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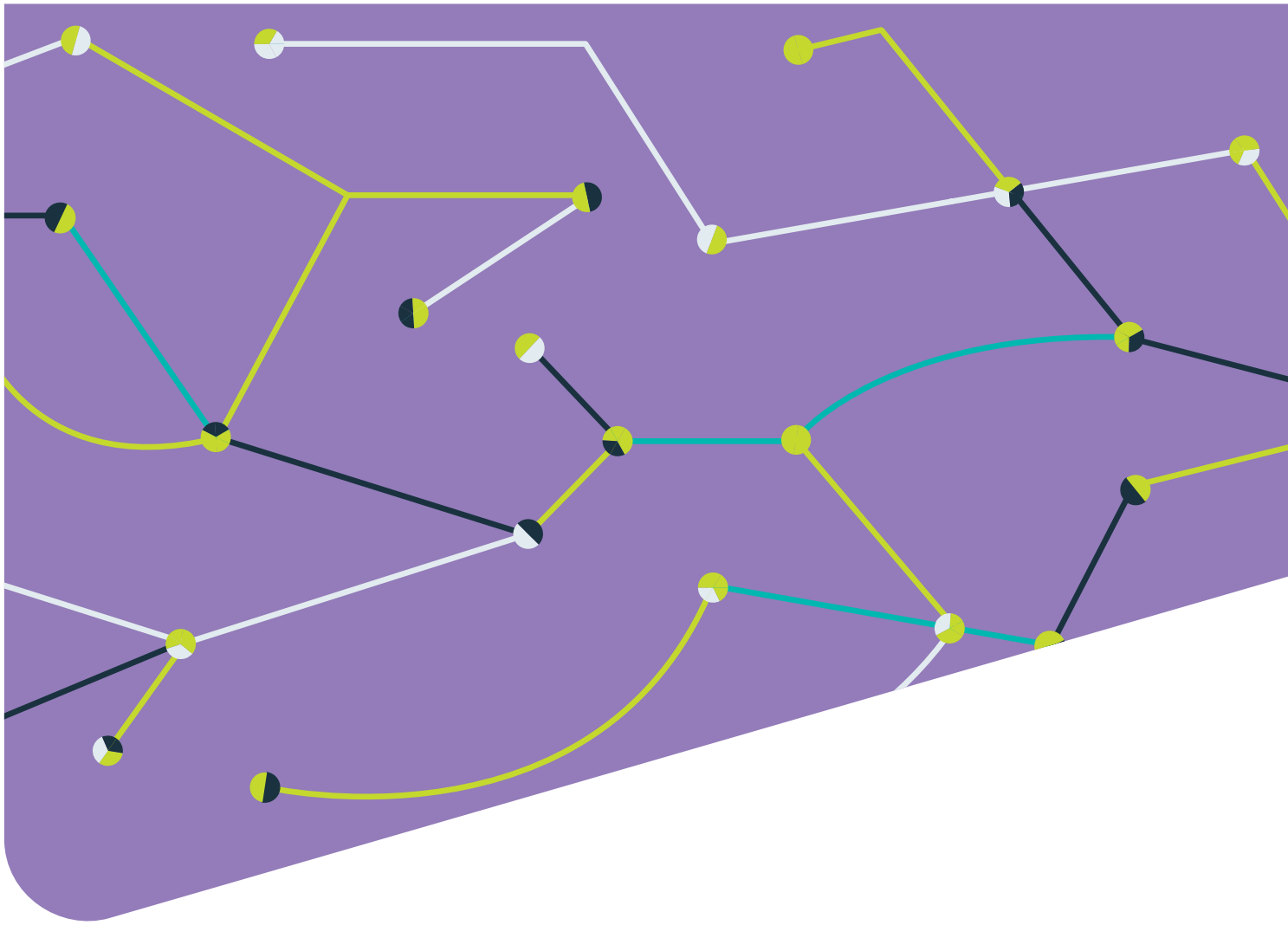

Open Research

ADVANCING DISCOVERY

DIVERSIFYING READERSHIP THROUGH OPEN ACCESS: A USAGE ANALYSIS FOR OA BOOKS

White paper

Contents

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Foreword - Springer Nature

At Springer Nature, we are committed to open access (OA), and this includes scholarly books. We have been publishing OA books for almost a decade, and we recently celebrated the publication of our 1000th OA book.

Alongside growing our programme, we have made it our mission to better understand how OA benefits scholarly books. We are in an unusually good position to do so: we make our books OA immediately on publication, under a CC BY licence by preference, but in all other respects our OA books are treated almost identically to our non-OA books. They are commissioned by the same editors, undergo the same review process and must meet the same standards for acceptance. Both OA and non-OA books are promoted and distributed using the same methods, and are available via a similar set of third-party platforms. This means that we have a strong dataset to support exploration of what effect OA has on books.

In this report, we collaborated with COARD to follow up on our 2017 work, *The OA Effect*, which explored the effects of OA on the downloads and citation of scholarly books. We also expanded our investigation to explore how OA affects the geographical diversity of readers, and in particular how it changes readership in low-income and lower-middle-income countries – something which we know from our 2019 report *The Future of OA Books* is of particular importance for authors. The COARD analysis demonstrates clear benefits for OA books for all of these measures; we hope these findings will help encourage greater support for OA books among authors, institutions, funders, and all those involved in scholarly communications.

Ros Pyne, Director, Open Access Books and Book Policies, Springer Nature

Foreword - COARD

COARD (Collaborative Open Access Research & Development), from its original form as the community interest company that initiated Knowledge Unlatched, has always been concerned with how the scholarly knowledge in books can reach new audiences.

A constant challenge with understanding how that works is scale. Drawing strong, statistically founded conclusions requires data with consistency at scale, which is hard to obtain. The large set of OA books published through Springer Nature and its various imprints offered us an exciting opportunity to provide more robust answers to those questions than ever before. We intuitively expect that OA books will reach new audiences, but understanding how and where in detail is important. Seeing the geographical diversity of uptake in this data is an exciting validation of the value that OA can bring to scholarly content, and to books in particular.

Cameron Neylon, Director, COARD

Executive summary

In 2019, Springer Nature made usage data relating to 3,934 books, including 281 OA books, available to COARD. This white paper presents the analysis of that data, exploring what effect, if any, publishing OA has on the geographic usage of books. In particular, it examines whether OA facilitates the take-up of books by countries that are traditionally underrepresented in the production and use of scholarly content. It also provides analysis on the potential benefits from OA publication, looking at usage and related indicators for a sample of books, stratified by both book type and discipline.

A range of analysis techniques are employed (see Methodology), and the data associated with the books in the study make it possible to identify the countries and regions from which usage on SpringerLink, Springer Nature's publishing platform, originates; as well as whether usage occurs via an institutional network access point (logged usage) or via the open web (anonymous).

The report focuses on four key questions:

1. Are patterns of geographic usage different for OA books compared with non-OA books?
2. Is there evidence of wider usage particularly from low-income and lower-middle-income countries?
3. Is there robust evidence that OA books outperform non-OA books on various proxy measures of usage?
4. Does such performance vary depending on the type of book (e.g. monograph, Brief/Pivot, contributed volume) or its disciplinary area?

The key findings are:

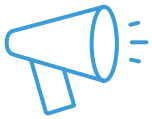
1. OA books show a higher diversity of geographical usage, reaching more countries and having a greater proportion of usage in a wider range of countries.
2. Importantly, OA books are increasing access and usage for low-income or lower-middle-income countries, including a high number of countries in Africa.
3. Books that contain the names of countries and regions in their title generally show enhanced usage in that country or region. The effect is most apparent for Latin America and Africa.
4. Downloads of OA books from the open web ('anonymous downloads') are generally around double those from institutional network points ('logged downloads').
5. On average, OA books have 10 times more downloads than non-OA books and 2.4 times more citations.
6. For every category of book in the sample there is an increase of at least 2.7-fold in downloads for OA books. For every type of book, every discipline, and each of the three years of publication in the sample, OA books show more downloads than non-OA comparison groups. This holds for every month after publication.

Conclusions and recommendations

- These findings demonstrate that immediate OA increases and diversifies the readership of scholarly books; they provide a powerful argument for increasing policy and financial support for OA books.
- Further work is needed to explore the effects of OA on books across a wider range of publishers and to take into account downloads from third-party platforms and aggregators. The work of the Exploring Open Access eBook Usage (OAeBU) project to develop a pilot data trust will be an important first step.[1]

1. *Developing a Pilot Data Trust for Open Access Ebook Usage*. (n.d.). Educopia. Retrieved June 29, 2020 from https://educopia.org/data_trust/

Introduction



Open access, as it was first envisaged, was intended to 'accelerate research, enrich education, share the learning of the rich with the poor and the poor with the rich, [and] make this literature as useful as it can be'.[2] Two decades on, it seems appropriate to consider whether OA is fulfilling its promise of expanding and diversifying readership. OA for scholarly books has developed relatively slowly, and understanding more about the benefits may help to increase support for OA books amongst authors, publishers, institutions and funders.

The number of OA books published is growing year on year, and at the time of writing the Directory of Open Access Books (DOAB) has indexed more than 29,000 titles.[3] Each year more publishers have rolled out OA book options. The last few years have also seen a wave of new university presses and scholar-led presses launched that focus on OA books, and institutions have further supported OA books by making funds available to monograph authors.[4] Importantly, funders are now engaging more with OA for books, following the examples of a small number of funders, including the Wellcome Trust, the European Research Council (ERC), the Austrian Science Fund (FWF), and the Swiss National Science Foundation (SNSF), which have had OA books policies and funding in place for several years. 2020 has seen important developments: UK Research and Innovation (UKRI) is consulting on introducing an OA mandate for monographs, and the Dutch Research Council (NWO) released a new funding programme for OA books and committed to including monographs in their National Plan for Open Science.[5] However, despite these developments, as of mid-2020 only a small proportion of scholarly books are published OA.[6]

In 2019, in *The Future of OA Books: Findings from a global survey of academic book authors*, we reported on findings from the first survey to focus specifically on the views of book authors about OA.[7] We found that authors were positive about OA books: more than half of those surveyed (including those who had not published an OA book themselves) believed all scholarly books should be available OA. Authors' top motivations for publishing a book (reaching a large audience, increasing interdisciplinary discussion of their work, reaching students and practitioners) were all related to reaching a large and diverse readership and expanding awareness of their work; for OA book authors, reaching readers in low-income and lower-middle-income countries (LICs and LMICs) was also a high priority. As OA has the potential to increase visibility, dissemination, and ultimately readership, it appears that it should help book authors achieve their publishing aims, and thus should be an attractive option. Indeed, the top reason cited by authors for choosing OA for their books was that they believed OA publications were read more widely.[8]

One of our conclusions in *The Future of OA Books* was that in order to accelerate take-up of OA for books, more needed to be done to increase awareness and understanding of OA, and to reduce scepticism, particularly amongst senior researchers and within North America, where attitudes are, on average, less positive towards OA.[9] This work is multi-faceted, but we know that authors and funders want more information about the impact of OA on books.[10] Springer Nature commissioning editors also report that being able to demonstrate the benefits of OA to book authors, in terms of increased usage and citations, can be powerful in changing attitudes and helping to make the case for OA.

