

The relationship between ILL/document supply and journal subscriptions

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Abstract

Purpose: The purpose of this article is to provide insights into the relationship between ILL/document supply and journal subscriptions and to assess recent trends in the ILL service.

Design/methodology/Approach: This survey is based on data from the ILL service conducted over the five year period 2005-2009 through the Italian NILDE (Network for Inter-Library Document Exchange) network.

Findings: This article bears out important previous findings that ILL is not used as a surrogate for journal subscriptions. This is supported by the analysis of a broad number of titles and over a wide time-range. On the contrary, analysis of data transactions, particularly of the most requested journals, can bring about positive effects on new title acquisitions and negotiations with publishers. This paper also shows, at least for Italy, an overall growth and vitality of ILL, in spite of the widespread availability of e-journals acquired through consortia purchasing.

Originality/Value: An insight into the relationship between ILL and journal subscriptions in Italy, a country where few studies have been carried out, and none at all for such a large number of libraries and transactions.

Keywords: interlibrary loan, ILL, resource sharing, document supply, electronic journals, consortia purchasing, Italy

Paper type: Research paper

Introduction

The relationship between the Inter Library Loan service (ILL) and journal subscriptions is a recurring issue in recent literature. Does ILL affect electronic or print journal subscriptions? Vice versa, do electronic journal subscriptions affect ILL?

This study, based on an analysis of the nationwide ILL service in Italy (the authors will use ILL to refer to the supply of copies of journal articles and other non-returnable materials), examines the relationship between ILL and journal subscriptions. The Italian survey presented not only confirms important previous results, but also casts new light on these issues.

To investigate the nature of the relationship between ILL and journal subscriptions in the digital era, it is useful to see the service in the context of copyright law. This matter has been well described by Simonetta Vezzoso: *“The Inter Library Loan service has a long and commendable history based on the idea that documents should be accessible to a patron independent from the latter's location. However when ILL started developing into the supply of a surrogate copy (photocopy) of the requested document, it met fierce opposition from publishers, who were fearing substantial loss of their revenue. The introduction of electronic document supply greatly increased these concerns, in particular with regard to articles published in scientific and technical journals. In fact, publishers consider that the possibility of patrons obtaining copies of articles at almost the same speed as if they were available by subscription to an e-journal would give libraries even more reason to cancel subscriptions thus affecting the normal exploitations of works and the legitimate interests of rights holders.”* (Vezzoso, 2006).

On the other hand, libraries want to be able to offer an ILL service that meets their patrons increased information needs and expectations of quick delivery of the requested materials. Thanks to the new integrated platforms based on the OpenURL standard (NISO, 2005), such as SFX journal citation link resolver and similar systems, high level integration at the user-interface has been reached for many library resources and services: library catalogs, bibliographical databases, full-

text journals, document supply and other available electronic resource. There is no reason why the ILL service must remain anchored to the past, not benefitting from the technology improvements.

Electronic ILL involves complex copyright issues, many of which have been raised in a case involving Subito, the German library document supply service, (Vezzoso, 2006). In particular, the compliance of electronic ILL services with the Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights (SocInfo Directive) was questioned by publishers, fearing economic damage to journal subscriptions caused by ILL.

However, the ILL activity carried out by libraries, even with “point-to-point” electronic transmission of the “graphic document”, does not appear to conflict with the SocInfo Directive’s article 5 (limitations and exceptions), (Vezzoso, 2005). Besides, overcoming the “three-step test” barriers¹, requires verification of the link between ILL and the loss of income to publishers. Such an evaluation should not be driven by preconceptions or the fear of loss of income. It should be considered not only for present but also future potential loss of income deriving not only from cancellations of current subscriptions, but also from the loss of new titles subscriptions.

Literature Review

Several important studies have been carried out in libraries on the impact of document delivery and ILL on journal subscriptions. All of them conclude that ILL does not affect subscriptions. For example, Woodward, finds that “*the prime motivation in forcing cancellations are user interests and financial pressures; alternative access to the journal by the replacement of subscriptions with borrowing is marginally important*”, (Woodward, 1978). Later, Russon concludes that “*ILL is not used as an alternative to subscriptions; ... the majority of ILL use is from institutions which have only occasionally need to consult a journal*” (Russon and Campbell, 1996). Another survey sponsored by The International Council for Scientific and Technical Information, reached similar findings: “*Publishers need not worry that institutions are using document supply as a realistic alternative to subscribing to journals. None of the organizations surveyed came anywhere near the break-even point at which it would be more economic to subscribe to a journal rather than use document supply for the few requests for articles made*”, (ICSTI, 1996). A wider study reported both by Russon and Murdoch, carried out at the British Library in cooperation with 15 publishers and the Canada Institute for Scientific and Technical Information, concludes that “*There is a real need from a large number of organizations for article supply.... Apart from a handful of instances, it doesn’t seem plausible to argue that document supply is having any discernible effect on subscriptions*”, (Russon, 2001), (Murdoch, 2001). A study at Illinois University and state libraries during 1996/1997, found that the highest average number of requests per title did not exceed the Copyright Guidelines CONTU² “rule of five”. They found that: “*While there are probably some individual titles generating more requests than the rule of five, it is reassuring to see that overall, the average is within copyright guidelines*”. In a follow-up study they confirmed that “*libraries continue to operate well within the copyright guidelines set by CONTU*”, (Wiley and Chrzastowski, 2001), (Wiley and Chrzastowski, 2005).

When we consider the reverse situation – that of the impact on ILL of e-subscriptions, we have to consider the great impact of the new consortia deals which publishers and libraries have adopted since the late 1990s, resulting in an enormous increase in e-journal availability. A number of studies

¹ The three-step test - by which limitations on exclusive copyrights are confined to 'certain special cases' which do not conflict with a 'normal exploitation of the work' and do not 'unreasonably prejudice the legitimate interests of the author'- is among the most enduring of standards affecting limitations on intellectual property rights. See (Senftleben, 2004).

² The CONTU guidelines on generally accepted document delivery practices were negotiated in the seventies between publishers and libraries by the National Commission on New Technological Uses of Copyrighted Works in the USA.

have suggested a link between the adoption of Big Deals and the decline in document supply in many countries – see for example, (Line et al. 2002), (Kidd, 2003).

Research from Spain, (Echeverria and Barredo, 2005) reported statistical data for document supply in Spanish university libraries, showing a 17% decrease between 2000 and 2002. Document supply in French university libraries showed a 27% decline between 2000 and 2002, (Gillet, 2008), and concluded that, “In general, the use of document delivery in university libraries has decreased since the introduction of a critical mass of online journals from 2000 onwards.” Research from Illinois reported a decline of nearly 26% from 1999 to 2003 in the number of ILL requests, (Wiley and Chrzastowski, 2005). An analysis, between 2003 and 2007, found a significant drop of 37% in document supply activity at the National Health Service North West libraries in the UK, (Glover et al., 2007). Data analysis of over 2.2 million ILL requests in the National Library of Medicine’s DOCLINE system from 3,234 US and Canadian medical libraries found that, despite the 24-fold increase in searching the medical literature via PubMed, the total number of ILL requests increased by only 22.5% to its peak in 2002 and has declined since then to nearly the 1992 level, (since the 2002 peak, decline has been between 6% and 9% each year), (Lacroix and Collins, 2007). In contrast, the Association of Research Libraries (ARL) study on Assessing ILL/DD services (Jackson, 2004), showed that ILL continued to grow even with the widespread introduction of big deals, so that the increase of the number of electronic journals available does not always lead to the reduction in ILL requests. The increasing trend is still true, as can be seen in the 2004-2009 statistical usage data published on the ARL website [1].

