	461	441	18,283	41
Pay	91	88	8,011	91
Total	552	529	26,294	50
Free%	84%	83%	70%	

Table 17.1. Journals and articles, Middle East

Pay journals average 2.2 times as many articles as free journals.

	2016	2015	2014	2013	2012	2011
Journals	529	540	516	455	387	303
%Free	83%	83%	83%	82%	80%	79%
Articles	26,294	24,054	21,917	18,226	15,584	11,047
%Free	70%	75%	74%	73%	71%	71%

Table 17.2. Journals and articles by year, Middle East

Both free and pay article count has grown each year.

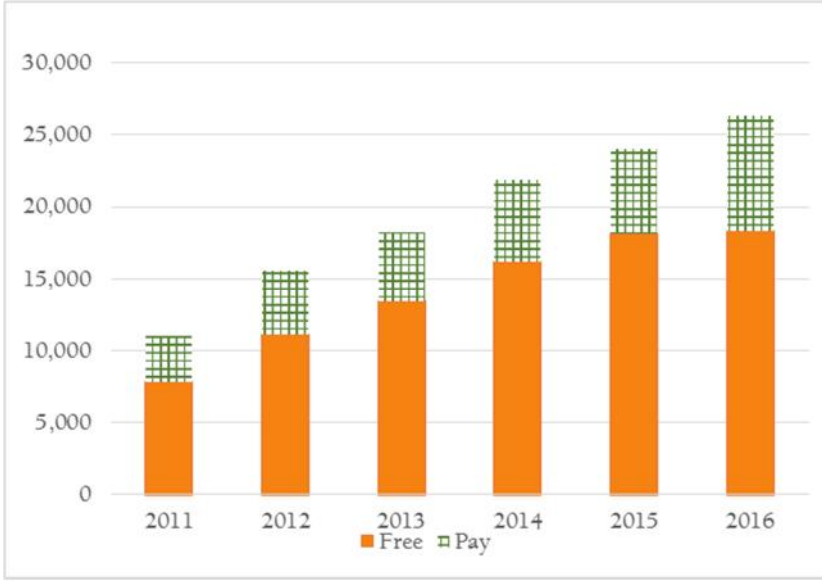

Figure 17.1. Free and pay articles by year, Middle East

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	2	100%	927	100%
Large: 150-599	31	45%	7,553	31%
Med.: 60-149	112	78%	7,587	79%
Small: 20-59	311	88%	9,427	88%
Smallest: 0-19	73	86%	800	88%

Table 17.3. Article volume, Middle East

The two largest journals are both free, and only among large journals are APCs in the majority.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	2	2%	0%	116	1%	0%
$600-$1.399	8	9%	1%	1,040	13%	4%
$200-$599	23	25%	4%	3,107	39%	12%
$2-$199	58	64%	11%	3,748	47%	14%
Free	461		84%	18,283		70%

Table 17.4. APC levels, Middle East

The Middle East is another region where, if there are fees at all, they're likely to be on the low side. Average cost per article in pay journals is $321; overall it's $98.

Starting Date

Figure 17.2. Starting dates, Middle East

A bit of early activity (eleven journals total through 1994), then growth from 1995 through 2002 and from 2005 through 2014—with most growth in pay journals from 2007 through 2014.

Segments

	Biomed	**STEM**	**HSS**
$1,400+	1	0	1
Articles	28	0	88
Revenue	$55,860	$0	$140,800
$600-$1.399	5	3	0
Articles	383	657	0
Revenue	$350,943	$739,790	$0
$200-$599	9	2	10
Articles	1,164	446	1,497
Revenue	$308,100	$201,868	$465,646
$2-$199	11	29	17
Articles	711	1,627	1,410
Revenue	$97,295	$138,087	$75,801
Free	215	94	132
Articles	9,570	3,637	5,076

Table 17.5. Articles and revenue by segment. Middle East

Publisher Category

Category	Journals	%Free	Articles	%Free
Univ/college	341	87%	15,002	75%
Miscellaneous	124	86%	6,623	70%
Open Access	45	53%	2,878	37%
Society/govt	26	96%	1,117	100%
Traditional	16	63%	674	35%

Table 17.6. Publisher categories, Middle East

The Middle East is another region where universities and colleges dominate OA publishing.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	92	16.7%	
Grew 25-49.9%	62	11.2%	27.9%
Grew 10-24.99%	53	9.6%	37.5%
Even, ±9.99%	158	28.6%	66.1%
Shrank 10-24.99%	82	14.9%	81.0%
Shrank 25-49.99%	56	10.1%	91.1%
Shrank 50%+	49	8.9%	

Table 17.7. Growth and shrinkage, Middle East

Slightly more growth than shrinkage.