2. Chan, L. *et al.* (2002). *Budapest Open Access Initiative*. Retrieved June 25, 2020 from https://www.budapestopenaccessinitiative.org/read
3. *Directory of Open Access Books*. (n.d). Retrieved July 13, 2020 from https://doabooks.org/doab?func=about#metadata
4. Adema, J., & Stone, G. (2017). *Changing Publishing Ecologies: A landscape study of new university presses and academic-led publishing*. Jisc. Retrieved July 13, 2020 from http://repository.jisc.ac.uk/6666/1/Changing-publishing-ecologies-report.pdf; *Funding for OA Books*. (n.d.). Springer Nature. Retrieved July 13, 2020 from https://www.springernature.com/gp/open-research/funding/books
5. *UKRI Open Access Review*. (n.d.). UKRI. Retrieved July 13, 2020 from https://www.ukri.org/funding/information-for-award-holders/open-access/open-access-review/; *NWO Open Access Books Call*. (2020). NWO. Retrieved July 13, 2020 from https://www.nwo.nl/en/news-and-events/news/2020/06/open-access-books-call-make-your-book-openly-accessible.html
6. Grimme, S. *et al.* (2019). *The State of Open Monographs*. Digital Science. pp. 6-7. Retrieved June 25, 2020 from https://doi.org/10.6084/m9.figshare.8197625.v4. Watkinson estimates 86,000 scholarly monographs published worldwide in 2013; by comparison, at time of writing DOAB lists 3,345 monographs with a copyright year of 2018.
7. Pyne, R. *et al.* (2019). *The Future of OA Books: Findings from a global survey of academic book authors* [White paper]. Springer Nature. https://doi.org/10.6084/m9.figshare.8166599.v1
8. Pyne, R. *et al.* (2019), pp. 7-10, 13, 30
9. Pyne, R. *et al.* (2019), p. 7
10. Emery, C. *et al.* (2017). *The OA Effect: How does open access affect the usage of scholarly books?* [White paper]. Springer Nature. pp. 13, 19. https://doi.org/10.6084/m9.figshare.5559280.v1

In this white paper, which is a collaboration between Springer Nature and COARD, we turn our attention to the geographic reach of OA books. In particular, we are interested in understanding where OA books are being used, and the extent to which patterns of usage between OA and non-OA books differ between countries and regions. Does OA help books to achieve not only a larger readership, but a readership that is distributed across more countries and regions? Does OA increase readership in LICs and LMICs? And do OA books that focus on a particular region reach more readers in that region?

The work of Snjider (2013) showed increased usage for OA books as well as some evidence of an increase in sales.[11] Using a sample of 180 books Snijder showed that despite a 'digital divide' in discovery and use between poorer and richer countries, OA led to increased proportions of usage in LICs and LMICs. Previous COARD research in association with four US- and UK-based university presses further showed that institutions located in LICs and LMICs appeared to be relatively high users of OA books which were made available via the JSTOR platform, compared to institutions located in the US, UK, and Western Europe.[12] However, this study did not benchmark against equivalent non-OA books by the same publishers. This white paper, which is based on a much larger dataset of both OA and non-OA titles than previous studies, can, therefore, provide more robust evidence for the benefits of OA on widening access and readership to scholarly books, including in LICs and LMICs.

We also return to the question of how OA affects downloads, citations, and web visibility of scholarly books. When we previously looked at this in 2017 (in our white paper *The OA Effect: How does open access affect the usage of scholarly books?*) we found strong evidence for an OA advantage: Springer Nature OA books on average achieved seven times more downloads and 50% more citations.[13] Returning to these questions with a larger number of books available has allowed us to apply a more stratified sampling approach and to have a larger sample size, enabling us to investigate these effects in much greater detail than has been possible before.

11. Snijder, R. (2013). Do developing countries profit from free books?: Discovery and online usage in developed and developing countries compared. *Journal of Electronic Publishing*, 16(1). https://doi.org/10.3998/3336451.0016.103
12. Montgomery, L. *et al*. (2017). *Exploring Usage of OA Books on the JSTOR Platform*. p. 31. Retrieved June 26, 2020 from http://kuresearch.org/PDF/jstor_report.pdf. COARD previously operated under the name KU Research.
13. Emery, C. *et al*. (2017), p. 4

Methodology and data overview

Usage data relating to 3,934 books, including 281 OA books, was analysed

Springer Nature provided COARD with data relating to a set of 281 English-language OA titles published under its various imprints in 2015, 2016, and 2017. The titles were divided into three book types (monographs, contributed volumes, and Briefs); as well as five discipline clusters (Humanities; Social Sciences; Business and Economics; Medical, Biomedical and Life Sciences; and Physical Sciences, Engineering, Mathematics and Computer Science). The metadata relating to an additional 21,059 non-OA Springer Nature titles was also made available for the purposes of the study. Of the 21,059 non-OA books, a comparison set of 3,653 non-OA books was selected for closer analysis. For a more detailed explanation of the selection of the non-OA titles sample see Appendix 1.

Download data was provided from the date of publication to September 2019 for both OA and non-OA titles included in the study; the period of usage data available for each book therefore ranges from 4 years and 9 months (for books published at the start of 2015) to 1 year and 10 months (for books published at the end of 2017). The data is COUNTER-compliant and one download refers to one chapter download; full-book downloads are counted as one download for each chapter in the book. The data included information about whether access was 'logged' (originating from the IP address range of an institution that has purchased or subscribed to at least one Springer Nature product); or whether it was anonymous (originating from an IP address range not associated with a subscribing university). More information on logged usage data can be found in Appendix 2.

Springer Nature also provided data on page and chapter counts and the number of citations for each book (the latter was exported from Digital Science's Altmetric Explorer).

The webometric visibility of the books included in the study was investigated as an additional proxy for use of the books. Webometric visibility provides an indication of the extent to which digital resources are being referred to, discussed, and used via the World Wide Web.

Analysis of the webometric visibility was conducted using the Webometric Analyst 2.0 tool developed by Thelwall *et al*. In this approach, the search term (author plus full title) is used to search the whole web (using the Bing API) and the web pages that are returned (i.e. those that contain both the book title and author surname) are then analysed.[14] The number of web pages found is used as an indicator of web visibility, and it is possible to extract unique domain names and top-level domains to analyse the country of origin for each of the URLs mentioning a title.

In Part 1, we look at the comparative usage of OA and non-OA books, looking at downloads, citations and webometrics. In Part 2, we explore usage patterns for both OA and non-OA books, looking at downloads and webometrics by country. Finally, we present a case study of one OA title to show usage patterns and further analysis.

14. Thelwall, M. (2009). *Introduction to Webometrics: Quantitative Web Research for the Social Sciences*. San Rafael, CA: Morgan & Claypool. https://doi.org/10.1080/19331681.2012.728386

Results

OA books have 10 times more downloads than non-OA books and 2.4 times more citations on average

Part 1: OA vs non-OA usage

OA books show more usage

Across all subjects and categories of books and for all publication years in the dataset, OA books show more downloads, higher levels of citation, and higher online visibility than non-OA books. OA books have 10 times more downloads than non-OA books and 2.4 times more citations on average (Figures 1, 2).

The increase in downloads is clear across the whole period after publication for which data was available. For every month in which there is comparable data for both OA and non-OA books, OA books show higher levels of downloads. There is an increase of at least 2.7 fold in downloads for OA books for every category of book in the sample. Citation is a useful proxy of academic usage and provides evidence of deeper engagement with the books than downloads, while webometric visibility provides insight into how OA books are being used on the web: as texts that are linked to and referenced on websites. There is a modest effect on the number of domains (web pages) that refer to the book's title and author but this is not large enough to be confident that it is statistically significant. The presence of higher levels of usage across all three of these proxies (downloads, citations, and online visibility) suggests that OA books are not just being downloaded more often than their non-OA counterparts but that they are also being read and used more often. This strengthens the case for a usage effect that is related to OA status specifically.

Figure 1: Average downloads, citations and number of domains for OA and non-OA books

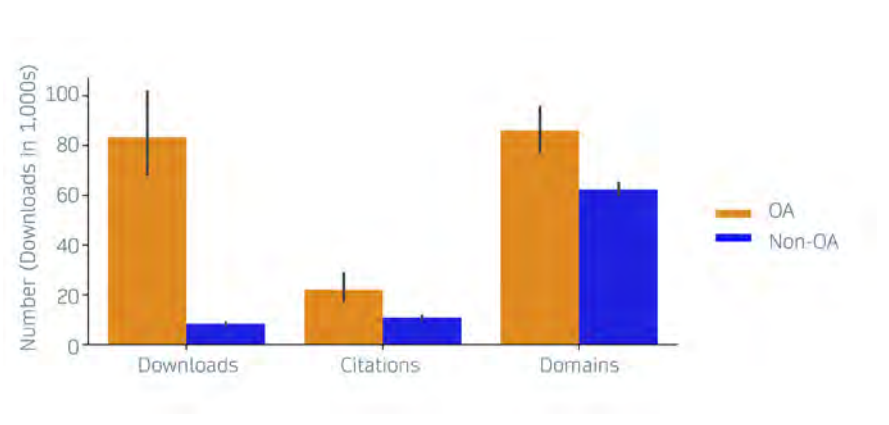
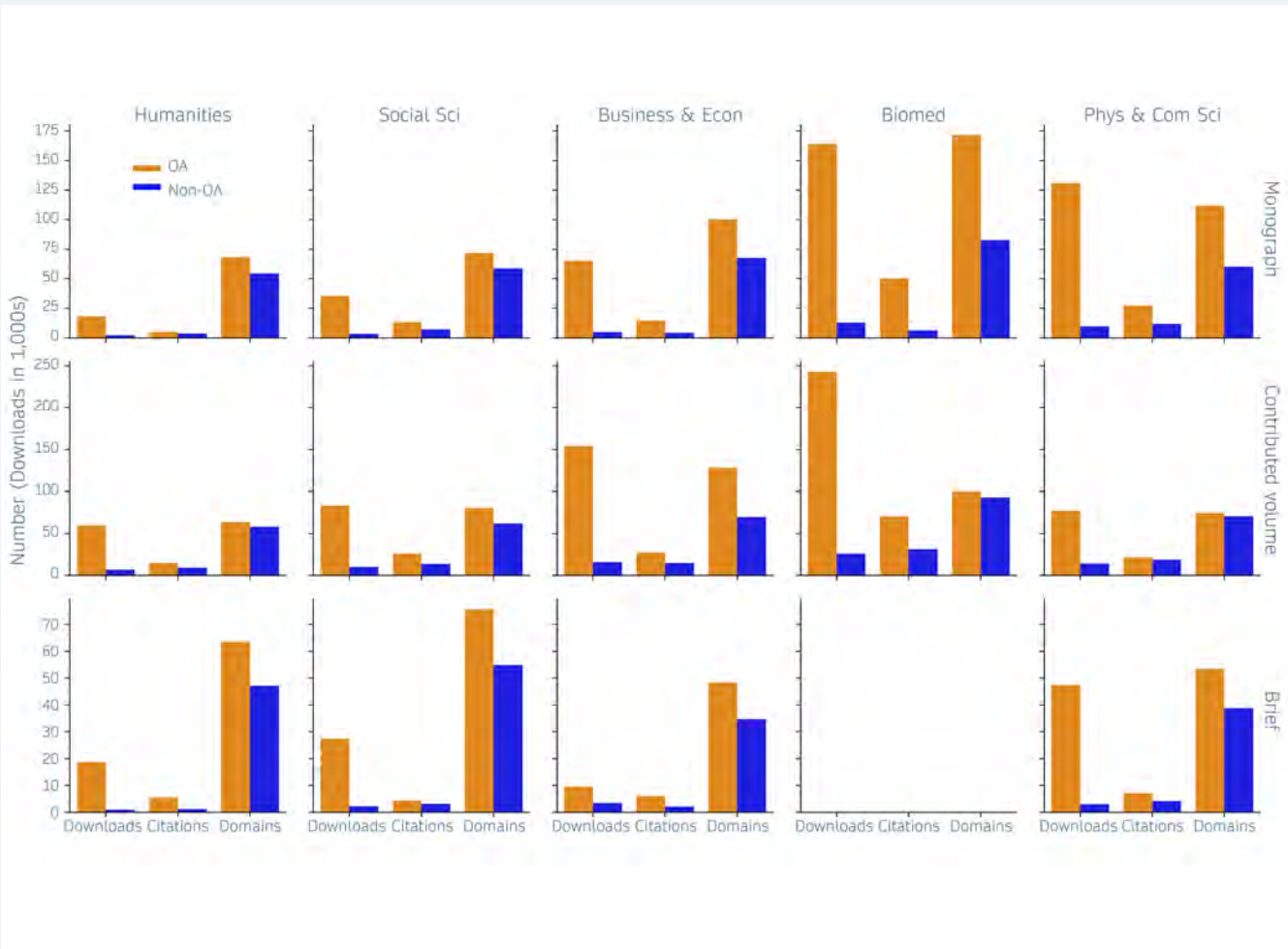


