
Looking for the Impact of Open Access on Interlibrary Loan

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Abstract:

The purpose of this paper is to analyze interlibrary loan (ILL) article requests for evidence of a decrease that could be attributed to the spread of open access. The authors collected and analyzed the interlibrary loan data of two Indiana academic libraries for requests submitted during October and November (peak ILL months) from 2006-2015. The requests were assigned to one of four categories: general, humanities, social sciences, and sciences based on Library of Congress classification, and the relative age of each article was calculated, where the relative age is the difference between year of publication and year of request. Assuming an embargo period of 12-18 months for traditional publications, a change in articles of relative age 0-2 would suggest that scholars were obtaining that material from other sources. The authors then looked for trends that might indicate the impact of open access on interlibrary loan requests. This paper will present the results and discuss the other environmental factors that may influence the number of requests placed within a field of study.

Keywords: interlending, interlibrary loan, resource sharing, open access, academic libraries

Introduction

In light of the spread of open access publishing and self-archiving, the authors wanted to look at whether open access is having an effect on interlibrary loan. The assumption is that the number of article requests received should decrease as open access increases. The purpose of this paper is to analyze interlibrary loan (ILL) article requests for evidence of a decrease that could be attributed to the spread of open access. In order to do so, the authors collected and analyzed the interlibrary loan data of two Indiana academic libraries for requests submitted during October and November (peak ILL months) from 2006-2015. Brief profiles of these academic libraries and their parent institutions follow.

The University of Notre Dame is a private research university enrolling approximately 12,000 students at the undergraduate, graduate, and doctoral levels. There is no university-wide open access policy, but the library faculty has implemented a policy, which took effect in July 2014. The Hesburgh Libraries includes nine branch libraries and provides interlibrary loan service to the faculty, staff, and students of seven of the university's eight schools. The

Notre Dame Law School has its own library, which provides their affiliates with interlibrary loan services.

Indiana University-Purdue University Indianapolis (IUPUI) is an urban public university comprised of academic units from both Indiana University and Purdue University. IUPUI enrolls more than 30,000 students at the undergraduate, graduate, and doctoral levels. The IUPUI Library Faculty passed an open access deposit mandate in April 2009, and the IUPUI Faculty Council passed a campus-wide open access policy in October 2014, both requiring deposit of scholarly works in the institutional repository, IUPUI ScholarWorks. IUPUI University Library serves two colleges and fifteen of the eighteen schools on the IUPUI campus. The schools of law, dentistry, and medicine each have their own library, providing their faculty, staff, and students with interlibrary loan services.

Methodology

Both the Hesburgh Libraries and IUPUI University Library have used OCLC ILLiad as their interlibrary loan management system since at least 2006. Therefore, the data for all copy requests submitted during the months of October and November from 2006 to 2015 were harvested from each library's ILLiad database. This sample data set was then reviewed and some requests were excluded due to format (i.e. book chapter rather than article), inability to determine journal title (e.g. inaccurate transliteration, title not provided, no standard number), or lack of publication year.

The relative age of each remaining article request was calculated, where the relative age is the difference between year of publication and year of request. For example, a request placed in 2015 for an article published in 2015 has a relative age of zero. Since articles are now frequently published online before being assigned to a specific journal issue, negative relative ages are possible. For example, an article scheduled for publication in a 2016 issue may be made available as a "pre-print" online in 2015. If this 2016 article were requested in 2015, the relative age would be -1. In the data analysis, requests with a negative or zero relative age are considered requests within the current year.

Finally, each request was assigned to one of four categories: general, humanities, social sciences, and sciences based on Library of Congress classifications shown below.

Table 1. Subject Categories and Corresponding Library of Congress classification

Broad Subject	LC Classification
General	A, U, V, Z
Humanities	B, M, N, P
Social Science	C, D, E, F, G, H, J, K, L
Science	Q, R, S, T

Discussion

When viewing the total article requests received during the ten years covered by the study, the authors found that Hesburgh Libraries experienced declines in 2010 and 2014, but the number of requests rebounded subsequent to those declines. IUPUI University Library requests, however, showed modest increases from 2008 through 2012. A significant decrease occurred in 2013, but the number of requests has been steadily increasing in the years since. While there were declines in the number of article requests in specific years, trend line analysis shows that article requests are, in fact, increasing for both institutions (see Figure 1).