An interesting result was found in the Japanese university context, where an apparently stable and slow increase in the total number of requests from 1994 to 2007, actually hid a significant change in researchers’ information requirements. Requests for photocopies of foreign journal articles increased until the late 1990s and then, from 1999, they began to steadily decrease, caused by the advent of Big Deal consortial agreements involving those foreign journals, the requests for domestic journal articles grew and eventually exceeded those for foreign journals, (Tutiya et al., 2007), (Koyama et al., 2009).

To sum up, there is no clear trend found in the literature and the impact on ILL of e-subscriptions, especially on Big Deal consortia purchases, has not yet been fully assessed.

In this study we investigate ILL activity in Italy through the NILDE (Network for Inter-Library Document Exchange) network over the five-year period 2005-2009. The data relate to more than 600 Italian libraries belonging to university, public research institutions, health research institutions, hospitals and not-for-profit organizations using ILL on a reciprocal basis. Within the NILDE network every library acts both as a provider and a borrower.

The results obtained from our study show that ILL undoubtedly is not being used as a surrogate to journal subscriptions. On the contrary, analysis of ILL data transactions could bring about positive effects on new contracts and negotiations with publishers. A knowledge of the most requested serial titles via ILL may provide to both library collection and consortia managers very useful insights to help guide electronic journal acquisitions including the evaluation of new consortia purchasing of the most requested titles via ILL.

Many previous studies, with the exception of ARL, show that ILL demand has declined after the advent of Big Deal contracts. Most of them compare ILL requests data before and after the adoption of Big Deals (this happened in almost all countries, including Italy, between 1999 and 2002, when contracts with big publishers such as Elsevier, Kluwer and Springer were signed).

The NILDE data used in the present study relate to a period of the “consolidated” Big Deal era. Since the NILDE network of libraries was established during 2004, there are no data to compare before or after the advent of Big Deal contracts in Italy. We may assume, on the basis of communications with libraries, representative in size and subject, - for example, (Mangiaracina and Beghelli, 2004) - that the access to Big Deal e-journals has led to a fall in requests between 2001 and 2003. The aim of this paper is not to compare our data with the pre-Big Deal era of ILL, but to

assess recent trends in the ILL service. The results obtained show an overall growth and vitality of ILL, in spite of the great availability of e-journals acquired through consortia purchasing.

The NILDE system and network of libraries

The NILDE system was initially developed at the Italian National Research Council's (CNR) Bologna Research Area Library with the aim of improving ILL services based on Internet technologies and to promote cooperation between the CNR and Italian university libraries, (Mangiaracina, 2002).

The initial vision for NILDE was:

- to create web-based ILL-manager software to computerize the entire ILL workflow activity and to allow secure electronic transmission of documents;
- to promote a cooperative model based on quality of service, which libraries might pursue on a national, regional or disciplinary affinity basis;
- to initiate a virtuous interactive cycle in Italy: if each library had the chance to measure its lending turnaround time it could be compared with the performance of other participants. It has been shown, (Mangiaracina et al., 2008) that this stimulates libraries to improve their service. As a consequence, not only will the requesting libraries benefit but, eventually, so will the overall system and the end-users.

These initial expectations have now been met and have led librarians to see NILDE as an essential daily working tool, used currently by 728 libraries: 75% are university libraries, 10% are health research institutes and hospitals, 6% are public research institutions, and 9% are other public and not-for-profit organizations.

The NILDE software was developed in 2000 in an Open Source Software environment, using Linux O.S., Apache Web server, MySQL and PHP. The 4.0 software release adds the use of cutting edge web technologies, usually referred to as Web 2.0 and includes MySQL 5, PHP 5, XHTML 1.0, CSS2, Ajax. New features and innovative user-interaction styles are introduced in order to make NILDE an even more user-oriented and friendly tool for ILL and scholarly work, (Mangiaracina et al., 2008).

NILDE's present features comprise:

- a suite of ILL manager software modules which support borrowing and lending among libraries, including a statistical package which generates ILL performance indicators, such as fill rate and turn-around time;
- an electronic transmission module providing Secure Electronic delivery by uploading files to a web server. Pdf files are "hard-copied", that is, automatically converted to graphic files, in order to comply with ILL clauses in electronic licenses that usually do not allow the sending of the publisher's original Pdf file, but only of a printed copy, (Zaetta and Mangiaracina, 2008);
- Z.39.50 implementation to search the Italian Catalogues within the NILDE (borrowing) environment;
- a dedicated end-user module to manage personal bibliographical references, allowing users to easily import, organize and export references, and to initiate an ILL request when the document is not directly accessible (from any bibliographic database, via Open-URL);
- federated end-user authentication via Shibboleth;
- a software-like user interface, Web 2.0 style, and a fully customizable environment;
- multilingual support;
- compliance with W3C guidelines for accessible and usable web development.

Since 2004, in order to join NILDE [2], each library must subscribe to the NILDE Rules and Regulations [3], agreeing to:

- a) reciprocally supply documents;
- b) facilitate access to its holdings, through joining at least one Italian common catalogues or meta-catalogues;
- c) supply documents as soon as possible;
- d) supply documents at no charge and, in the case of high usage, request a one-off payment at the end of the year;
- e) distribute its requests equally between all libraries.

All libraries are required by the NILDE Rules and Regulations to comply with Italian copyright law and, where applicable, the permitted uses of ILL according to specific electronic licenses.

Unless licenses explicitly allow the electronic delivery of documents, either as a Pdf file or a scanned printed copy, libraries agree to supply patrons only with a printed copy of the document, even if the library possesses a digital copy.

Thanks to the rapid and ongoing growth in membership, the evolution of NILDE has shown just how urgent the need was in Italy for the adoption of standardized and structured processes for ILL services by implementing best practices in resource sharing.

It should be noted that although NILDE is the most popular and widespread system employed for ILL requests (of copies of articles and other non-returnables) in Italy, libraries may also use other systems, therefore, this study does not cover all requests.

Methodology

ILL transactions analysis is an important instrument for monitoring the network's performance and underpins the decisions and future strategies of library managers. A preliminary study, (Filippucci et al., 2009) focused on two important aspects: firstly an analysis of NILDE network performance in terms of turnaround time, reciprocity factor and requested/supplied documents imbalance, and secondly an analysis of the most ILL requested serial titles and their relationship to consortia e-only acquisitions. In this paper we present more insights on the latter issue taken from our study described below.

Data on filled and unfilled ILL requests from 2005 to 2009 were extracted from the NILDE online database and stored in a new local "warehouse" a MySQL database called Whnilde. Library identities in the Whnilde database are anonymous.

Unfortunately, bibliographic metadata associated with ILL transactions, particularly journal titles, are neither complete nor available in a standard format. Total filled requests within the five-year period were 491,414 and referred to 49,886 apparently unique titles. Actually, many titles appeared in different versions and it was necessary to identify each unique title for statistical analysis. Table 1 is an example of diversity in title forms encountered. Heterogeneity has several causes, as the request form can be completed in many different ways. Even a blank space could cause a duplication of the same title. Variations may occur due to:

- the request originating from catalogues using different rules for title cataloguing
- the NILDE software is OpenURL-compliant: the references derive from databases such as Pubmed, ISI Web of Science or Scifinder Scholar using different standards for titles (i.e., full or abbreviated title)
- manual input with spelling mistakes or non-standard title abbreviations

*Journal of agricultural and food chemistry
*Journal of agricultural and food chemistry (Online)
J Agr. Food Chemistry
J Agric Food Chem
J Agric Food Chem DEP VET VIII B
J Agric Food Chem.
J. Agric. Food Chem
J. Agric. Food Chem.
j. agric. food chemistry
J. agric.Food Chem
J.Agric. Food Chem.
J.Agric.food chem.
Journal Agricultural and food chemistry
Journal Agricultural Food Chemistry
Journal Agricultural Food Chemistry.
Journal of Agricultural and Food Chemistry
Journal of Agricultural & Food Chemistry
Journal of Agricultural and Food Chemistry
Journal of Agricultural and Food Chemistry.
journal of agriculture and food chemistry

Table 1. Example of title variety: at the beginning of the analysis the title “Journal of agricultural and food chemistry” appeared in 20 different versions.