Subjects

Table 17.8 (next page) shows articles and journals by subject. As in some other regions, medicine dominates.

Subject	Journals	%Free	Articles	%Free
Medicine	231	90%	11,237	81%
Education	56	88%	2,167	70%
Economics	31	71%	2,147	32%
Agriculture	24	42%	1,329	45%
Mathematics	16	88%	1,277	31%
Language & Literature	10	80%	1,172	95%
Other Sciences	15	67%	1,049	41%
Engineering	21	95%	909	95%
Sociology	16	69%	884	29%
Biology	21	76%	619	83%
Zoology	15	47%	608	47%
Anthropology	7	86%	428	79%
Chemistry	9	100%	351	100%
Miscellany	7	100%	303	100%
Arts & Architecture	8	88%	284	100%
Ecology	8	88%	222	94%
Earth Sciences	8	75%	219	84%
Computer Science	8	75%	207	60%
Library Science	7	100%	159	100%
History	8	88%	157	66%
Physics	4	100%	132	100%
Media & Communications	2	100%	77	100%
Philosophy	4	75%	74	92%
Religion	5	80%	73	73%
Technology	3	100%	64	100%
Political Science	4	100%	63	100%
Law	2	50%	47	23%
Psychology	2	100%	36	100%

Table 17.8. Subjects, Middle East

Countries

Country	Journals	%Free	Articles	%Free
Iran, Islamic Republic of	281	82%	12,150	70%
Turkey	221	90%	11,451	77%
Iraq	15	60%	1,008	28%
Jordan	2	50%	593	6%
Qatar	6	67%	261	82%
United Arab Emirates	6	17%	222	0%
Oman	2	100%	157	100%
Saudi Arabia	2	50%	156	79%
Egypt	7	71%	141	71%
Israel	5	80%	71	100%
Iran	1	100%	39	100%
Yemen	2	50%	26	69%
Lebanon	1	100%	19	100%
Palestine, State of	1	100%	0	

Table 17.9. Country of publication, Middle East

Iran has slightly more journals and articles than Turkey. Oddities include the low percentages of free articles in Jordan and the United Arab Emirates.

18. Pacific/English

This "region" is composed of Australia, Canada (with apologies to Québec), New Zealand and the United States. The United States is the largest OA factor, which is hardly surprising.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	557	515	15,640	30
Pay	275	266	23,221	87
Total	832	781	38,861	50
Free%	67%	66%	40%	

Table 18.1. Journals and articles, Pacific/English

The average APC-charging journal has nearly three times as many articles as the average free journal.

	2016	2015	2014	2013	2012	2011
Journals	781	806	783	726	645	586
%Free	66%	67%	66%	67%	69%	69%
Articles	38,861	32,432	27,789	24,278	21,011	18,529
%Free	40%	47%	51%	52%	56%	58%

Table 18.2. Journals and articles by year, Pacific/English

While the percentage of free journals has held fairly steady in recent years, the percentage of free *articles* has steadily declined. As you can

see in Figure 18.1, that's not because free articles have declined (they've grown every year) but because pay articles have grown faster.