This growth is across nearly all disciplines with Humanities and Sciences increasing more rapidly than Social Sciences (see Figure 2).

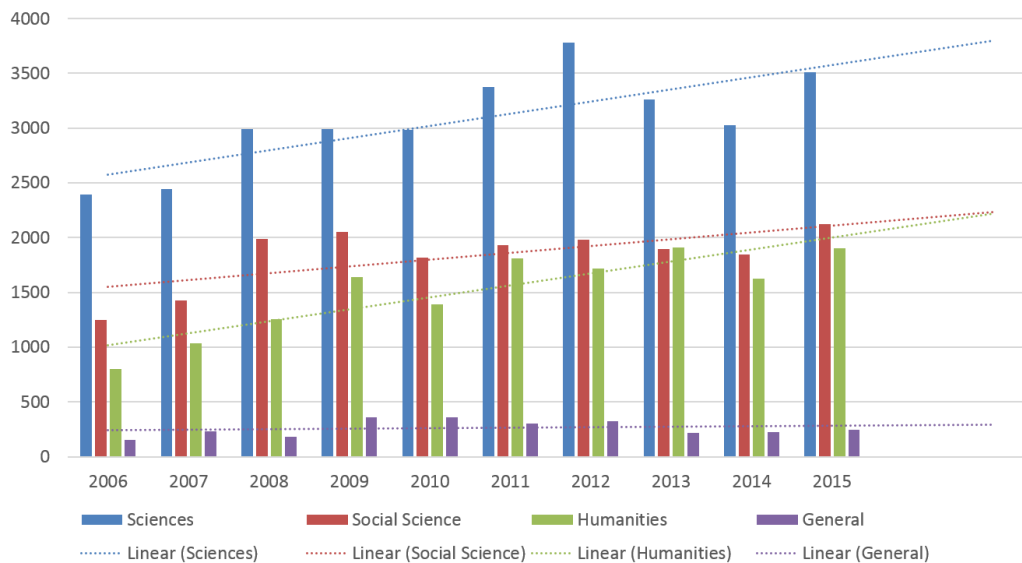
Figure 1. Distribution of Article Requests by Institution



When Hesburgh Libraries and IUPUI University Library requests are combined and considered by subject, the following can be seen (see Figure 2).

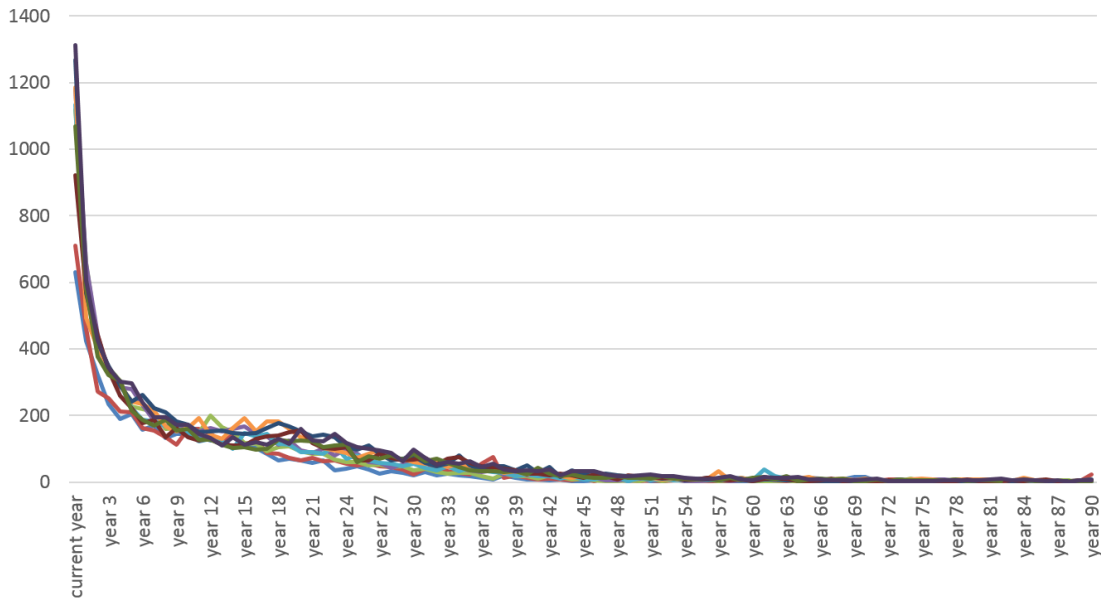
- No subject area shows consistent growth or decline but trend line analysis shows that requests in all areas are trending upwards.
- Science shows the highest variability with a peak 3,784 requests in 2012 followed by a two-year decline then rebounding to 3,513 requests in 2015.
- Social Science’s highest year is 2015 with 2,121 requests.
- Humanities requests appear relatively consistent but did dip in 2014.
- General requests represent such a small percentage of the requests that any changes are difficult to see in the graph. Where other subjects had requests in the thousands, General requests were in the low hundreds and relatively consistent in number.