A librarian can cope with such variations, but software cannot. The initial list of 49,886 titles was refined through both an “ad-hoc” software tool and eventually by manual intervention of the authors. The software tool used to standardize titles uses PHP5 and MySQL and comprises two procedures: title pre-processing and title consistency. The latter searches the database and overwrites each title in standard form. The pre-processing tool receives a csv (*comma-separated values*) file input and generates a new UTF8-XML file as output. Data in the csv file must be arranged in two columns, each row containing two values: an “alias”, which can be represented as an ISSN, eSSN, or a title abbreviation, and a “name” which contains the standard form of the title.

Several sources were used to standardize titles: three lists of serials from Thomson Reuters web site containing ISSN and full journal titles (Science Citation index, Social Science Citation Index and Arts and Humanities Citation Index journals) [4]; the American Chemical Society CPlusSM Core Journal Coverage List containing journal abbreviations and their full titles [5]; a list of full journal titles, containing ISSN, eSSN, and NLM journal abbreviations from the National Library of Medicine web site [6]. Unfortunately, the proportion of ILL requests having an ISSN was low thus standardization of titles based on ISSN was inadequate. After several cycles of running the title standardisation tool, final manual interventions assessed the number of unique journal titles at 23,810. There were 3,741 requests for monograph parts (earth sciences and physics were the most requested), which was less than 1% of all ILL transactions.

ILL data transactions were then analyzed using MySQL queries against the Whnilde database. Summary data were later exported from MySQL and imported into Excel for the authors to elaborate, study, format, and present. Statistical analysis was performed using SPSS 18.0 (SPSS Inc, Chicago, IL).

Results and discussion

The aim of this study is to present a quantitative and qualitative analysis of journal titles shared by Italian libraries through their ILL service. There are few Italian studies on the subject, and this is the most extensive in terms of libraries involved and ILL requests examined.

Results from ILL article sharing among NILDE libraries, over the five year period 2005-2009, show an overall rise in ILL activities.

Total NILDE requests and network use

Table 2 shows the number of borrowing libraries, the total number of requests, filled and unfilled, the average number of filled requests per library and the number of journal titles used in each year of the study. We can see an upward trend in all of them.

	2005	2006	2007	2008	2009
Borrowing Libraries	496	520	558	602	633
Total requests	86,320	100,643	113,250	121,212	137,065
Filled requests	75,652	87,846	99,083	106,908	121,925
Unfilled Requests	10,668 (12.4%)	12,797 (12.7%)	14,167 (12.5%)	14,304 (11.8%)	15,140 (11.0%)
Average number of filled requests/library	153	169	178	178	193
Unique journal titles	6287	6962	7823	7960	8471

Table 2: NILDE network document supply data over the five-year period 2005-2009

This growth could be explained by the net increase in the number of libraries joining the network. The NILDE network is continuously changing, due to the large number of libraries joining and some of them leaving in a given year. The number of libraries joining has been constantly growing. These elements of flexibility also suggest a more careful approach in evaluating the growth of ILL requests, since data sets may be affected by such a continuously changing framework. However, the 26% increase in the average number of requests per library indicates a real increase in ILL activity across Italian libraries. This is in line with the ARL experience.

To understand whether ILL growth may be attributed to some specific group of libraries, Figure 1 shows ILL requests grouped by the borrower's disciplinary fields.

Insert Figure 1 here

Figure 1 shows that increases occurred in all disciplines but Biomedicine and S&T libraries dominate in terms of volume and are responsible, respectively, for more than 50% and 30% of all transactions.

Journal title use

Table 2 also shows a remarkable growth in unique journal titles year by year, showing a greater diversification in end-user needs to support their research. Figure 2 illustrates the distribution of title use. 30% (7,187) of titles were requested only once over the five-year period by all the NILDE libraries. 60% (14,322) of titles were requested no more than five times, thus on average less than once a year. Only 5% (1206) of titles were requested more than 100 times, thus on average more than 20 times a year and they account for 53% of all transactions. These findings are in agreement with previous studies, (Wiley and Chrzastowski, 2005), (Lacroix and Collins, 2007), (Tonta and Ünal, 2005), (Tutiya et al, 2007), and demonstrate that requests are spread over many titles and only a small number are heavily used for ILL.

Insert Figure 2 here

Date distribution of requests

Figure 3 shows the requests distribution by publication date. We note that the graph curves for older documents are similar and these results are consistent with previous studies, (Lacroix, 1994;

Lacroix and Collins, 2007). However, it also shows that the number of requests for articles published in the most recent years is high and increasing year by year demonstrating that researchers require an even higher proportion of the most recently published material than previously was the case. In fact, requests for articles published in the same year as the request rose from 11.9% to 14.9% during the period of the research.

Insert Figure 3 here

Figures 4a-4e represent the date distribution of requests in another way: requests are grouped in time-ranges, (as in Echeverria and Barredo, 2005), in order to highlight possible trends in requests for recently published and older articles.

Insert Figures 4a', 4a''-...- 4e',4e'' here

Figures 4a', 4b', 4c', 4d', 4e', are very similar year by year and reveal no trend. The left-hand column(s) show the percentage of requests for articles published in the most recent three years; they indicate a slight rise from 32% (2005) to 34% (2009): this figure agrees with those of Russon and Murdoch (Russon, 2001; Murdoch, 2001) who found that, depending on the disciplinary field, between 20% and 50% of requests were for articles published within the last three years. The right-hand column(s) showing material published more than 22 years ago also shows a rising trend from 13% (2005) to 18% (2009). However, it is only an apparent growth, brought about by the shift forward of data each year (that is, the percentage of requests for articles published up to 1982, in each year from 2005 to 2009, does not change).

Pie charts in figures 4a'', 4b'', 4c'', 4d'', 4e'', provide further insight into the publication date distribution of requests within the last three years, showing that current publications are increasingly involved in document supply.

Since most Italian universities and research institutions have been accessing many multidisciplinary collections purchased through library consortia in the form of Big Deals or disciplinary journal packages and are, at the same time, responsible for a large number of ILL requests, our findings demonstrate, at least for Italy, an increasing request for recently published documents probably not belonging to big publishers.

The following part of the study focuses upon the most requested journals, through quantitative and qualitative analysis, in order to clarify what users mainly request and why their requests are increasing.

Most requested journals

From here onwards, we narrow our analysis to requests for articles published within the previous five years, for several reasons:

- more than 80% of requests come from S&T and biomedical users, interested in reading and citing recent literature;
- since our request data range between 2005 and 2009, taking into account only requests for articles published within the previous five years implies a range of publication years between 2000 and 2009 – that is, a time period equally affected by Big Deal licenses;
- older publications, at least in the S&T and biomedical fields, do not affect decisions on subscriptions;
- the data interval is large enough to highlight possible trends.

Table 3 shows the top 10 requested titles in each year and some interesting information emerges.