Figure 1. OA books see more usage and attention by downloads, citations and webometrics (number of domains). Vertical lines in the top panels are the 95% confidence interval for each metric.

Figure 1b: Average downloads, citations and number of domains by cluster and book type



There are no OA books in the Brief category for Biomedical Sciences.

Figure 2: Downloads per book for OA and non-OA categories

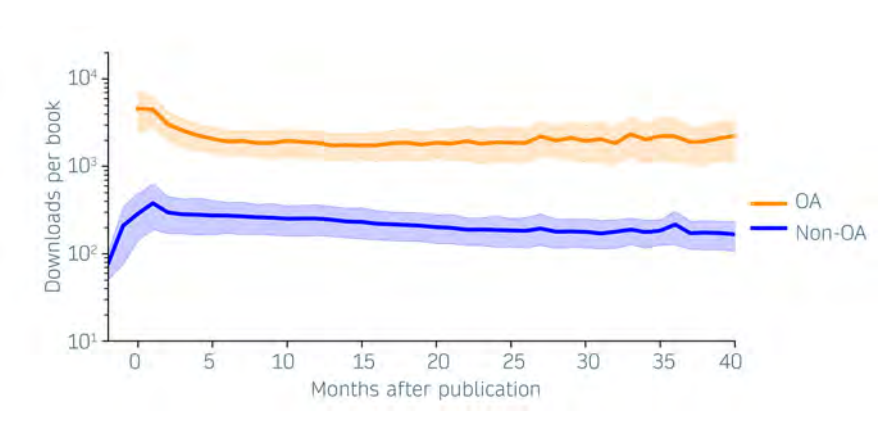
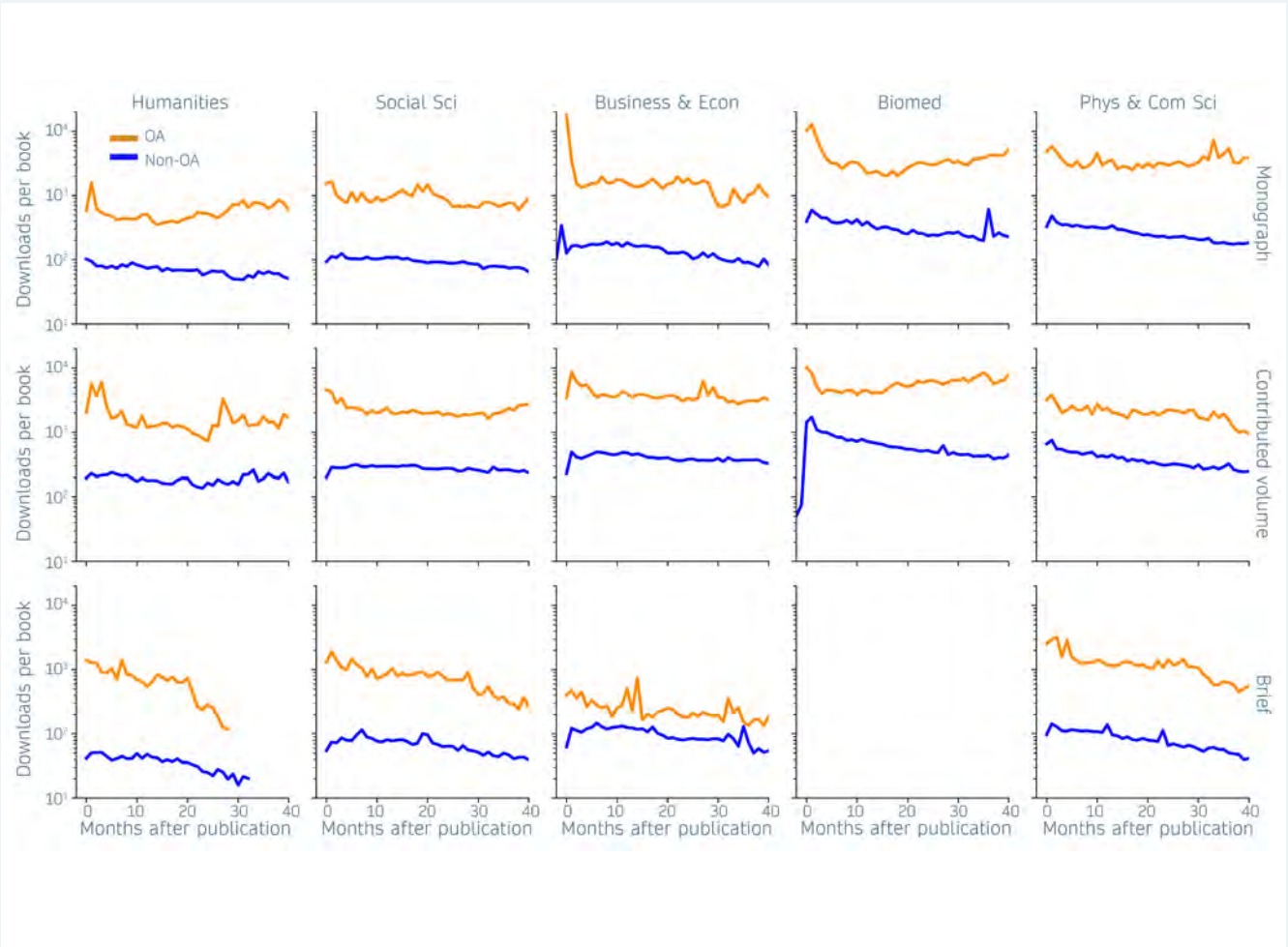


Figure 2. OA books see more downloads for all types and all disciplines for every month after release date. Chapter downloads per book are for each month since publication for OA and non-OA books in each of the 15 categories. Some books have usage data from prior to the official release date so show usage prior to zero months.

Figure 2b: Downloads per book over time by discipline cluster and book type



There are no OA books in the Brief category for Biomedical Sciences.

Part 2: Geographic usage patterns for OA and non-OA books

OA books are downloaded in 61% more countries than non-OA books

OA books show more usage across a wider diversity of countries

The usage of both non-OA and OA books is international, although OA books show usage in a wider diversity of countries. Usage of non-OA books in the Springer Nature dataset is identified in 125 countries, whereas usage of OA books is identified in 201 countries, 61% more. For both OA and non-OA books the highest levels of usage are seen in the USA, UK, Germany and mainland China. Several countries show a greater difference in usage for OA books compared to non-OA books, and these countries are predominantly in the southern hemisphere (Figure 3).

Figure 3. Usage is international and OA books show usage in more countries

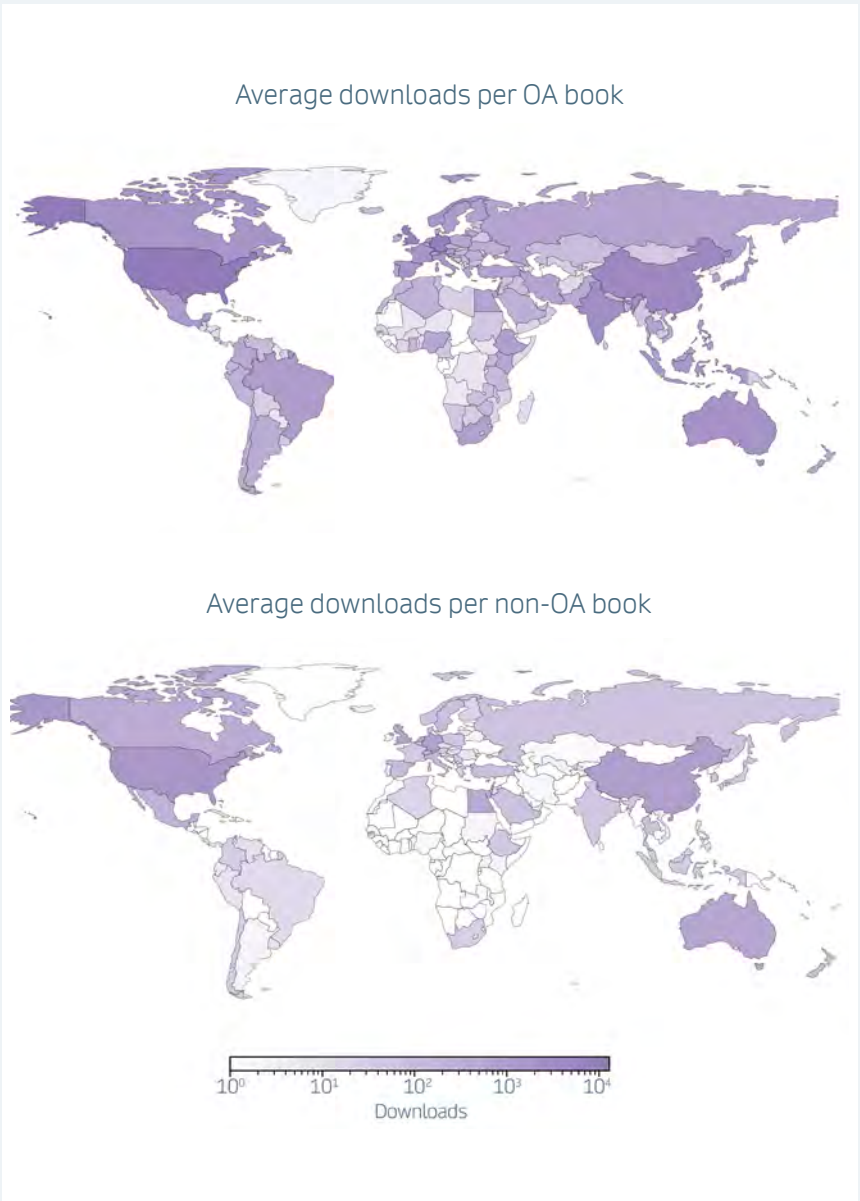


Figure 3. Usage is international and OA books show usage in more countries. Overall usage by country across the whole corpus for OA (top) and non-OA (bottom) books. Both maps are on the same colour scale.