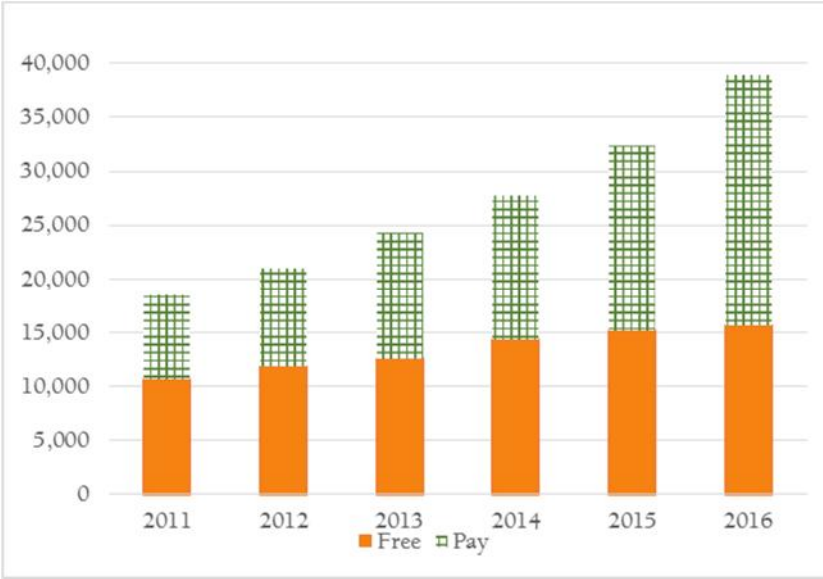

Figure 18.1. Free and pay articles by year

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	10	20%	11,200	6%
Large: 150-599	53	38%	10,667	36%
Med.: 60-149	91	46%	5,630	49%
Small: 20-59	356	73%	8,962	72%
Smallest: 0-19	271	71%	2,402	77%

Table 18.3. Article volume, Pacific/English

As usual, smaller journals are more likely to be free.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	99	36%	12%	11,424	49%	29%
$600-$1.399	80	29%	10%	6,214	27%	16%
$200-$599	68	25%	8%	3,846	17%	10%
$2-$199	28	10%	3%	1,737	7%	4%
Free	557		67%	15,640		40%

Table 18.4. APC levels, Pacific/English

There are quite a few expensive journals in Pacific/English countries—and very few nominal-price journals with very few articles. Average cost per article in APC-charging journals is $1,375, coming down to $821 for all articles. In both cases that's the highest of any region.

Starting Date

Figure 18.2. Starting dates, Pacific/English

The twin-peaked curve for APC-charging journals, with an early highest peak in 2007-2007, is unusual.

Segments

	Biomed	STEM	HSS
$1,400+	74	20	4
Articles	8,835	2,412	177
Revenue	$17,214,205	$5,971,973	$300,700
$600-$1.399	44	26	7
Articles	2,676	3,272	266
Revenue	$2,736,064	$3,802,613	$199,946
$200-$599	29	26	11
Articles	1,424	1,697	725
Revenue	$570,147	$594,703	$235,757
$2-$199	7	7	11
Articles	73	1,391	273
Revenue	$9,440	$252,889	$32,197
Free	79	78	358
Articles	3,537	3,278	8,825

Table 18.5. Articles and revenue by segment, Pacific/English

Perhaps worth repeating: only journals publishing 2016 articles appear in this table, while some other tables include all journals.

Publisher Category

Category	Journals	%Free	Articles	%Free
Open Access	144	15%	10,390	8%
Society/govt	126	74%	9,448	32%
Miscellaneous	203	78%	8,999	52%
Univ/college	303	93%	8,463	83%
Traditional	56	4%	1,561	4%

Table 18.6. Publisher categories, Pacific/English

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	188	22.6%	
Grew 25-49.9%	81	9.7%	32.3%
Grew 10-24.99%	93	11.2%	43.5%
Even, ±9.99%	144	17.3%	60.8%
Shrank 10-24.99%	80	9.6%	70.4%
Shrank 25-49.99%	107	12.9%	83.3%
Shrank 50%+	139	16.7%	

Table 18.7 Growth and shrinkage, Pacific/English

A lower percentage of stable journals than in some regions, and *slightly* more growth than shrinkage.

Countries

Country	Journals	%Free	Articles	%Free
United States	556	68%	30,410	37%
Canada	137	75%	4,892	53%
Australia	77	84%	2,738	56%
New Zealand	62	18%	821	19%

Table 18.8. Country of publication, Pacific/English

It's somewhat interesting that New Zealand has the lowest percentage of free journals and articles while Australia has the highest.

Subjects

Table 18.9 shows journal and article publishing by subject, and while medicine is first (as usual), the distant second this time is computer science.