2005	
Requests	Journal Titles
240	Annals of The New York Academy of Sciences
152	Oncogene
146	Anticancer Research
129	Archives of Internal Medicine (1960)
115	Hepato-Gastroenterology
109	Journal of Pediatric Endocrinology & Metabolism
105	Current Pharmaceutical Design
98	Current Medicinal Chemistry
93	British Journal of Cancer
84	International Journal of Oncology
2006	
Requests	Journal Titles
397	Annals of The New York Academy of Sciences
146	Anticancer Research
133	Current Pharmaceutical Design
104	Current Medicinal Chemistry
96	Methods In Molecular Biology
94	Kidney International
91	Hepato-Gastroenterology
87	Radiation Protection Dosimetry
85	Journal of Food Protection
82	Journal of Endocrinological Investigation
2007	
Requests	Journal Titles
286	Annals of The New York Academy of Sciences
198	Anticancer Research
162	Current Medicinal Chemistry
151	Current Pharmaceutical Design
140	Methods In Molecular Biology
122	Expert Opinion on Pharmacotherapy
111	Progress In Brain Research
104	Drugs
104	Journal of Pediatric Endocrinology & Metabolism
102	Hepato-Gastroenterology
2008	
Requests	Journal Titles
226	Current Medicinal Chemistry
181	Expert Opinion on Pharmacotherapy
173	Circulation
172	Current Pharmaceutical Design
168	Anticancer Research
167	Nature Protocols
150	Proceedings of The National Academy of Sciences of The United States of America
134	Oncogene
128	Journal of Clinical Oncology
125	Chest
2009	
Requests	Journal Titles
253	Current Pharmaceutical Design
246	Frontiers In Bioscience
225	Current Medicinal Chemistry
206	Anticancer Research
201	Expert Opinion on Pharmacotherapy

179	Progress In Brain Research
173	Methods In Molecular Biology
172	Nature Protocols
169	Science (Washington, D.C.)
168	Journal of Endocrinological Investigation

Table 3: Most frequently requested titles

In 2008 the top title, “Annals of the New York Academy of Sciences”, suddenly disappeared. Access to the full-text through the Wiley-Blackwell consortia subscription is the most plausible and simple explanation. Since university and research institution end-users can quickly download Pdf articles whenever they need them, requests for this journal have fallen dramatically. This is an example of consortia purchasing having a big impact on document supply. As said before, ILL data before 2005 are not available, however what happened to this title could give a hint of what had happened in Italy at the beginning of the Big Deal era and its impact on ILL.

Surprisingly, *Science*, probably the most widely held journal in Italian S&T libraries, appears in the 2009 top ten list. In 2008 the Italian National Research Council (CNR), the largest government research institution in Italy, discontinued its subscription to Science Online because of disagreements with the publisher regarding the dramatic increase in the requested subscription price. This caused several CNR libraries to use ILL to satisfy their researchers’ needs. It should be noted that Science Online provides free access to research articles one year after publication. Since one of the authors has been directly involved in the exhausting, three-year long, price negotiation with the publisher, we can say that an agreement satisfying both parties has recently been reached and, seemingly, CNR will subscribe again to Science Online from 2011. This case demonstrates the importance of implementing a national resource sharing policy to make sure libraries have access to scientific information and to withstand publisher demands for unreasonable price increases.

Quantitative analysis of the most requested journals

Table 4 shows the number of unique journal titles borrowed more than 20 times per year and the corresponding number of filled requests.

	2005	2006	2007	2008	2009
Titles requested ≥ 20 times*	448 (7%)	523 (8%)	597 (8%)	647 (8%)	781 (9%)
Total requests corresponding to titles requested ≥ 20 times**	15,247(20%)	18,541(21%)	22,308(23%)	25,942(24%)	33,524(27%)
Average borrowings/title by same library	2.0	2.0	2.1	2.1	2.2
Average lendings/title by same library	6.8	7.1	8.3	8.7	8.9
Average ratio between #borrowing and #lending libraries per title	2.9	3.8	4.5	4.6	4.5
Average top use of titles per library	6.9	7.1	7.7	7.7	8.4
Highest use per title range	1-35	2-89	2-38	2-105	2-94

Table 4: Highly used titles (requested more than 20 times in a year), average and top use per title.

*In round brackets the percentage with respect to the total number of used titles

** In round brackets the percentage with respect to the total number of requests

In this table only requests of articles published within the previous 5 years are taken into account.

A small proportion (7-9%) of the journals are responsible for a much higher proportion (20-27%) of all requests. Borrowing libraries made an average 2.0-2.2 requests for each title between 2005 and

2009. Lending libraries delivered an average of 6.8-8.9 documents for each title. We note that lending libraries have been supplying more and more articles. The average ratio of borrowing libraries to lending libraries for each title is growing too. The number of lending libraries is almost constant (for these sets of titles), while the number of borrowing libraries is growing (data calculated but not shown).

Table 4 also shows the average use of top titles per library (6.9-8.4) and the range of the highest use per title per library, for example in 2005 the most used titles ranged from 1 only to 35 requests. A closer examination of data found that rarely has a journal been heavily requested by the same library. This happened only once over the five-year period. Such exceptions are not representative of library network behaviour, which generally shows great respect for copyright law.

Previously cited studies found that non-subscriber institutions made an average of 2.4 requests per title, (Russon, 2001), (Murdoch, 2001). In order to answer the question “is document supply an alternative to subscription?”, Russon states that “*reasonably, the vast majority of organizations are using document supply to meet very occasional needs*”. However, the 2001 survey examined a limited number of titles (28) within a one year period (2000). The present study, which is supported by the analysis of a much broader number of titles and a longer time-scale, bears out the findings of both Russon and Murdoch.

Thus publishers need not be concerned about ILL services threatening subscription revenues. It is also true that without an ILL service, some published articles would never have been read by researchers of non-subscribing institutions. The dissemination of information, even through document supply, is necessary for increasing the citation rate and other bibliometric indicators. Publishers benefit from a minimum level of ILL and they should support it rather than attempt to obstruct it. Since the recession has reduced library budgets, (Baveye, 2010),(Sykes, 2010), we think it is even more unlikely that libraries would purchase a subscription for a journal which is needed only a few times per year.

Qualitative analysis of the most requested journals

In order to look into the nature of highly requested titles we studied their impact factors (IF), citation counts, subject categories and publishers. Titles requested more than 20 times in each year were identified and constitute a “core” set of 224 journals (1% of total titles). These core journals account for 55,841 requests (11% of total requests), and we show the top 20 in Table 5 below.

	Journal title	Publisher*	2005§	2006§	2007§	2008§	2009§	mean requests/year
1	Anticancer Research	Int Inst Anticancer Research	146	146	198	168	206	172,8
2	Current Medicinal Chemistry	Bentham Science Publ Ltd	98	104	162	226	225	163,0
3	Current Pharmaceutical Design	Bentham Science Publ Ltd	105	133	151	172	253	162,8
4	Expert Opinion on Pharmacotherapy	Informa Healthcare	32	80	122	181	201	123,2
5	Methods in Molecular Biology	Springer	70	96	140	121	173	120,0
6	Hepato-Gastroenterology	H G E Update Medical Publishing S A	115	91	102	115	141	112,8
7	Oncogene	Nature Publishing Group	152	80	99	134	96	112,2
8	Proceedings of the National Academy of Sciences of the United States of America	Natl Acad Sciences	53	77	96	150	145	104,2
9	Journal of Endocrinological Investigation	Editrice Kurtis S R L	58	82	98	97	168	100,6

10	Drugs	Adis Int Ltd	46	65	104	110	131	91,2
11	Advances in Experimental Medicine and Biology	Springer	72	81	73	107	119	90,4
12	Journal of Clinical Oncology	Amer Soc Clinical Oncology	72	64	64	128	117	89,0
13	Neurology	Lippincott Williams & Wilkins	70	72	70	107	123	88,4
14	The New England Journal of Medicine	Massachusetts Medical Soc	52	79	65	117	123	87,2
15	Journal of Pediatric Endocrinology & Metabolism	Freund Publishing House Ltd	109	63	104	73	82	86,2
16	The Annals of Pharmacotherapy	Harvey Whitney Books Co	48	61	87	98	132	85,2
17	Science (Washington, D.C.)	Amer Assoc Advancement Science	38	73	45	99	169	84,8
18	Leukemia & Lymphoma	Taylor & Francis Ltd	56	66	69	87	142	84,0
19	European Journal of Gynaecological Oncology	I R O G Canada, Inc	63	80	77	91	105	83,2
20	Journal of Agricultural and Food Chemistry	Amer Chemical Soc	64	71	59	76	142	82,4

Table 5: Top 20 titles among core journals.