Open access books reach more low-income and lower-middle-income countries

OA books show usage in more countries on average than non-OA books, with those additional countries being amongst the poorer ones globally. A key question is whether OA increases access and usage for populations that typically have lower access to scholarly literature. We can analyse this at the country level by examining downloads in countries that do not otherwise have access to Springer Nature books in digital formats. Downloads of OA books were identified in a wide range of countries that recorded zero usage of the non-OA books in the dataset. This shows that these OA books are being used in countries that do not otherwise have access to Springer Nature books on SpringerLink. Of the countries where only OA books recorded downloads, more than 20 were in Africa, with others mostly in the Middle East and Southeast Asia. LICs and LMICs are significantly represented in this group. Usage of OA books from countries that do not otherwise purchase Springer Nature non-OA ebook titles totalled over 100,000 downloads, representing 1% of the total anonymous usage of OA titles.

Figure 4. Anonymous downloads from countries having no logged downloads

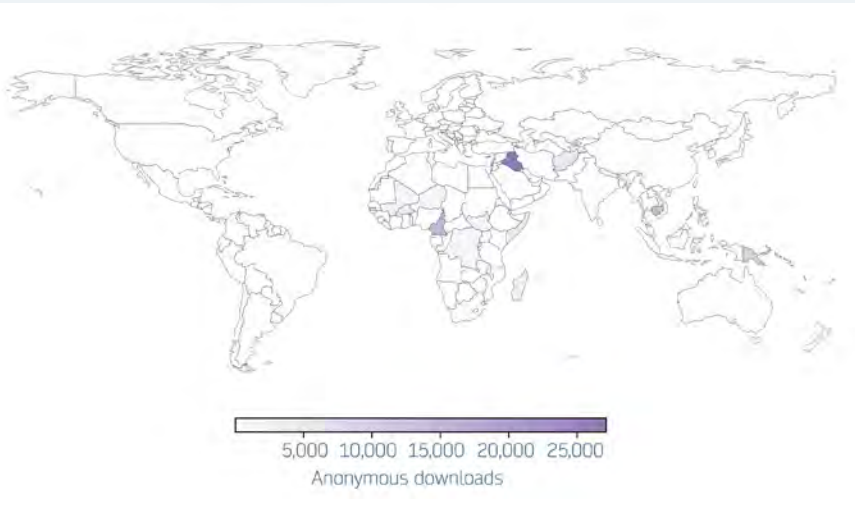


Figure 4. Anonymous total chapter downloads from countries with no logged usage. Of the countries where only OA books recorded downloads, more than 20 were in Africa, with others mostly in the Middle East and Southeast Asia.

We can provide a more quantitative measure of this effect by examining disparity amongst country usage. A disparity index is a measure of the *diversity* of usage. That is, how much usage deviates from the situation where all countries show even usage. The Gini coefficient is a disparity index that is often used to define levels of income inequality. We can use the same calculation to measure inequalities in geographical usage and use this to compare OA and non-OA books (Figure 5). A lower Gini coefficient indicates more diverse usage; that is, lower inequality in usage. For the corpus as a whole and for every category, the median Gini coefficient of OA books is lower, meaning that the geographical usage of OA books is more diverse (i.e. less unequal), while non-OA titles have lower diversity. However, there are outliers amongst both non-OA and OA books in terms of the value of the Gini coefficient.

Figure 5. Gini coefficient for OA and non-OA books

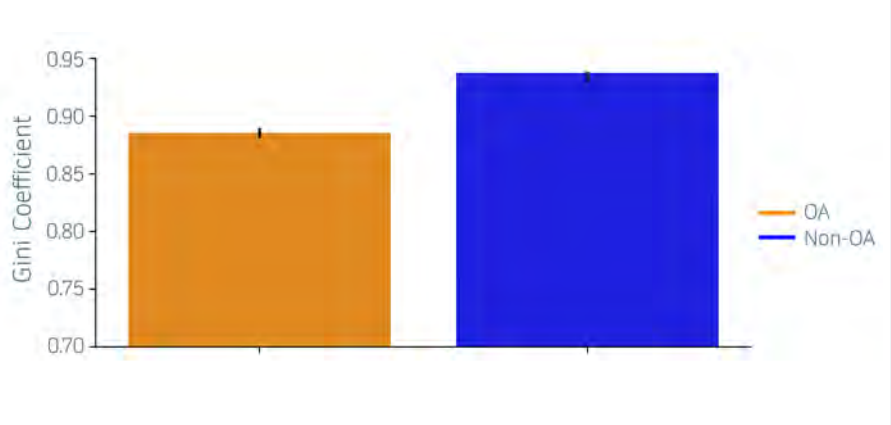
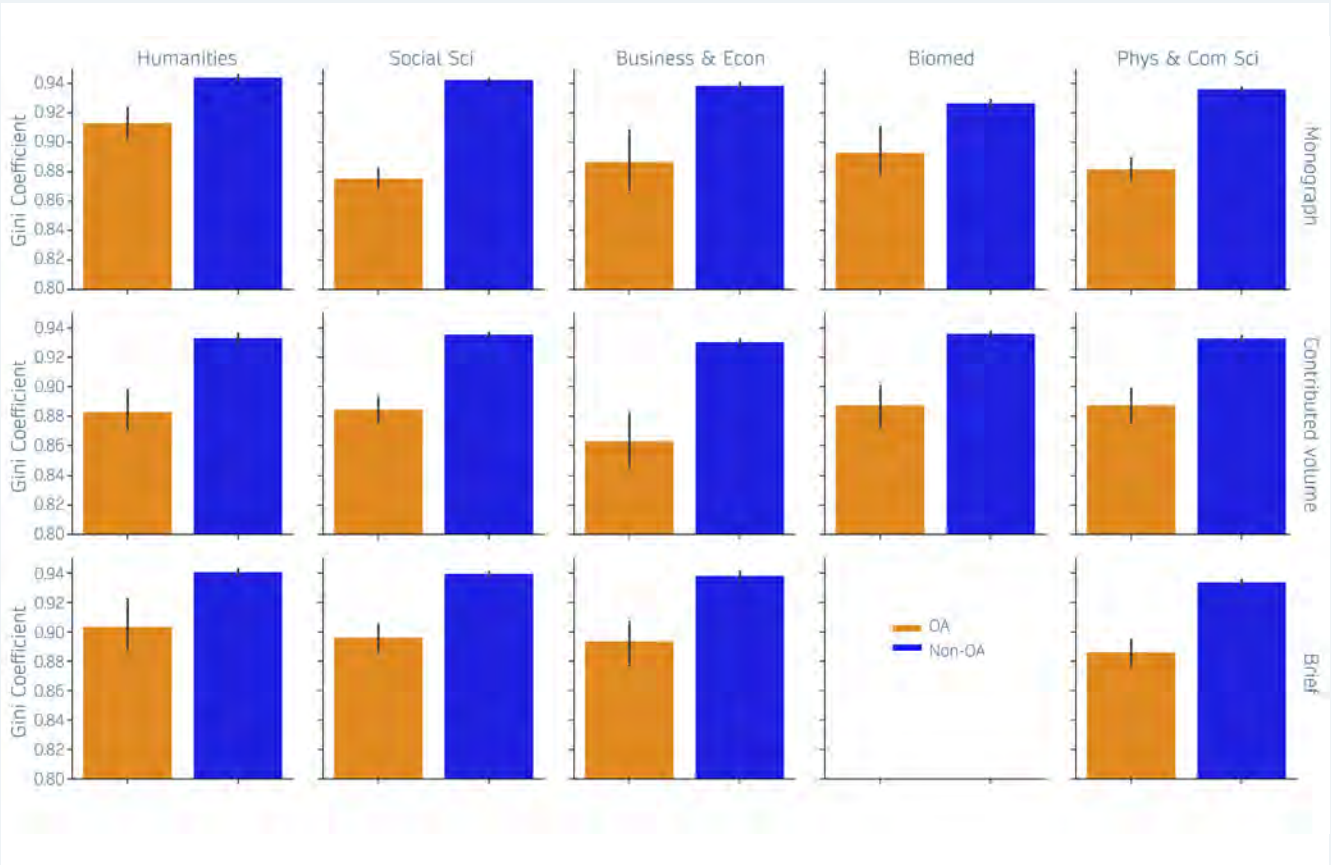


Figure 5. Geographical usage of open access books is more diverse. The Gini coefficient is a statistical measure of inequality. Here the coefficient is calculated for the contribution of each country to the overall usage. A lower Gini coefficient means more diverse usage. The median Gini coefficient and the 95% confidence interval is shown by the use of vertical lines.