Subject	Journals	%Free	Articles	%Free
Medicine	205	34%	14,628	22%
Computer Science	24	54%	3,090	21%
Other Sciences	14	57%	1,921	4%
Biology	38	34%	1,917	16%
Education	83	94%	1,710	88%
Sociology	51	92%	1,463	74%
Language & Literature	55	95%	1,441	83%
Engineering	16	38%	1,344	9%
History	36	100%	1,273	100%
Physics	10	40%	1,107	24%
Ecology	29	41%	1,079	46%
Chemistry	5	40%	937	19%
Mathematics	20	90%	842	96%
Economics	33	70%	777	56%
Media & Communications	19	100%	754	100%
Technology	12	75%	737	62%
Library Science	29	100%	564	100%
Agriculture	16	31%	488	28%
Political Science	20	90%	400	94%
Arts & Architecture	19	95%	387	79%
Philosophy	18	100%	357	100%
Anthropology	13	85%	325	86%
Zoology	6	0%	317	0%
Religion	14	100%	302	100%
Psychology	14	57%	265	57%
Earth Sciences	11	64%	188	45%
Law	14	93%	134	100%
Miscellany	8	75%	114	96%

Table 18.9 Subjects, Pacific/English

19. Western Europe

Western Europe has the most open access journals of any OAWorld region and by far the most 2016 articles—and it's second only to Latin America for free percentage of articles.

Journals and Articles

	Journals	Active 2016	Articles	Art/Jrnl
Free	1,456	1,351	59,836	44
Pay	327	322	22,042	68
Total	1,783	1,673	81,878	49
Free%	82%	81%	73%	

Table 19.1. Journals and articles, Western Europe

Table 19.1 shows Western Europe as one of only two regions where the average APC-charging journal does *not* publish more than twice as many articles as the average free journal: the ratio is only 1.5:1.

	2016	2015	2014	2013	2012	2011
Journals	1,673	1,721	1,659	1,526	1,412	1,250
%Free	81%	82%	83%	83%	84%	85%
Articles	81,878	69,947	67,771	61,496	56,451	48,140
%Free	73%	73%	71%	69%	71%	72%

Table 19.2. Journals and articles by year, Western Europe

Total OA volume boomed in 2016 after slow growth in 2015.

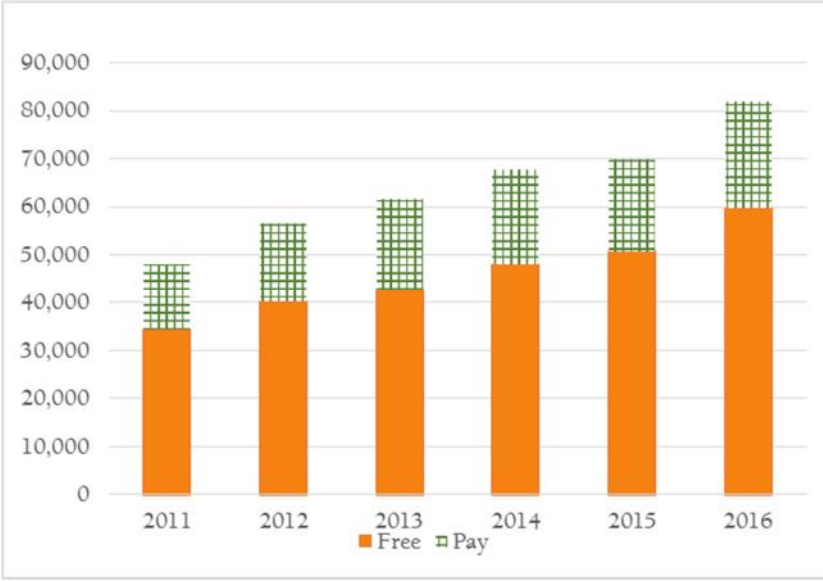

Figure 19.1. Free and pay articles by year, Western Europe

As shown in Figure 19.1, free articles grow consistently faster than pay—which actually declined slightly in 2015.

Article Volume

	Journals	%Free	Articles	%Free
Largest: 600+	16	69%	26,579	84%
Large: 150-599	62	50%	13,388	42%
Med.: 60-149	240	61%	15,129	60%
Small: 20-59	853	84%	21,813	84%
Smallest: 0-19	502	88%	4,969	90%

Table 19.3. Article volume, Western Europe

Table 19.3 breaks from usual patterns: the largest journals are mostly free, with the next largest group the only one with mostly pay articles.