Figure 2. Distribution of Article Requests by Broad Subject Category



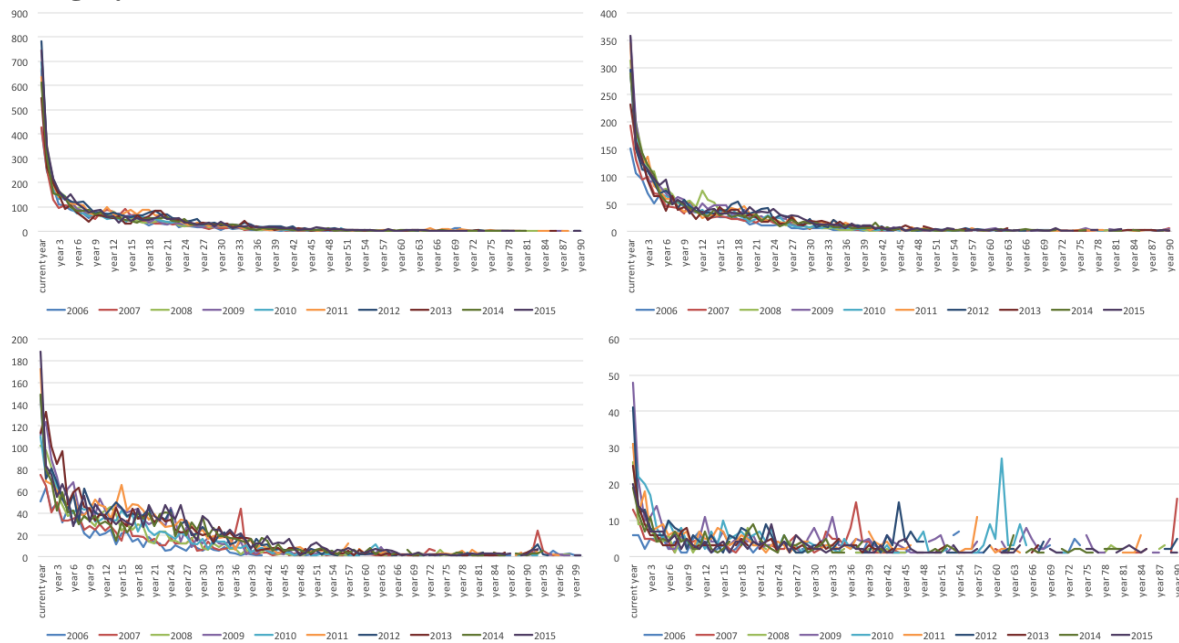
The impact of open access is more likely to be seen in requests placed within the first two years of publication rather than in the total number of requests. Unless an article is published in an open access journal, it is frequently under embargo for 12-18 months before being made available via an aggregated database or open access repository. Assuming an embargo period of 12-18 months for traditional publications and lacking data regarding publication month, the authors considered requests for articles with a relative age of 0-2 years. Articles in the current (relative age 0) and first year of publication can be assumed to be in their embargo period. Due to variations in the length of embargo periods, articles in their second year may still be embargoed or may have begun to age into availability.