Figure 5b: Gini coefficient by cluster and book type

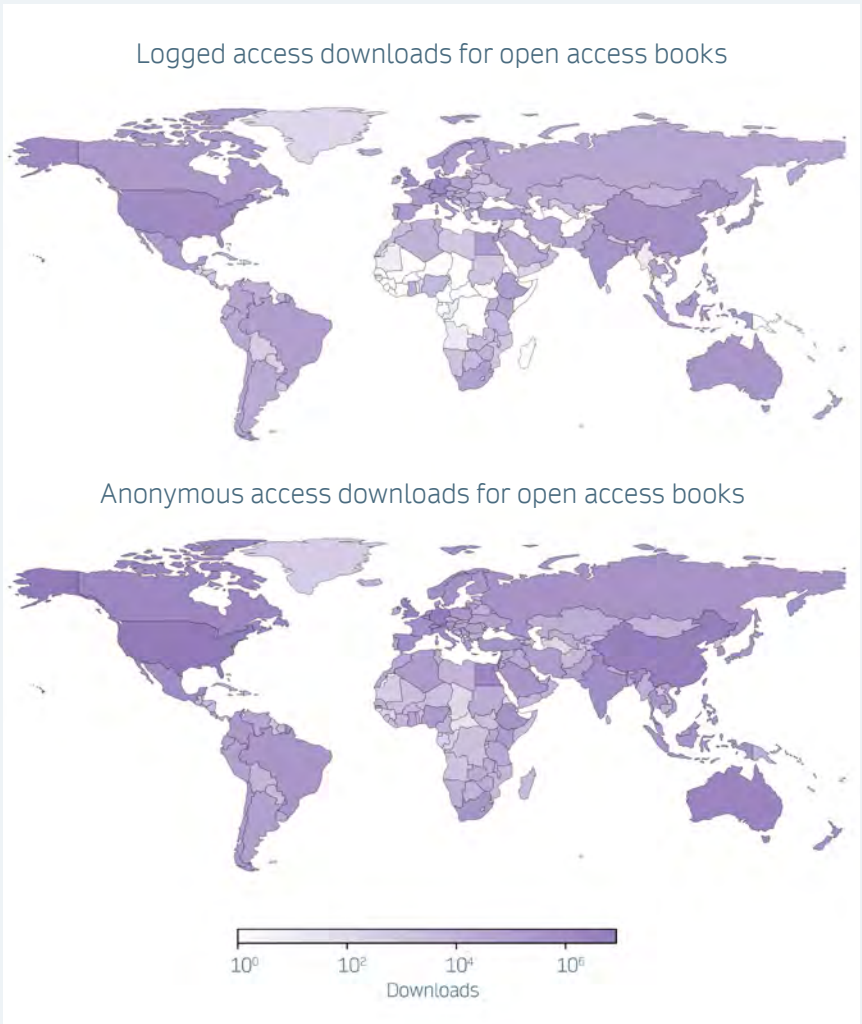


There are no OA books in the Brief category for Biomedical Sciences.

Anonymous and logged usage follow different patterns

Anonymous usage is always greater than logged usage for OA books. Across the dataset we see significant differences in logged and anonymous usage (Figure 6), with anonymous generally being twice that of logged usage (although there are a small number of books where the increase is small).[15]

Figure 6. Logged (top) vs anonymous (bottom) usage of OA books show different country-level patterns of usage



We cannot directly ascribe anonymous usage to 'general public' or 'non-academic' usage because a proportion of this will be off-campus or personal device usage by scholars. However, there are differences in the patterns of usage. For example, anonymous usage is 2.9 times higher than logged usage in Kenya, 2.3 times higher in Brazil, 2 times higher in India, and 3.2 times higher in Iran. Logged usage is 3 times higher in Egypt. We have already noted that there is substantial anonymous usage in countries for which there is no logged usage (see Figure 4). There is also a wide range of countries with a very high proportion of usage which is anonymous, despite these countries including institutions that have access to non-OA books. This list includes Syria, Ukraine, Georgia, Guatemala and Sri Lanka.

15. Anonymous usage is only available for the OA books in the dataset as non-OA books cannot be downloaded without a purchase or subscription. Therefore, only logged usage can be compared across non-OA and OA books and anonymous usage can only be compared with logged usage for OA books.

At the other end of the scale, there is no obvious pattern in the countries that show a higher level of logged usage than anonymous usage for OA books. This list includes Turkey, Liechtenstein and Moldova, where logged and anonymous usage are quite close (Germany has almost precisely the same amount of logged and anonymous usage) and Egypt, Suriname and Taiwan where logged usage is higher than anonymous usage. Overall, these differences will be the result of a complex mixture of usage patterns, internet provision and access, as well as Springer Nature's market penetration.

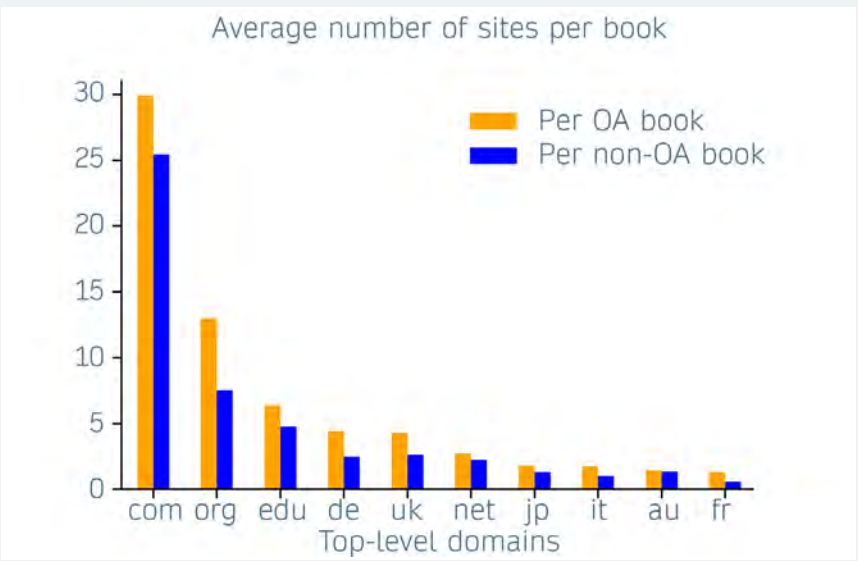
Web visibility shows only a small effect for OA

No significant OA advantage to web visibility could be identified for books in the study dataset. We use webometrics analysis as a proxy for visibility (looking at how many websites refer to each title), applying the approach and tools described by Thelwall.[16] In this study, other proxies for the usage of books (citations and downloads) show a substantial OA effect. Although we might expect to find a similar advantage for the web visibility of OA books, no significant OA advantage could be identified for books in the study dataset (Figure 7).

Broadly speaking the geographical representation of web pages that refer to books in the corpus is consistent with the level of usage, with European (.uk, .de, .it), North American (.edu, .ca) and Australian (.au) top-level domains (TLDs) dominating. Overall, the difference between the number of websites and the range of TLDs between OA and non-OA books shows an increase in the average number of unique domains referencing the OA books versus non-OA titles (see Appendix 4). This is a relatively small increase compared to the tenfold effect on downloads and more than doubling of the number of citations.

Springer Nature has well established and effective pathways for marketing and digital dissemination which are applied to both OA and non-OA titles. The small effect of OA on the number of websites referring to these titles is most likely to be a result of the fact that both OA and non-OA books benefit from these processes; for publishers with less well-established digital dissemination routes, OA may have a bigger effect on web visibility.

Figure 7. Average number of websites referring to titles in the dataset, per OA and non-OA book, for the ten highest top-level domains across the corpus



16. Thelwall, M. (2009)

A book's title affects its geographic usage. OA enhances the effect

Approximately 16% of the whole corpus of books in this study had a region or country name in their title or subtitle. The proportion of OA vs non-OA books with a geographic reference in the title is approximately the same. Title references to countries or regions were hand-coded, including variations referring to language (e.g. 'Chinese') and regions ('Africa', 'Latin America') as well as possessives (such as 'Sub-saharan' and 'Latin American') and the usage from those regions was examined, focusing on Latin America, Africa, and mainland China as examples.

A book's title affects its geographic usage and OA enhances this effect

For books that feature Africa and Latin America in the title, we see substantially enhanced downloads overall, and the effect is strongest in the region referenced in the title. In Figure 8, we see overall downloads for each country of books with Africa in the title divided by downloads for that country for the full corpus. OA titles show substantially enhanced downloads across a range of countries, with the enhancement concentrated in Africa, where it is five-fold. Other countries with enhanced downloads are Laos, the Solomon Islands and Timor Leste.

The same analysis is presented for Latin America in Figure 9. Here we also see massively enhanced downloads for the whole corpus of books mentioning Latin America in the title. The size of this effect is larger for Latin America than it is for Africa (the scale runs to just over 100-fold increase vs five-fold) and there are a larger number of countries that see increased downloads for books on Latin America than for Africa when we consider both OA and non-OA books.

In both cases, there is also some evidence of enhanced downloads in some parts of the other region (i.e. enhanced downloads in a small number of African countries for titles that have Latin America in the title, and vice versa). In the case of books with Africa in the title there are enhanced Latin American downloads in Guyana, Suriname, Venezuela, and Panama.

The size of the geographic effect is strongly enhanced by OA. OA books about Africa are widely read beyond Africa as well as in Africa. There is a very large enhancement of downloads compared to the whole sample across the African continent. Non-OA books show a smaller enhancement and only in South Africa, Uganda, Ethiopia and Sudan. Not only does OA enhance usage in countries underrepresented in global scholarship, it also enhances the global usage of scholarship about underrepresented countries.

Similar effects are seen for Latin America, although the enhancement is not quite as localised as in the case of Africa. Downloads in Latin America are strongly enhanced for all books with 'Latin America' (including variations and possessives such as 'Latin American') in the title and the degree of enhancement is substantially stronger for OA books. In addition, there is broader enhancement of usage internationally for OA books. The overall enhancement effect is larger for books with Latin America in the title (maximum enhancement of 100-fold usage) than it is for those with Africa in the title (maximum enhancement of five-fold).