APC Levels

	Jour.	%APC	%All	Art.	%APC	%All
$1,400+	52	16%	3%	5,815	26%	7%
$600-$1.399	122	37%	7%	7,664	35%	9%
$200-$599	102	31%	6%	4,509	20%	6%
$2-$199	51	16%	3%	4,054	18%	5%
Free	1,456		82%	59,836		73%

Table 19.4. APC levels, Western Europe

Western Europe is second only to Pacific/English for expensive OA journals and the more expensive journals publish more articles than the cheaper ones. Average cost per article within APC-charging journals is $946; across all journals it's $255.

Starting Date

Figure 19.2. Starting dates, Western Europe

Figure 19.2 shows some early OA journals with steadily increasing growth through 2012.

Segments

	Biomed	**STEM**	**HSS**
$1,400+	31	12	9
Articles	3,114	2,376	325
Revenue	$6,156,694	$4,599,313	$724,809
$600-$1.399	45	51	25
Articles	2,080	4,509	1,075
Revenue	$1,871,233	$4,208,107	$1,242,353
$200-$599	30	37	34
Articles	1,367	2,105	1,037
Revenue	$598,667	$720,531	$309,574
$2-$199	7	23	18
Articles	220	3,452	382
Revenue	$25,962	$357,057	$38,142
Free	140	242	969
Articles	7,448	29,130	23,258

Table 19.5. Articles and revenue by segment, Western Europe

The biggest clump of paid articles and the most potential revenue are both in expensive biomedical journals.

Publisher Category

Category	Journals	%Free	Articles	%Free
Miscellaneous	456	84%	28,730	85%
Univ/college	795	96%	20,457	84%
Traditional	108	31%	12,838	63%
Open Access	231	46%	12,058	45%
Society/govt	193	89%	7,795	62%

Table 19.6. Publisher categories, Western Europe

While universities and colleges publish more journals, independent journals and publishers account for more articles—and multijournal open access publishers charge for most journals and articles.

Growth and Shrinkage

Change 2015-16	Count	Percent	Cum%
Grew 50%+	347	19.5%	
Grew 25-49.9%	206	11.6%	31.0%
Grew 10-24.99%	194	10.9%	41.9%
Even, ±9.99%	396	22.2%	64.1%
Shrank 10-24.99%	179	10.0%	74.1%
Shrank 25-49.99%	214	12.0%	86.1%
Shrank 50%+	247	13.9%	

Table 19.7. Growth and shrinkage, Western Europe

More journals grew than shrank.

Countries

Country	Journals	%Free	Articles	%Free
United Kingdom	238	53%	25,163	63%
Germany	182	74%	13,091	57%
Spain	484	96%	12,157	93%
France	167	92%	10,807	97%
Italy	273	83%	7,526	79%
Sweden	65	54%	2,136	35%
Netherlands	42	81%	2,085	91%
Switzerland	34	44%	1,995	25%
Portugal	75	89%	1,980	81%
Austria	45	87%	1,362	68%
Norway	51	88%	756	82%
Greece	27	85%	738	83%
Belgium	30	97%	642	94%
Finland	24	79%	564	64%
Iceland	5	100%	360	100%
Denmark	25	96%	313	93%
Ireland	13	92%	173	100%
Luxembourg	2	100%	21	100%
Malta	1	100%	9	100%

Table 19.8. Country of Publication, Western Europe

The UK has the most articles, Spain the most journals—and Sweden and Switzerland are the only countries where most articles are in pay journals.

Subjects

Medicine tops the list as usual, with physics second. Here, most medicine articles don't involve charges—but most chemistry and computer science articles do.

Subject	Journals	%Free	Articles	%Free
Medicine	237	59%	11,101	53%
Physics	12	42%	9,775	90%
Technology	33	64%	6,135	95%
Ecology	47	70%	6,023	53%
Engineering	27	44%	5,302	79%
Earth Sciences	87	71%	4,096	63%
Language & Literature	198	99%	3,932	98%
History	118	98%	3,441	99%
Education	134	90%	3,333	82%
Biology	31	42%	3,128	50%
Sociology	108	85%	2,750	82%
Chemistry	11	36%	2,475	19%
Agriculture	42	69%	2,206	56%
Other Sciences	21	67%	2,005	69%
Computer Science	35	77%	2,004	25%
Arts & Architecture	99	95%	1,992	87%
Anthropology	93	89%	1,864	88%
Media & Communications	53	94%	1,351	91%
Political Science	66	88%	1,279	84%
Law	52	96%	1,218	98%
Zoology	36	72%	1,013	62%
Psychology	42	79%	980	71%
Economics	55	84%	958	71%
Philosophy	40	95%	882	97%
Religion	27	93%	839	97%
Library Science	32	94%	655	96%
Miscellany	24	88%	603	75%
Mathematics	23	74%	538	54%