*Data about publishers refer to the last upgrade of Journal of Citation Reports 2009 (Thomson Reuters), as retrieved on June 16th, 2010

§Filled requests of articles published over the last five years.

Figure 5 shows the impact factor (IF) range distribution of core titles: 4.5% of titles (10) have no IF, 78.1% have an IF between 0 and 6, 17.4% have an IF higher than 6.

Insert Figure 5 here

The average IF is 4.813, the median is 2.750. There are 11 titles with an IF between 26.483 and 47.050 which are all published by the Nature Publishing Group, with the exception of The New England Journal of Medicine. If we exclude these titles, the average IF decreases to 3.410 and the median to 2.695.

The IF is a much criticized index in bibliometrics and it is well known that it is not suitable for comparing journals in different disciplines. An average IF of 4.813 could be a great or a risible value depending on the journal subject. The most requested title in Table 5, *Anticancer research*, has a 2009 impact factor lower than 1.5. We analyzed the correlation between IF values and ILL requests for core titles. No correlation was found between the frequency of use of 224 core titles measured by the number of ILL requests in 2009 and their 2009 impact factors (Pearson's $r=0,090$, $p=0,191$). Therefore, the null hypothesis that "no relationship exists between the frequency of use of core journal titles and their journal impact factors" is a valid one. This correlation is less than those found in the study by Tonta and Ünal and seems to confirm that journal impact factors cannot be used as reliable indicators to forecast the numbers of ILL requests, (Tonta and Ünal, 2005).

In order to know whether citation counts for core journals could be a more useful indicator to predict ILL requests, Pearson's correlation was calculated for the 2009 ILL requests of core journals and the 2009 total citation counts for articles published over the same period (2004-2009) in the same journals. Citation counts were taken from Web of Science (Thomson Reuters) taking into account all published items indexed in the database (articles, reviews, letters, meeting abstracts, comments and so on...). Titles not indexed in Web of Science even for one year within the period 2004-2009 were excluded. The correlation between citation counts and ILL requests in the same year was rather weak, although statistically significant (Pearson's $r=0,279$, $p<0,001$). This is consistent with the findings of previous studies (Tonta and Ünal, 2005; Schloegl and Gorraiz,

2006), but the correlation is weaker than the INIST-CNRS study, which was carried out by specifically taking into account only pharmaceutical journals (Bador et al., 2003).

Core title analysis of subject categories shows a wider distribution of journal disciplinary fields. Thomson Reuters subject categories [7], were used to assign subject categories to core journals. Some journals could belong to many subject categories (for instance, Oncogene has up to four subjects: Biochemistry & Molecular Biology; Oncology; Cell Biology, Genetics & Heredity groups). The authors also assigned subject categories to titles not included in Thomson Reuters lists.

Table 6 shows the frequency distribution of core titles per subject category. Apart from a few titles in S&T, biomedical journals dominate.

Subject area	Number of titles
Oncology	24
Clinical Neurology	16
Pharmacology & Pharmacy	16
Surgery	15
Biochemistry & Molecular Biology	14
Gastroenterology & Hepatology	13
Neurosciences	12
Endocrinology & Metabolism	11
Cell Biology	10
Nutrition & Dietetics	9
Biotechnology & Applied Microbiology	6
Genetics & Heredity	6
Hematology	6
Immunology	6
Medicine, General & Internal	6
Public, Environmental & Occupational Health	6
Radiology, Nuclear Medicine & Medical Imaging	6
Veterinary Sciences	6
Dentistry, Oral Surgery & Medicine	5
Infectious Diseases	5
Biochemical Research Methods	4
Cardiac & Cardiovascular Systems	4
Critical Care Medicine	4
Food Science & Technology	4
Medicine, Research & Experimental	4
Pediatrics	4
Peripheral Vascular Disease	4
Psychiatry	4
Rehabilitation	4
Toxicology	4
Urology & Nephrology	4
Chemistry, Analytical	3
Chemistry, Medicinal	3
Chemistry, Multidisciplinary	3
Chemistry, Organic	3
Dermatology	3
Environmental Sciences	3
Multidisciplinary Sciences	3
Obstetrics & Gynecology	3
Orthopedics	3
Pathology	3
Respiratory System	3
Rheumatology	3

Allergy	2
Biology	2
Chemistry, Applied	2
Chemistry, Physical	2
Engineering, Biomedical	2
Geriatrics & Gerontology	2
Materials Science, Multidisciplinary	2
Medical Laboratory Technology	2
Microbiology	2
Physics, Applied	2
Physics, Condensed Matter	2
Polymer Science	2
Spectroscopy	2
Virology	2
Acoustics	1
Agriculture, Multidisciplinary	1
Anesthesiology	1
Biophysics	1
Cell & Tissue Engineering	1
Engineering, Environmental	1
Geosciences, Multidisciplinary	1
Health Care Sciences & Services	1
Instruments & Instrumentation	1
Materials Science, Biomaterials	1
Meteorology & Atmospheric Sciences	1
Mycology	1
Nuclear Science & Technolog	1
Nursing	1
Obstetrics & Gynecology	1
Ophthalmology	1
Otorhinolaryngology	1
Parasitology	1
Physics, Atomic, Molecular & Chemical	1
Plant Sciences	1
Psychology	1
Sport Sciences	1

Table 6: Frequency distribution of core titles per subject category

Table 7 shows the frequency distribution of core titles per publisher and the average number of requests per title.

Publisher	Number of titles	Average number of requests/title
Lippincott Williams & Wilkins	20	218
Nature Publishing Group	17	239
Wiley	14	223
Taylor & Francis Ltd	10	251
W B Saunders Co-Elsevier Inc	10	188
Springer	8	265
Thieme	7	224
Adis Int Ltd	6	226
Karger	6	209
Elsevier Science Inc	4	248
Amer Assoc Cancer Research	3	284
Amer Medical Assoc	3	327
Bentham Science Publ Ltd	3	648
Mary Ann Liebert Inc	3	304