Figure 8. Books with 'Africa' in the title are downloaded more in Africa

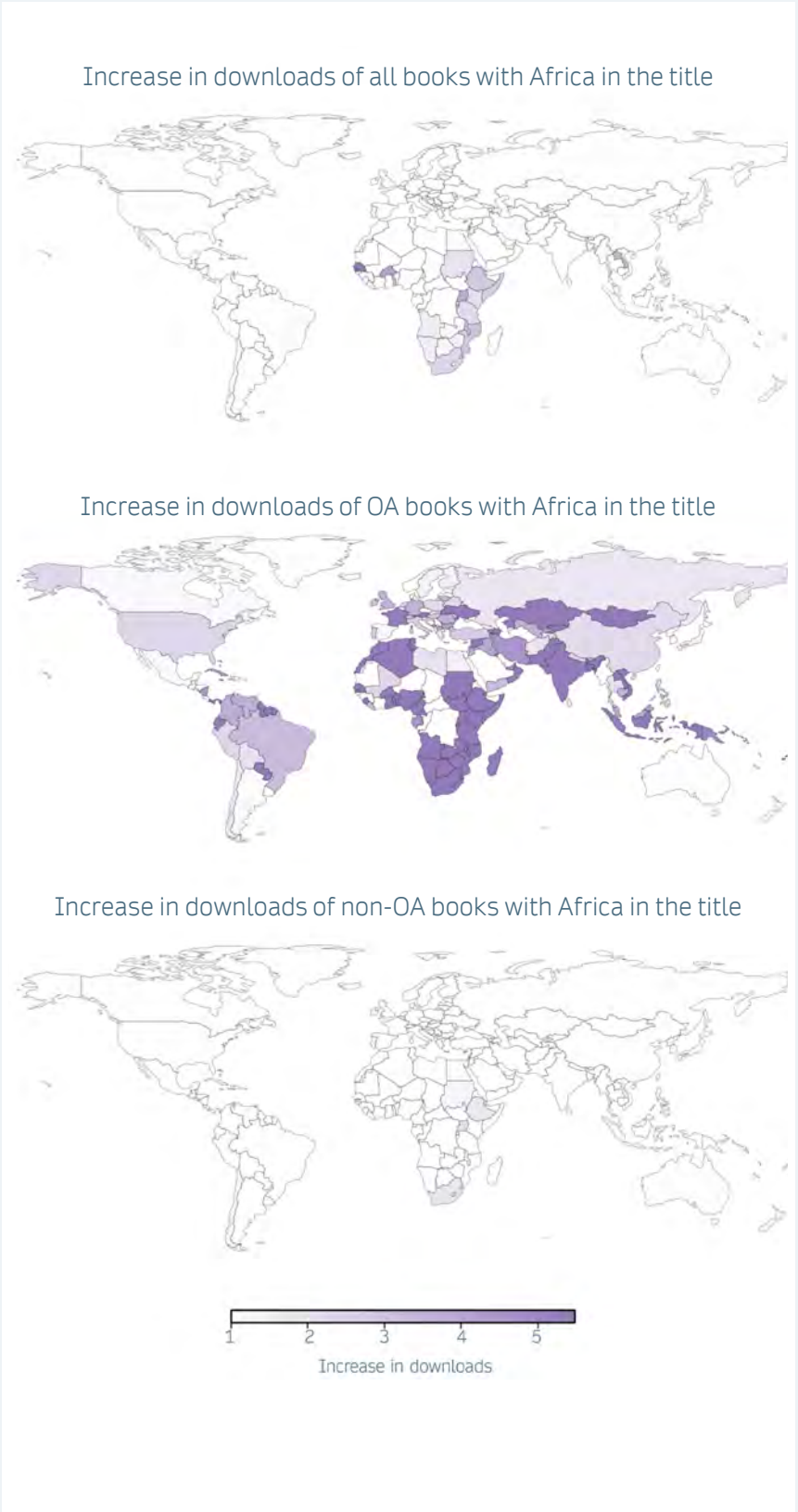


Figure 8. Books with 'Africa' in the title are downloaded more in Africa. Increases in usage are shown on a log scale with all countries showing unchanged or decreased usage in white.

Figure 9. Books with Latin America in the title see enhanced usage in Latin America

Figure 9. Books with Latin America in the title see enhanced usage in Latin America. The first map shows the overall effect for all titles featuring Latin America and the second map shows the effect of OA books in this group. Minimal increase was observed when looking at downloads of non-OA books with Latin America in the title. The maximum size of the usage enhancement is larger than that seen for books with Africa in the title (see Figure 8), and the colours are presented on a log scale as a result.

Case study - *Digital Kenya*

In this case study, we explore how the usage trends described above apply to an individual title. *Digital Kenya* is an edited collection offering insights into the historical, cultural, social, economic and political forces at play in the creation of world-class ICT innovations in Kenya.[17] It is the most downloaded Palgrave Macmillan OA book to date. Published as part of the Palgrave Studies of Entrepreneurship in Africa series, it was released OA under a CC BY 4.0 licence.

Publication date	18 November 2016
Copyright year	2017
ISBN	978-1-137-57878-5
Discipline	Business
Cluster	Business & Economics
Product category	Contributed volume
Imprint	Palgrave Macmillan

Table C1: Publication and category data for *Digital Kenya*

	Digital Kenya	**Mean of non-OA titles in same category**
Number of countries where downloads originated	172	39 [18]
Country Gini coefficient	0.93 (rank: 705)	
Total chapter downloads	209,731	11,985 [19]
Monthly mean average chapter download	5,992	379 [20]

Table C2: Downloads of *Digital Kenya* compared with non-OA titles of the same publication year, discipline cluster, and book type.

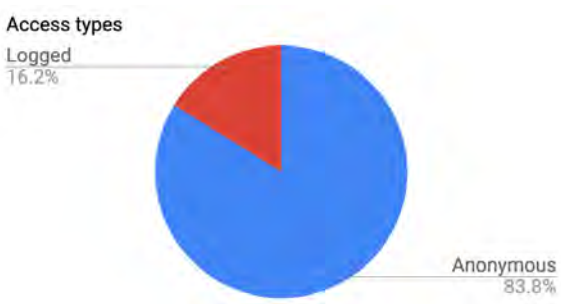


Figure C1: Proportion of logged vs anonymous usage for *Digital Kenya*.

Overall performance

Digital Kenya is a high performing book in terms of downloads. Compared to its comparison group of non-OA books it has 15 times more downloads per month. Over 80% of *Digital Kenya*'s downloads have been anonymous, emphasising the impact of the OA status for this book.

17. Ndemo, B., & Weiss, T. (Eds.). (2017). *Digital Kenya: An Entrepreneurial Revolution in the Making*. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-57878-5
18. Mean of all non-OA titles.
19. Mean of non-OA books with the same publication year, discipline cluster, and book type.
20. ibid.

Geographic reach

Given the title and focus of the book, it is naturally of interest to identify whether this OA volume shows enhanced usage in Kenya. In the context of African usage, Kenya is a significant user of both non-OA and OA books, having usage in a similar range to South Africa for non-OA books. However, *Digital Kenya* shows a substantially higher proportion of its usage from Kenya (see Table C3). This higher usage is sustained over the whole period of data collection and is most prominent for anonymous usage.

Other African countries also show enhanced proportional usage of this title, with Nigeria, Ghana and South Africa showing the strongest effects. There is also evidence of a greater proportion of overall usage from Indonesia and India, potentially due to the wider relevance of the issues discussed in the book beyond Kenya and its neighbouring countries. Interestingly, the effect for Indonesia seems to be stronger for logged usage, which may suggest OA can drive enhanced usage even among users with more traditional avenues of access to research content. Further analysis might address the question of whether specific areas showing enhanced usage would be likely to have had access if the book were not OA but otherwise the same.

Figure C2. The effect of the title on downloads from Africa

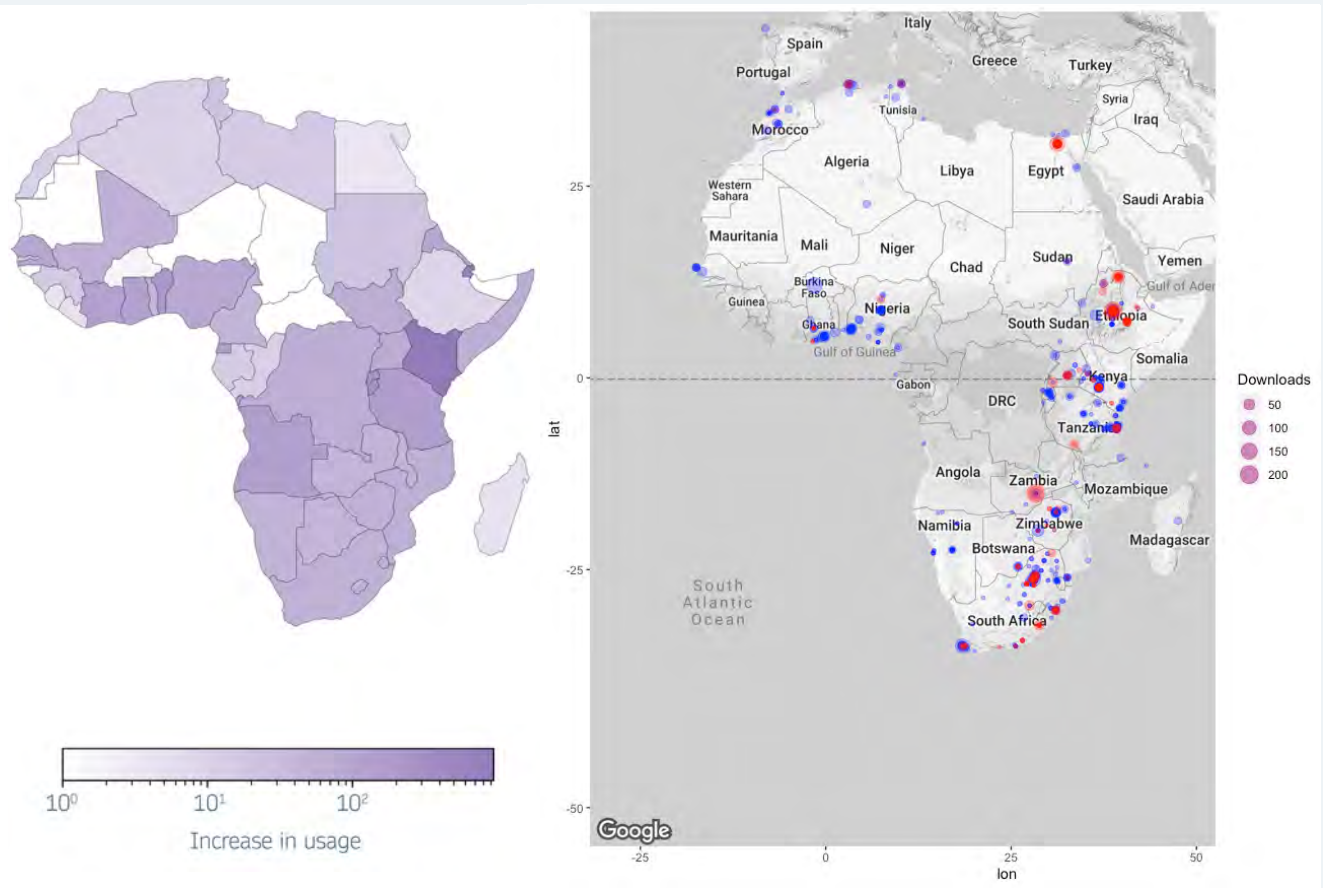


Figure C2. The effect of the title on downloads from Africa. In Africa, downloads for *Digital Kenya* are up to 1,000 times greater than for non-OA books with the same characteristics. Blue dots represent anonymous access downloads, and red represents logged access downloads.

Ranking	Overall (all books)	Logged (*Digital Kenya*)	Anonymous (*Digital Kenya*)
1	United States	Germany	Germany
2	Germany	United States	Kenya
3	China (mainland)	Kenya	United States
4	United Kingdom	United Kingdom	United Kingdom
5	Australia	Egypt	China (mainland)
6	Canada	South Africa	Netherlands
7	Egypt	Indonesia	South Africa
8	Netherlands	Switzerland	Nigeria
9	Mexico	India	India
10	India	China	France
	Kenya (46)		

Table C3. Rank order of usage by country for the full corpus, and for logged and anonymous usage of the title *Digital Kenya*. African countries feature much more heavily in the usage of this book, particularly Kenya which rises from 46th place to second or third.

Discussion and conclusion

OA is making a substantial difference to the reach of books and their authors

Our findings show OA has a robust effect on the number of downloads, geographical diversity of downloads, and citations across this corpus of books. The effect is seen for all disciplinary groupings, across all three years of publication found in the sample, for all types of book (Briefs, monographs, and contributed volumes) and for every month after publication. OA is, in other words, making a substantial difference to the reach of books and their authors.