Table 19.9. Subjects, Western Europe

20. Volatility and Predictability

The *tl;dr* version of this chapter: it's probably pointless to attempt to predict the future size of all OA journals based on the past. The improvement over a general "probably around 60% of journals will grow or at least not shrink by more than 10%" is at best marginal using any method I tried. Details follow, but feel free to skip them.

In Chapter 20 of *Gold Open Access Journals 2011-2015*, I discussed some attempts to develop an algorithm or measure for viability—that is, whether it was feasible to predict the future health of a gold OA journal based on its present and recent past. I would characterize the results as marginally useful at best, pointless at worst.

Between then and now, I tried several approaches to summarizing a journal's past as a basis for predicting its future. None was much more successful than tossing a coin.

One approach seemed at least hypothetically plausible: looking at past volatility as a predictor of future volatility. That is: if a journal's change from year to year in the past—whether growing or shrinking—is within a certain range, is it reasonable to predict that it will *stay* within that range? (Note that while 10% volatility is low, growing or shrinking 10% in each of several years begins to add up.)

Defining the Universe for Phase 1

Very small journals are inherently volatile: if you go from six articles in one year to eight in the next, that's a 33% change. So I deleted journals with fewer than 10 articles in 2015 or in 2014—and journals *beginning* in 2015 or 2016. That yielded 6,656 journals with 487,440 articles in 2016: 74% of the journals with 93% of the articles.

Measuring Volatility for Phase 1

The measure of volatility was simple: the absolute percentage increment from one year to the next. Expressed as an Excel formula where A16 is the article count for 2016 and A15 is the article count for 2015, the formula is "=ABS((A16-A15)/A15)." Because I wanted to consider average volatility over several years, I limited the range to 60% or less—that is, "=MIN(ABS((A16-A15)/A15),0.6)." Thus, the result (assuming A15 isn't zero) is always somewhere between 0 and 0.6—between no change and an increase or decrease of 60%. (You can take care of cases where A15 *is* zero either by adding to the formula or by sorting the results and changing the Divide-by-Zero error message to 0.6.) If you're wondering, there are about two dozen journals that publish *exactly* the same number of articles each year—mostly 20 but as high as 48—and more than 120 that stayed within a 5% range, at least through 2015.

Phase 1 Results

Did journals with less than 20% average annual volatility from 2011 through 2015 stay within a 15% or 25% range from 2015 to 2016?

I tried four cases—averaging all five years, eliminating 2011, eliminating 2012, and only looking at 2014-2015. Not surprisingly, the fewer the years, the larger the sample: including all five years eliminated 75% of the journals (making it essentially worthless as a test), while looking at 2014-2015 alone included 43%.

Without limiting the 6,656-journal universe by volatility in earlier years, 40% of the journals changed by less than 15% from 2015 to 2016 and another 16% changed by 16% to 25%. So that's the baseline: 40% and 16%.

For journals averaging 20% volatility or less over up to five years, the comparable results were 52% and 17%—but you'd only be able to predict low volatility for 13% of the journals.

Looking only at 2014-2015 yields 48% and 17%—but you can now predict low volatility for 20% of the journals.

The more I looked at these results, the less impressed I was: having a *slightly* higher level of confidence for one-fifth of the journals hardly seems worthwhile!

Just for fun, I tried one other test on this reduced universe: looking at journals that were "roughly even or better" (that is, didn't shrink more

than 10%) from 2014 to 2015 and seeing whether they did as well from 2015 to 2016. The results are even more dispiriting: 62.73% of journals that didn't shrink significantly in 2015 didn't shrink significantly in 2016—as compared to 62.6% of *all* journals that didn't shrink significantly in 2016. If that's not a null result, it's pretty close

Phase 2: Dropping Smallest and Largest Journals

It seemed reasonable to assume that even very small journals with more than 10 articles per year would be more volatile than most—and that might well be true for the largest journals as well. Additionally, it's clear and not surprising that many journals are much different in their founding years than in later years.