Oxford Univ Press	3	236
Sage Publications	3	173
Amer Chemical Soc	2	309
Amer Geophysical Union	2	221
Amer Inst Physics	2	215
Amer Veterinary Medical Assoc	2	169
B M J Publishing Group	2	221
Cambridge Univ Press	2	174
Federation Amer Soc Exp Biol	2	177
Informa Healthcare	2	441
Iop Publishing Ltd	2	148
Quintessence Publishing Co Inc	2	208
Royal Soc Chemistry	2	221
Spandidos Publ Ltd	2	369
Walter De Gruyter & Co	2	236
Academy of Neonatal Nursing	1	139
Alphamed Press	1	270
Amer Acad Pediatrics	1	270
Amer Acad Periodontology	1	299
Amer Assoc Advancement Science	1	424
Amer Assoc Clin Endocrinol	1	239
Amer Assoc Clinical Chemistry	1	213
Amer Assoc Immunologists	1	333
Amer Assoc Neurological Surgeons	1	202
Amer Coll Allergy Asthma Immunology	1	263
Amer Coll Chest Physicians	1	377
Amer College Nutrition	1	153
Amer Diabetes Assoc	1	225
Amer Inst Ultrasound Medicine	1	260
Amer Occupational Therapy Assoc, Inc	1	143
Amer Roentgen Ray Soc	1	204
Amer Soc Biochemistry Molecular Biology Inc	1	318
Amer Soc Clinical Nutrition	1	286
Amer Soc Clinical Oncology	1	445
Amer Soc Clinical Pathology	1	144
Amer Soc Nephrology	1	209
Amer Soc Nutritional Science	1	185
Amer Soc Trop Med & Hygiene	1	141
Amer Thoracic Soc	1	150
Aoac Int	1	316
Biolife Sas	1	285
British Veterinary Assoc	1	280
Cell Press	1	141
Chemical Soc Japan	1	309
Clinical & Exper Rheumatology	1	382
Cmp Media LLC	1	380
Dustri-Verlag Dr Karl Feistle	1	155
Editrice Kurtis S R L	1	503
Edizioni Int Srl	1	126
Edizioni Minerva Medica	1	206
Emap Healthcare	1	342
Endocrine Soc	1	204
Esift Srl	1	211
European Respiratory Soc Journals Ltd	1	229
F Hernandez	1	176
Freund Publishing House Ltd	1	431
Govi-Verlag Pharmazeutischer Verlag Gmbh	1	200

H G E Update Medical Publishing S A	1	564
Harvey Whitney Books Co	1	426
I C R Publishers	1	230
I R O G Canada, Inc	1	416
Il Pensiero Scientifico	1	219
Int Assoc Food Protection	1	392
Int Inst Anticancer Research	1	864
Int Medical Press Ltd	1	247
Ios Press	1	198
J Reprod Med Inc	1	238
J Rheumatol Publ Co	1	401
Johann Ambrosius Barth Verlag	1	170
Medizinverlage Heidelberg Gmbh		
Journal Bone Joint Surgery Inc	1	213
Lombardo Editore	1	180
M I T Press	1	175
Maney Publishing	1	215
Massachusetts Medical Soc	1	436
Masson Editeur	1	181
Natl Acad Sciences	1	521
Pharmacotherapy Publications Inc	1	276
Physicians Postgraduate Press	1	389
Portland Press Ltd	1	133
Pulsus Group Inc	1	123
Quadrant Healthcom Inc	1	186
Radiation Research Soc	1	221
Routledge Journals, Taylor & Francis Ltd	1	180
Royal Soc Medicine Press Ltd	1	143
Setac Press	1	243
Soc Applied Spectroscopy	1	137
Soc General Microbiology	1	163
Soc Neuroscience	1	227
Società Editrice Universo	1	184
Southeastern Surgical Congress	1	155
Thomson Reuters (Scientific) Ltd	1	159
Univ Chicago Press	1	354
Vsp Bv	1	160

Table 7: Frequency distribution of core titles per publisher and average number of requests/title (sum of all requests within 2005-2009)

Notes to Table 7: Publishers are reported as in Journal of Citation Reports 2009 (Thomson Reuters), as retrieved on June 16th, 2010. Some publishers, appearing with different names, were grouped together under a single name:

Sage Publications includes Sage Publications Inc and Sage Publications Ltd.

Wiley includes John Wiley & Sons Inc, John Wiley & Sons Ltd, Wiley-Blackwell Publishing, Inc, Wiley-Liss, Wiley-V C H Verlag Gmbh

Springer Includes Springer France

Elsevier Science Inc includes Elsevier Science Inc, Excerpta Medica Inc-Elsevier Science, Pergamon-Elsevier Science Ltd and Academic Press Inc Elsevier Science

Thieme includes: Thieme Medical Publ Inc, Georg Thieme Verlag Kg

Taylor& Francis includes: Taylor & Francis As, Taylor & Francis

Matching the core title list with the titles purchased in Italy through Big Deal consortia, we observed that: only two titles belonging to Springer have been accessible through a Big Deal subscription since 2005; only one title belonging to Elsevier has been available through the Freedom collection since 2008. Wiley requires specific considerations; almost all their titles within the core list are biomedical journals and have been available through Big Deal consortia

subscriptions. However, these journals are available to almost all university libraries, but not to all health science libraries (mainly health research institutions). A personal communication to the authors stated that a group of health research libraries is now negotiating a new contract to access the Wiley collection through subscription.

The majority of titles in the core are published by small publishing houses or scientific societies. Since these titles are rarely subscribed to through consortia packages, it is almost certain that a tail of demand for these titles will continue in the future. As library budgets are facing large cuts leading to serials cancellations and cost constraints, (Baveye, 2010); (Sykes, 2010) this tail is likely to become increasingly important. Russon's foresights are still enlightening: "*An essential issue is that when the core (... Russon was referring to Big Deal licenses) is gone, there is still a social and public policy need to make sure smaller organisations in the public or private sector have access to material published by learned society which is occasionally needed*" (Russon, 2001).

Copyright versus contract

Libraries should pay increasing attention to the licenses for access to electronic resources (databases, e-journals and e-books). Technology has made the ILL process even easier, while digital content licensing often attempts to reverse the speed of service and anachronistically increase costs of paper, toner, shipping and so on, if not to stifle it completely. The greater challenge of the restrictions imposed through electronic licenses could strongly limit the importance and institutional practice of ILL services. In fact, ILL uses for e-journals are usually permitted under certain conditions which can refer, for example, to which type of requests may be processed, how they should be processed and how the requested copies may be delivered (unfortunately, many licensors do not allow ILL at all for the majority of e-book collections).

To this end, Vezzoso underlines the importance of libraries not conceding some of their rights which are recognized by copyright law: "*A not only theoretical possibility, therefore, is that the contractual agreements on access to electronic works set aside copyright exceptions. Indeed, some view copyright limitations as default rules (not as imperative rules), to be applied when the producers, intermediaries and end users do not determine directly the conditions of use of protected material. Others fear, however, that without appropriate contractual boundaries, users may be forced to forego some of the privileges recognized by law, in order to gain access to protected material. Of course, it can be argued that at least some copyright restrictions are not merely default rules, and the question would then be if those based on the policy goal of promoting study and research should possibly qualify for any kind of special treatment. In any case, due to the lack of consensus on this rather difficult legal issue, it probably makes more sense to approach the problem pre-emptively by carefully negotiating ILL clauses in licenses for electronic works. For libraries, of course, this can be made individually or through their consortia.*", (Vezzoso, 2006).

A 2003 survey by 13 large research libraries in the Midwest of the USA on how licensing affects both the lending and borrowing operations found that negotiations can often be very effective, even though it takes time to change. With the help of libraries and library associations, publisher restrictions may gradually loosen to allow more ILL use, (Wiley, 2004).

In Italy significant progress has been made in this direction. Since 2005 within the NILDE network a working group has been created to examine the licenses on electronic journals in Italy. The purpose of the group is to foster communication between libraries and consortia and to stimulate them to be more aware about ILL clauses in electronic resource licenses (Zaetta, 2006). A database to collect ILL clauses in electronic licenses has been created [8] and continually updated and, more importantly, the NILDE system has been recognised by some publishers as a secure electronic system to supply a single paper copy or an electronic copy of (individual documents from) their licensed material. The Italian experience has proved that careful negotiation can lead to suitable licensing conditions (Ortigari 2008).

Conclusions

The purpose of this article was to provide insights into the relationship between ILL/ document supply and journal subscriptions.