Downloads of OA books are on average 10 times higher than those of non-OA books, and citations of OA books are 2.4 times higher – an even larger OA effect than was found in previous Springer Nature research.[21] Downloads of OA books from the open web via SpringerLink are generally around double those from institutional network points, suggesting that OA is also helping to reach a more diverse readership. The effect of OA on downloads is most significant for countries and regions with low gross national income. Latin America and Africa show significantly greater downloads for OA books compared to non-OA books. This is also seen in a quantitative analysis of the geographic diversity of downloads using the Gini coefficient disparity index. OA books have quantitatively greater geographic diversity of downloads.

A book's title is also shown to have a robust effect on geographic usage. Where the names of regions such as Latin America and Africa are present in a book title, we see substantial increases in downloads in those regions. This effect is much stronger for OA books. The same effect is seen for individual countries in Latin America and Africa. There are individual exceptions to these geographical effects and those titles may be of particular interest for further work.

Although we observe a difference in web visibility for OA books, the effect for this dataset is small, a fact that is likely to reflect the high levels of integration of all Springer Nature titles into global discovery and usage pathways.

To our knowledge, this is the largest independent analysis of the usage of OA and non-OA books ever conducted, over the longest period of time. The sample size and structure allows us to be confident that there are substantial effects connecting OA status with downloads and citations for this set of books. There is a limited amount of previous work comparing downloads of OA and non-OA books with the goal of understanding the impacts of OA on the geographies of usage. These findings show evidence of a higher level of diversity of geographic usage for OA books.

This analysis shows that immediate OA on the publisher's platform brings significant benefits to scholarly books, both in the number of citations and downloads, and in the diversity of location of those downloads, helping to unlock a latent readership. Not only does OA enhance usage in countries underrepresented in global scholarship, it also enhances the global usage of scholarship about underrepresented countries. The findings in this report provide a powerful argument for prioritising measures that will support the expansion of OA for books, including introducing policies that require OA for books and increasing financial support to facilitate this.

21. Emery, C. *et al.* (2017), p. 4

While these results are compelling, further work is needed to explore the effects of OA on books across a much wider range of publishers and to understand usage effects across a range of different platforms, including aggregators and online libraries. The work of the Exploring Open Access eBook Usage (OAeBU) project – which is about to initiate a pilot to develop and test infrastructure, policy and governance models to support a diverse, global data trust for usage data on OA monographs – will be important.[22]

This study was carried out before the outbreak of the COVID-19 pandemic. There has been a substantial increase in downloads of OA and non-OA books hosted on SpringerLink since March 2020, and this increase appears to be linked to the pandemic. Many publishers, including Springer Nature, have also made some non-OA ebooks freely available in this period. It will be interesting in future to understand how the pandemic, and differences in location and behaviour of readers in this period, has affected usage, and how these effects differ between OA and non-OA books.

22. *Developing a Pilot Data Trust for Open Access Ebook Usage*. (n.d.). Educopia. Retrieved June 29, 2020 from https://educopia.org/data_trust/

Limitations

The primary limitations of this study are that it only examines books from a single publisher, and only examines usage of OA books via a single platform: SpringerLink. Springer Nature's OA books are also made available via a range of other platforms, including the OAPEN Digital Library, Google Books, Apple Books, Amazon, PubMed's NCBI Bookshelf, and funders' own platforms. OA books are also indexed in the Directory of Open Access Books (DOAB), and, where appropriate, Web of Science, Scopus, as well as more than 200 other abstracting and indexing services. Usage via those platforms is not captured in this study. The analysis also only captures digital usage and reach of ebooks and does not consider print sales and distribution, which may also show different trends for OA and non-OA books.

Springer Nature is a large publisher with an experienced and effective sales and marketing team, and online infrastructure. We would predict that the overall effect of this would be to reduce the difference between OA and non-OA books on the metrics we can measure.

A significant statistical limitation is that the study was conducted on a retrospective stratified sample. We therefore cannot completely rule out confounding effects resulting from variables beyond our control. Specifically we have not controlled for affiliation or the prestige or fame of authors. There is some risk that there is a correlation between the wealth of an institution (and therefore its ability to fund OA publication), the prestige and reach of authors, and therefore the downloads and citations of books. However, the nature of our stratified sample and the consistency of positive effects across all groups, for all types of book, for all disciplines, for all three years of publication and for all times after publication provides confidence that the effects of OA are credible.

One aspect that is important to consider is the role of population size in the geographical patterns of usage. A challenge with analysis of academic usage is to identify a good proxy of 'academic population size'. COARD used an in-house database tracking the number of publications and citations by country to normalise Springer Nature country download data with country publications, citations and enrollment in tertiary education. The goal was to use the total number of research outputs and/or citations as a signal of 'total research activity'. This could potentially have provided evidence of cases where the increase in usage tied to OA was not necessarily connected to academic activity, which would strengthen the evidence for wider public use. We did not obtain clear results from this analysis that would allow us to distinguish between academic and non-academic usage. We therefore focussed on country-level differences in usage between OA and non-OA books.

In some cases usage numbers are small and this can exaggerate the effects seen when seeking to normalise usage. The precise size of geographic effects and details of rankings of effect by country should therefore not be relied on. However, the broad patterns of change and directions of effect are robust, and the broad geographic patterns of changes in usage are consistent across various subsamples and for individual books. Overall, we are highly confident of the claim that OA enhances usage in countries which suffer exclusion from scholarly discourse.

The webometric analysis is reliant on the construction of a search term that combines the title with author names. This can be expected to experience false negatives (not all web pages referring to the book will contain this information) and some false positives (particularly for short titles and common author names). Nonetheless, the broad pattern of visibility should be reliable and is supported by its concordance with the geographic usage data.

This study focuses on books published 2015-17, the earliest time period that would allow a sizable dataset; the maximum period of usage and citation data provided for any book in the dataset was 4 years and 9 months. Given how long Humanities and Social Sciences monographs, in particular, remain in use, there is still a need to revisit these questions in future to understand the longer-term effects of OA on books.

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Glossary

Altmetric Explorer: A database provided by Altmetric that gives access to the attention data for scholarly outputs, enabling monitoring and reporting on altmetrics of published content.

Brief: SpringerBriefs and Palgrave Pivots are Springer Nature's short-form book types, typically 50-125pp / 25,000-50,000 words. For brevity, both formats are referred to as 'Briefs' throughout the report.

Confidence interval: A confidence interval is a statistical measure of confidence in the value of an average. In this case the vertical bars indicate the range within the average will be found with 95% confidence. It provides information on the variation within the results for a specific category.

Contributed volume: Springer Nature does not officially define the format of a contributed volume (also known as edited volume/collection), however it is generally understood to be a collection of scholarly or scientific chapters written by different contributors/authors. The chapters in a contributed volume are original works.

COUNTER (or Project COUNTER): COUNTER is an international non-profit membership organisation of libraries, publishers, and vendors. COUNTER publishes a widely accepted standard for calculating the usage of electronic resources, as well as a Code of Practice for handling and cleaning usage data for scholarly publications.

Domain name: A domain name is an address used on the internet, whether for websites or for email. It is a string of characters which usually spells out a word or the name of a company, organisation or person. For the URL http://ccat.curtin.edu.au/about-us.html the domain name is curtin.edu.au.

Gini coefficient: The Gini coefficient is a statistical measure of the degree of variation represented in a set of values, used especially in analysing income inequality. It measures how much a measure deviates from the situation where all countries are even. A lower Gini coefficient indicates more diversity; that is, lower inequality.

Low-income country (LIC), lower-middle-income country (LMIC): For the current year, LICs are defined as those with a gross national income (GNI) per capita of $1,035 or less in 2019; LMICs are those with a GNI per capita between $1,036 and $4,045. The classifications are updated annually by the World Bank. For current country classifications see: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.

Metadata: Metadata summarise basic information about data, which can make finding and working with particular instances of data easier. Author, date created, date modified and file size are examples of basic document metadata. The ability to filter through this metadata makes it easier for users to locate specific documents.

Monograph: Springer Nature does not officially define the format of a monograph, however it is generally understood to be a long-form publication (70-100,000 words) of a specialist scholarly work on a single subject or an aspect of a subject, usually by a single author.

Top-level domain (TLD): TLD refers to the last segment of a domain name, or the part that follows immediately after the full stop. TLDs are classified into two categories: generic TLDs (gTLD) and country-code TLDs (ccTLD). Examples of some common TLDs include .com (commercial businesses), .org (organisations), .net (network organisations), .gov (U.S. government agencies), .edu (educational facilities like universities), .ca (Canada), and .au (Australia).

URL: URL stands for Uniform Resource Locator. A URL is a (mostly) human-readable string that uniquely identifies a resource (i.e., an asset, file or piece of content) on the Internet.

Web page: A web page is a document, commonly written in HyperText Markup Language (HTML), which is accessible through the Internet or another network using an Internet browser. A web page is accessed by entering a URL address and may contain text, graphics, and hyperlinks to other web pages and files.

Webometric Analyst: Webometric Analyst is a free software programme that uses URL citations or title mentions to produce network diagrams, link impact reports, and web environment networks. It mainly uses Bing's API.

Webometrics: Webometrics aim to measure the impact of a research object across the web by examining numbers and types of hyperlinks, and employing bibliometrics approaches to examine usage patterns.[23]

23. Almind, T. C., & Ingwersen, P. (1997). Informetric analyses on the World Wide Web: Methodological approaches to webometrics. *Journal of documentation*, 53(4), 404–426. https://doi.org/10.1108/EUM0000000007205

Appendices

Appendix 1: Selection of non-OA comparator titles

A comparison set of non-OA books was used in this study to provide a robust baseline of usage for non-OA content. This comparison set was made up of books accessed via SpringerLink, which would generally be linked to an institutional subscription or purchase of specific book packages. Our goal was to maximise the statistical power of the sample while maintaining a consistent ratio of OA to non-OA books across the categories of book types (monographs, edited collections, and Briefs) and disciplines in the OA sample.

21,059 books were considered for inclusion in the comparator set. Books were selected for inclusion in the comparator set in the following way:

- The OA books were divided into 'groups' according to the type of book (monograph, contributed volume, or Brief); year of publication; and discipline cluster.
- For each group of OA books the number of non-OA titles with the same type, year of publication and discipline cluster was identified.
- To construct a maximally informative set of comparison groups, COARD identified the number of non-OA and OA titles for every group which had an OA title. This provided 37 groups out of the 45 theoretically possible (3 book types x 5 discipline clusters x 3 years) as not every possible group had an OA title. They identified that across all groups there were at least 13 non-OA titles for each OA title. COARD therefore generated a random stratified sample by selecting 13 non-OA titles for each OA title within each group to give a total of 3,653 non-OA titles for comparison.

Appendix 2: Logged and anonymous usage data

Logged usage data included information relating to:

- ISBN of the accessed book
- Month of download
- Country and city information

Data relating to anonymous use was provided in the form of IP address usage logs. The final byte of the IP address was removed by Springer Nature in order to ensure the privacy of users. IP addresses were used to identify the country and city of download. To convert the IP addresses for anonymous usage to geographical usage COARD used the IP2Location database to identify countries and cities associated with individual IP addresses. This required replacing the last byte in the IP address (with '1') and matching the country and city names to those used in the logged usage data.