Figure 3. Demand Curve by Relative Age of Total Article Requests



When Hesburgh Libraries and IUPUI University Library requests are combined and considered by relative age, the most commonly requested articles have a relative age of 0, meaning they are requested in the same year that they are published. This is consistent across the full decade considered by this study; demand for the current year dominates followed by a sharp decline over time (see Figure 3). As expected the demand for Sciences articles falls most rapidly while the Humanities demand curve is less precipitous. The demand curve for Social Sciences articles falls between those of the Sciences and Humanities. Demand for General materials still declines sharply, but has more sporadic demand for older content (see Figure 4). All of these reflect the nature of the disciplines they support and the content of those Library of Congress ranges. The demand curves in Figures 3 and 4 show relative age 0 through 90 to make the variations in the earlier years more visible.

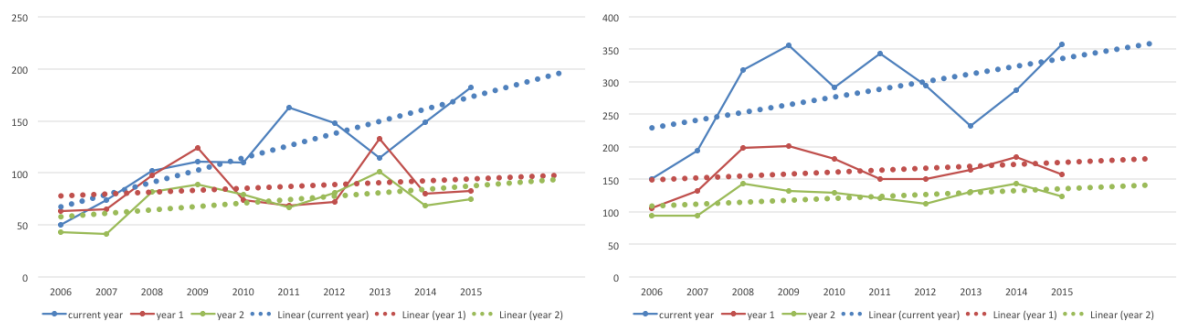
Figure 4. Demand Curve by Relative Age of Article Requests by Broad Subject Category (shown in order-- Sciences, Social Sciences, Humanities, General)

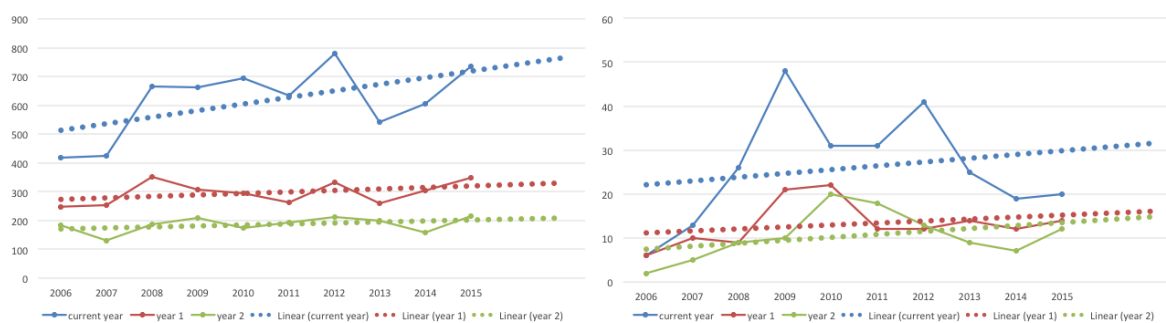


While Figures 3 and 4 clearly demonstrate that demand through interlibrary loan is for the most current content, the scale masks any impact from open access. It is while looking at the data for these critical years (relative age 0-2) that trends begin to emerge within the disciplines. While linear regression analysis shows that articles requests overall are steadily increasing for both institutions, there are some fluctuations occurring within disciplines at specific relative ages.

In the Humanities, the demand for current year content is increasing rapidly whereas demand for years one and two shows much slower growth. Social Sciences requests show a steep increase for current content and almost identical growth for years 1 and 2. Sciences requests, the area where one might expect to see a greater impact from open access due to the public access mandates of government funders such as the National Institutes of Health (NIH), show growth in demand for current content and modest to almost no growth in years 1 and 2, with little change both before and after the institution of public access mandates (see Figure 5). Due to the relative maturity of the NIH public access mandate, further study of Sciences requests is needed to determine whether such mandates have an impact on ILL.