The first question answered is “Does ILL affect electronic or print journal subscriptions?”.

The results of this survey of 633 Italian academic and research libraries between 2005 and 2009 show that requests are generally spread over many titles and only a relatively small number of journals (5%) are heavily used. NILDE libraries borrow 65% of articles published more than 2 years earlier, which have no effect on renewals or new subscriptions, making, on average, 2.2 requests per title per year, and each individual title is requested by many libraries.

The primary conclusion from this analysis of national journal resource sharing is that publishers need not be concerned about ILL services, since these are not being used as a surrogate for journal subscriptions. On the contrary, analysis of transaction data often has a positive effect on new title acquisitions and negotiations with publishers. The results of this paper show that publishers should support ILL in their electronic licenses, rather than attempt to obstruct it, since ILL guarantees diffusion of their published works to researchers in non-subscribing institutions.

Answering the question “Do electronic journal subscriptions affect ILL?” is more complex, since various simultaneous effects come into play. An apparently steady or growing trend can hide a more complex situation, such as a shift in demand, due to a number of factors: on one hand greater accessibility through Big Deals, digital conversion of back files and open archives can lead to a decrease, but on the other hand, increased findability and discoverability through databases and internet research engines, increases in end-user populations, changing behaviours and rising expectations due to the ease of access to ILL services, improved turn-around time and the advent of an efficient cooperative network of libraries as with NILDE all have a positive effect on ILL.

The ILL service can be affected by electronic subscriptions only when access becomes available at many institutions simultaneously, as with consortium contracts and/or Big Deals. We foresee a decline in document requests from journals included in new consortia subscriptions and conversely an increase in them with the cancellation of existing contracts.

However, some interesting observations can be drawn from this study. The 2005-2009 results show an overall growth of ILL, in spite of widespread consolidated availability of e-journals acquired through consortia purchasing. More than 80% of document exchanges are initiated by biomedical and S&T libraries, which are interested in up-to-date publications. The analysis of publication date distributions of requests shows that very recent publications seem to be increasingly involved in document supply. This finding is in contrast with many other recent studies, reporting that requests for recently published articles are declining, while borrowings for older documents is increasing.

We have studied the most requested journals over the five-year period 2005-2009 with the aim of identifying a core journal collection, that is, the most highly requested journals over the whole period. We have identified a core title collection of 224 journals and examined their impact factors, citations, subject categories and publishers. We found that apart from a few S&T titles, biomedical journals prevail. There is no correlation between IF and document supply, while citation counts are weakly correlated with ILL requests of highly used titles. The majority of titles in the core are published by small publishing houses or scientific societies.

The existence of a core collection highlights a nationwide demand for these journals which probably should be maintained nationwide, with perhaps more than one copy over several libraries. These are the titles which would be most beneficial to provide access through a consortia project, preferably in electronic format. Since small publishing houses and scientific society journals are rarely acquired through consortia, it is almost certain that a tail of ILL demand for these titles will persist and become more important.

The increase in ILL requests, mainly due to more recent publications (as shown in figure 3), leads us to suggest that this could be the first visible effect of the current economic crisis which involves not only Italian libraries. This suggestion requires further investigation to be verified, but we can

not exclude that some institutions in economic difficulties have given up subscribing to new titles or have even cancelled subscriptions to less frequently used resources, thus compensating for local needs through borrowing. The economic crisis is likely to bring about cancellations of current subscriptions and to prevent new title acquisitions, resulting in a narrowing of national journal holdings. It is no surprise that some new emerging titles belong to the core too.

This paper sets the bar for further investigation: we need to continue monitoring the situation of title subscriptions in Italy, mapping the national distribution of collections and suggesting journal acquisition priorities for libraries and for consortia. A thorough understanding of what is not available in Italy, but required by users and has to be found abroad, would be useful to develop a more efficient policy of acquisitions at a national level. A nationwide policy to make sure that holding libraries maintain the most requested journals is necessary. Cooperative efforts should be set up to guarantee the distribution of new title acquisitions over many organizations, to avoid the impoverishment/flattening of journal collections and to preserve access to material published by scientific societies and small publishers.

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Further reading

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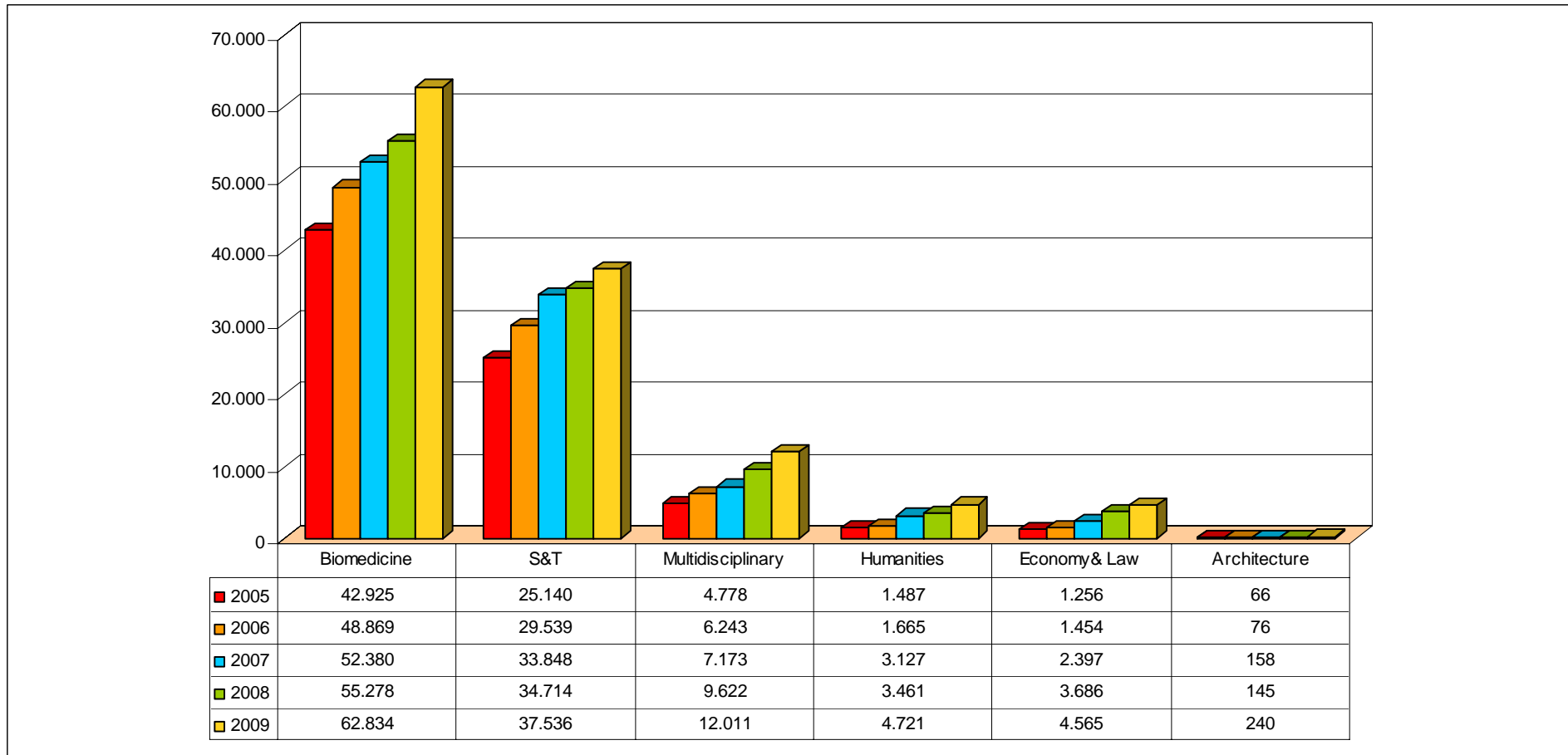


Figure 1: Filled requests per library disciplinary field over the five year period 2005-2009.