Appendix 3: Distribution of titles in each combination of categories

Table A1: Distribution of titles in each combination of categories

Product category	Publication year	Discipline cluster	OA titles	Non-OA titles (x13)
Brief	2015	Physical Sciences, Engineering, Maths & Computer Science	1	13
Brief	2016	Business & Economics	2	26
Brief	2016	Physical Sciences, Engineering, Maths & Computer Science	7	91
Brief	2016	Social Sciences	8	104
Brief	2017	Business & Economics	1	13
Brief	2017	Humanities	7	91
Brief	2017	Physical Sciences, Engineering, Maths & Computer Science	4	52
Brief	2017	Social Sciences	14	182
Contributed volume	2015	Business & Economics	4	52
Contributed volume	2015	Humanities	2	26
Contributed volume	2015	Medical, Biomedical & Life Sciences	6	78
Contributed volume	2015	Physical Sciences, Engineering, Maths & Computer Science	4	52
Contributed volume	2015	Social Sciences	10	130
Contributed volume	2016	Business & Economics	3	39
Contributed volume	2016	Medical, Biomedical & Life Sciences	12	156
Contributed volume	2016	Physical Sciences, Engineering, Maths & Computer Science	8	104
Contributed volume	2016	Social Sciences	13	169
Contributed volume	2017	Business & Economics	3	39
Contributed volume	2017	Humanities	3	39
Contributed volume	2017	Medical, Biomedical & Life Sciences	4	52
Contributed volume	2017	Physical Sciences, Engineering, Maths & Computer Science	7	91
Contributed volume	2017	Social Sciences	18	234
Monograph	2015	Business & Economics	3	39
Monograph	2015	Humanities	4	52
Monograph	2015	Medical, Biomedical & Life Sciences	3	39

Monograph	2015	Physical Sciences, Engineering, Maths & Computer Science	10	130
Monograph	2015	Social Sciences	6	78
Monograph	2016	Business & Economics	5	65
Monograph	2016	Humanities	6	78
Monograph	2016	Medical, Biomedical & Life Sciences	3	39
Monograph	2016	Physical Sciences, Engineering, Maths & Computer Science	15	195
Monograph	2016	Social Sciences	42	546
Monograph	2017	Business & Economics	5	65
Monograph	2017	Humanities	9	117
Monograph	2017	Medical, Biomedical & Life Sciences	1	13
Monograph	2017	Physical Sciences, Engineering, Maths & Computer Science	18	234
Monograph	2017	Social Sciences	10	130
Total			**281**	**3,653**

Appendix 4: Frequency of selected top-level domains

Table A2. Frequency of top-level domains across the corpus and for non-OA and OA titles. OA does not have a strong effect on web visibility.

TLD	Total Sites	Total %	Non-OA	Non-OA %	OA	OA %
com	101,979	40.44	92,975	40.95	8,404	34.6
org	31,313	12.42	27,535	12.13	3,649	15.02
edu	19,347	7.67	17,434	7.68	1,793	7.38
uk	10,907	4.33	9,654	4.25	1,210	4.98
de	10,295	4.08	9,169	4.04	1,233	5.08
net	9,000	3.57	8,206	3.61	767	3.16
au	5,502	2.18	4,968	2.19	410	1.69
jp	5,305	2.1	4,824	2.12	505	2.08
it	4,114	1.63	3,707	1.63	491	2.02
ca	3,905	1.55	3,563	1.57	336	1.38

Appendix 5: Effects of book length

It is possible that the length of a book may have a confounding effect on usage patterns, particularly if OA and non-OA books had systematically different lengths. Plots of length vs downloads did not show either an obvious bias in the length of books for the OA and non-OA sets and overall; while there is a relationship between length and number of downloads this effect seems similar for OA and non-OA.

Figure A1 shows the relationship between the number of book pages and downloads for the OA and non-OA sets and Figure A2 shows the relationship between the number of chapters and download behaviour.

Figure A1. Scatterplot for downloads vs number of book pages for each title, for OA and non-OA books.

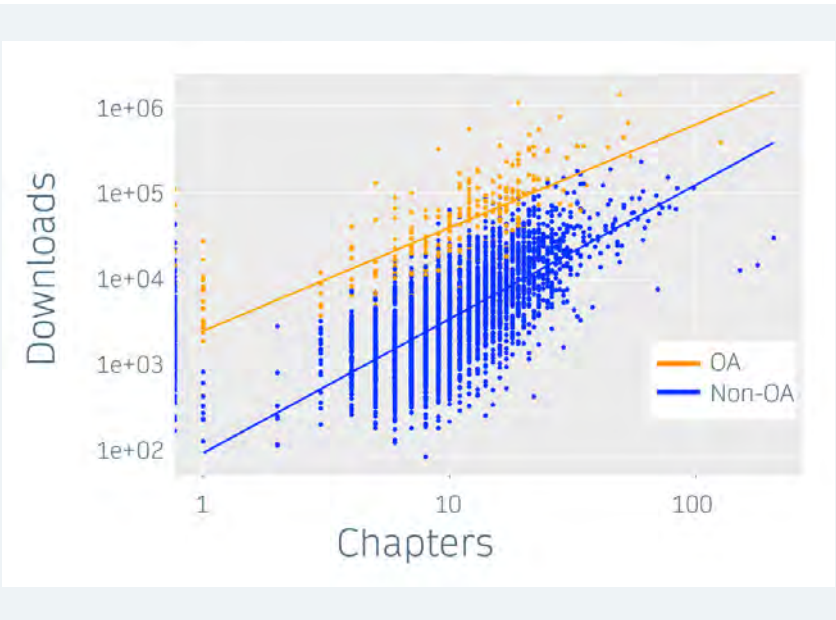

Figure A2. Scatterplot for downloads vs number of chapters for each title, for OA and non-OA books.

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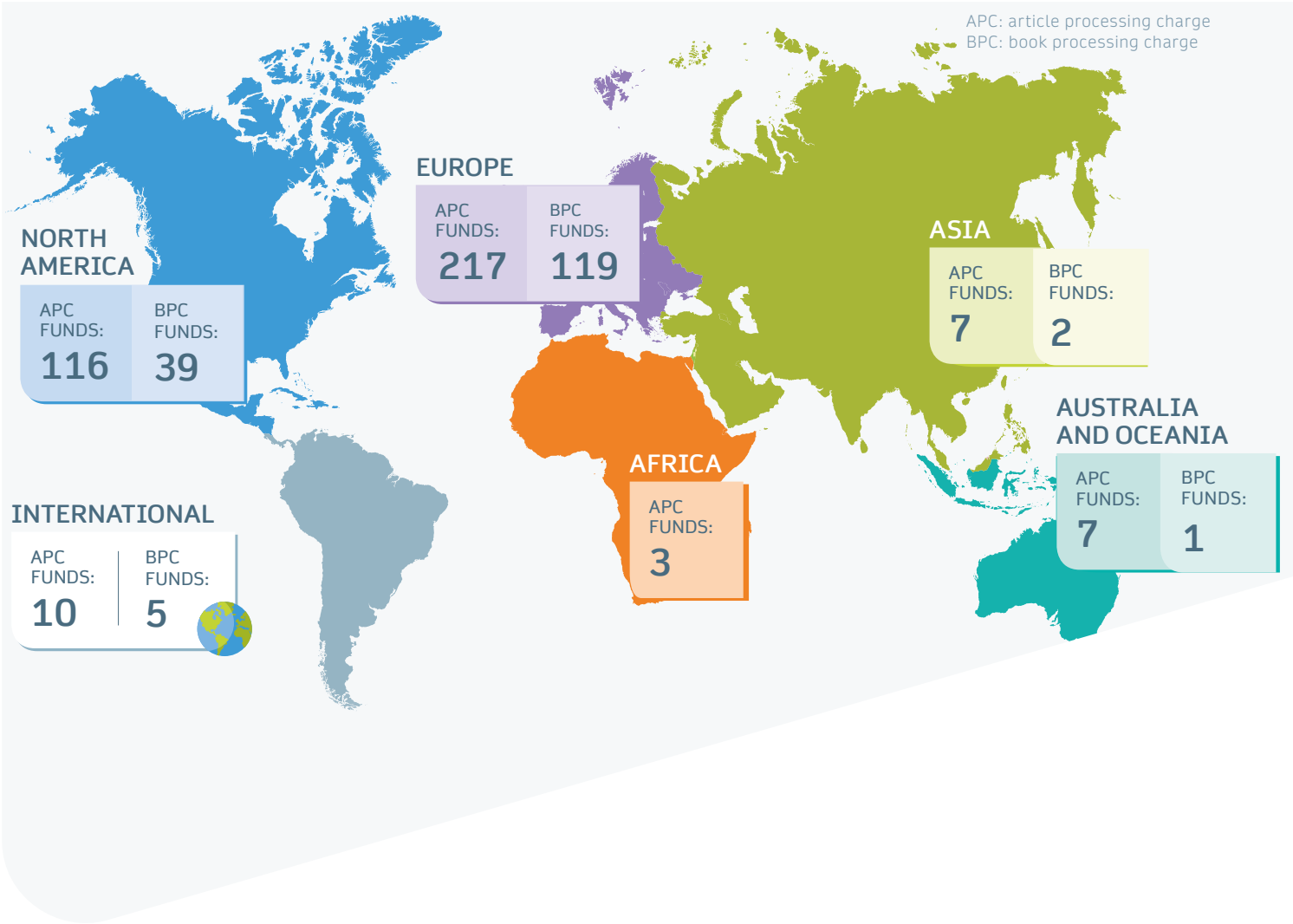

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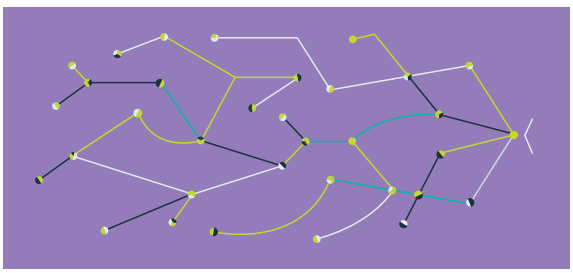
Around our complex and interconnected world, the research community is advancing discovery for all of us. These illustrations celebrate some of the great minds who have helped advance discovery through history.



John Dewey (1859–1952)

John Dewey radically transformed fundamental approaches to teaching and learning. His ideas about progressive education emphasised the subjective quality of a student's experience and asserted that students must be invested in what they are taught; and prioritised learning through doing and experiencing and participation in classroom democracy.

For Dewey, the purpose of education was the realisation of one's potential and the ability to use those skills for the greater good within society. Dewey's emphasis on progressive education has had a vital and enduring influence on pedagogy, psychology and philosophy, revolutionizing how we teach and learn.