So I eliminated journals with peak article volume either less than 20 or more than 1999 and journals beginning after 2013 (because I wanted to ignore the first year). I blanked out article counts for a journal's first year, for those journals starting in 2011-2013.

That left 5,886 journals and 331,682 articles.

Testing with up to 20% average volatility over more than two years was interesting in that anywhere from 43% to 44% of those journals *did* show more than 20% volatility from 2015 to 2016: the history didn't yield much more than a coin flip in terms of predictability.

Limiting the results to "OK" for 2014-2015 (that is, no more than 10% shrinkage) yielded 63.9% "OK" for 2015-2016—but not adding the limit yielded 64.8%! (Yes, that's more than the overall 62.6%, but not enough to be meaningful.)

There are some other test results, but they all boil down to the same thing: attempting to use past volatility or growth to predict future volatility is generally not a worthwhile pursuit.

Appendix A. Methods, Changes and Caveats

The Investigation

This research begins with the master dataset prepared for *Gold Open Access Journals 2011-2015* and the downloaded *DOAJ* metadata as of 1:30 a.m., January 1, 2017 (as timestamped in the filename).

The 2015 dataset includes 10,944 journals, including those dropped from *DOAJ* in the May 19, 2016 delisting. The 2016 dataset (the *DOAJ* download) includes 9,451 journals.

Matching proceeded as follows:

- For 6,810 journals, the URL and journal title in the 2015 and 2016 files were exact matches (according to Excel's Vlookup and equality tests).
- For 235 journals, the URL in both datasets was an exact match, and manual inspection said that these were the same journals but with changes in titles (e.g., adding or removing an initial article or subtitle, spelling out an acronym or substituting an acronym, punctuation changes). That adds up to 7,045 unambiguous matches.
- For 427 journals, the URLs were different, the journal titles were identical, and the publishers were either identical or represented normal changes (e.g., deGruyter Open taking over society journals). That adds up to 7,472 matches.
- Manual comparison of titles yielded 81 more journals that changed both URLs and titles (the latter usually in small ways). That adds up to 7,553 total matches.

- While I have no doubt that there are a few more matches (e.g., cases where the URL changed and an initial article was deleted or added), it was not plausible to track them down.
- Thus, the dataset for 2016 begins with 9,451 journals, of which 1,898 were not *apparently* in the 2011-2015 study, and 3,391 journals from the 2011-2015 study not in the new study.
- During the course of testing, 85 duplicates appeared—primarily cases where the same journal (with the same or an equivalent URL) appears with the title in two different languages or with other minor changes. That leaves 9,366 journals.
- As discussed in Chapter 3, some 334 journals were excluded for various reasons ("X" codes) and 40 apparently had APCs but did not state the amount ("C" code). That leaves 8,992 journals that published at least one article between 2011 and 2016, were accessible during the testing period (January 2, 2017-April 26. 2017). All "X" journals were tested twice; all "XM" journals were checked three times.

Changes from *Gold Open Access Journals 2011-2015*

Because there are now two megajournals with more than 20,000 articles in 2016, I have *not* omitted any A-B journals from discussions and tables. Subjects and segments are unchanged (and some journals may have different subjects, but there's been no overall effort here).

The meaning of B codes is now simply "some characteristic worth noting." B-coded journals are fully integrated throughout—except for the discussion in Chapter 1.

Changes in B Codes

Two codes have been added:

- **B5: No articles since 2015**. All of these were rechecked in late April 2017. I'm sure that rechecking later in 2017 would yield 2016 articles for some of these.
- **BX: Accessible via Title Search**. For each inaccessible journal—that is, codes XX and XM—I attempted to locate the journal using

a title phrase browser search. In 121 cases, I was able to access the journal through a different route. Note that the datasheet has blank URLs for these journals, since they are either affected by malware or unavailable via the URL in *DOAJ*.

Caveats

The same caveats apply as in *Gold Open Access Journals 2011-2015*. Briefly, article counts are (generally) inclusive of reviews, short reports and (sometimes) editorials, especially when counting shortcuts were available; I used every counting shortcut I could find; and there are *very* few estimates this time around (I have six journals marked as approximate counts). I'm certain that manual counts are off by one or two in some cases.

Index

Index to tables and figures