Figure 5. Distribution of Article Requests by Relative Age and Broad Subject Category (shown in order -- Humanities, Social Sciences, Sciences, General)





The authors were operating under the assumption that if open access were having an impact on interlibrary loan, that effect would be most apparent in Sciences articles of relative age 0-2. Open access versions of many articles only become available following a 12-18 month publisher embargo. Fewer interlibrary loan requests for materials with a relative age of 1-2 would therefore suggest that scholars are obtaining that material from other sources. While there is less growth in the number of Sciences requests received for articles with a relative age of 1 or 2, the authors did not find a strong indication of an open access impact in this preliminary analysis.

Though the authors are unable to definitively assert an open access impact on ILL based on this preliminary analysis, several interesting observations can be made. First, one would expect demand for current year articles to be growing due to 12 month embargoes allowed by public access mandates as well as the fact that researchers are slow to move away from publishing in traditional journals with high impact factors. Second, there is an anecdotal assumption that humanities scholars are slower to move towards open access, and the data do show a more rapid increase in the number of requests for current content than other areas. This suggests that perhaps humanities scholars have less access to needed materials through an open access channel. Finally, Social Sciences requests appear to be trending up but are anemic in comparison to other subject categories. This is an area to watch, especially in light of Elsevier's recent purchase of the Social Sciences Research Network (SSRN), a popular open access subject repository containing more than 500,000 documents.

Conclusion

A growing amount of content is being shared through open access models such as open access journals, post-publication archiving per funder mandates, and self-archiving in institutional and/or subject repositories. However, there are other environmental factors for which it is difficult to fully account. Foremost among these is the personal sharing of content outside "traditional" open access channels. The technology for more direct downloading and sharing of documents between researchers, as opposed to open access models or interlibrary loan, has existed for some time. Websites and services to facilitate collaboration and sharing among researchers have developed over the course of the last decade. Some of those services and their introduction date are listed below. The introduction dates are taken from the websites themselves unless otherwise noted.

- 2005 Box.com
- 2007 Dropbox.com
- 2008 ResearchGate.net and Academia.edu
- 2011 #icanhazpdf (Gardner, 2015)
- 2011 Sci-Hub (Bohannon, 2016b)
- 2012 Google Drive

Though created in 2011, Sci-Hub is the most recent sharing mechanism to be in the spotlight. The site was created by a Kazakhstani graduate student, Alexandra Elbakyan, to address her “frustration with the barriers that scientists face,” especially in developing parts of the world (Bohannon, 2016a). Elsevier sued Elbakyan and succeeded in procuring a judicial order for Sci-Hub to cease operations in October 2015 (Banks, 2016). However, Sci-Hub continues to operate as it moves from domain to domain (Banks, 2016).

Six months later, attention grew when an article by John Bohannon was published in *Science* titled, “Who’s Downloading Pirated Papers? Everyone.” A look at the accompanying data visualization map shows 402 Sci-Hub download requests in the immediate South Bend, Indiana, area and only 872 requests that appear to be within Marion County, which is roughly equivalent to the city of Indianapolis. These figures are miniscule when compared to the overall download requests for the same period (28 million) or the figures cited in other university cities such as Columbus, Ohio (19,000) or East Lansing, Michigan (68,000) (Bohannon, 2016b). Though Sci-Hub use certainly cannot explain the reduction in growth of relative age 1-2 article requests, taken in combination with other sharing platforms, it may play a role. The question we are unable to answer is: “Is the slowing growth in interlibrary loan article requests a result of legitimate open access avenues, illegal sharing of copyrighted materials, or some combination of the two?”

In the hopes of coming closer to an answer, the authors plan to conduct a fuller analysis of the article request data set, including a more granular look at requests by broad subject category and the relationship of relative age to these categories. The slowing growth of relative age 1-2 requests may be due to an actual decline in one or more subject areas with stronger ties to the open access movement. To test this hypothesis, the authors plan to look more specifically at Health Sciences article requests to assess the possible impact of public access mandates.

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