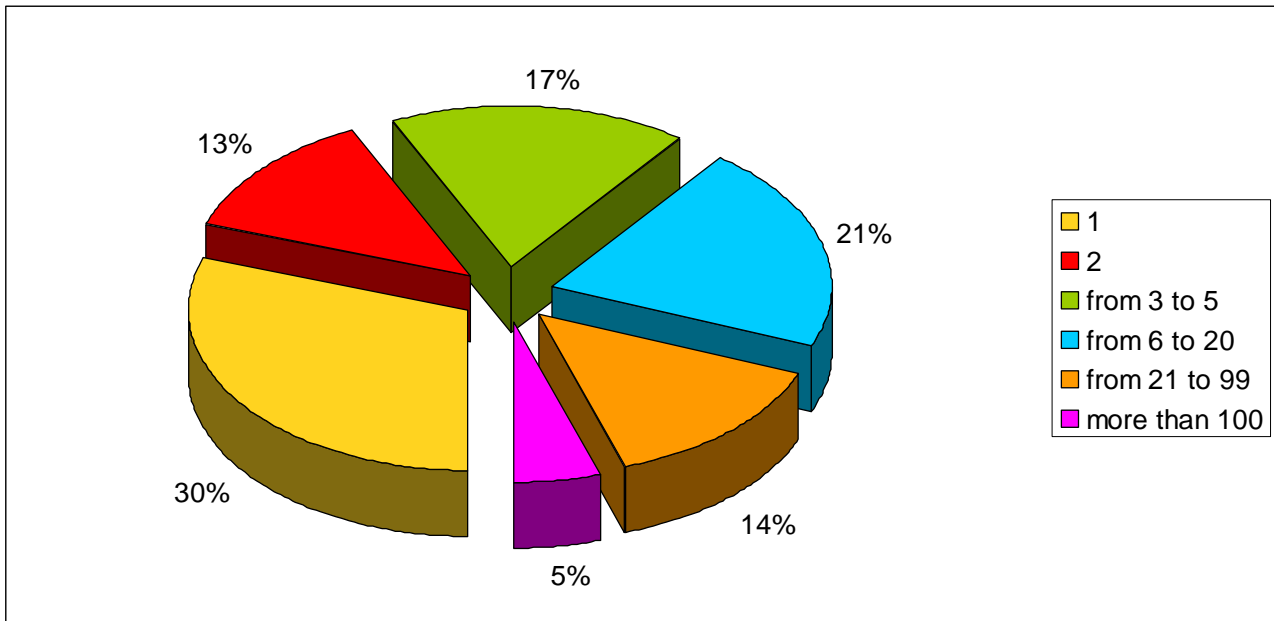


Figure 2: Percentage of filled request per title over the five year period 2005-2009.

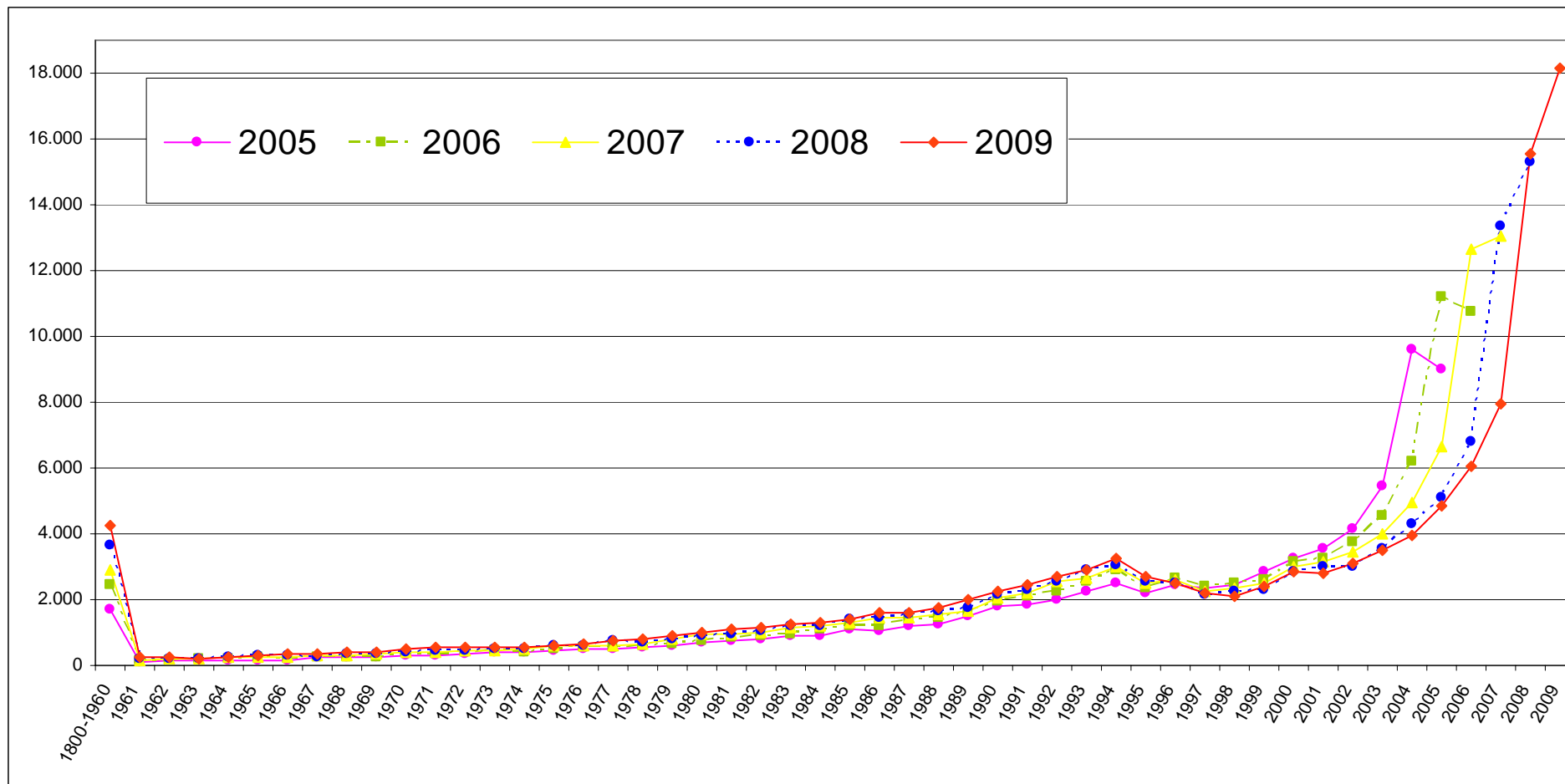
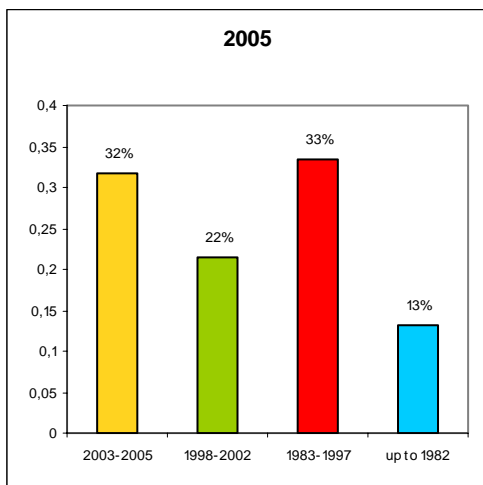
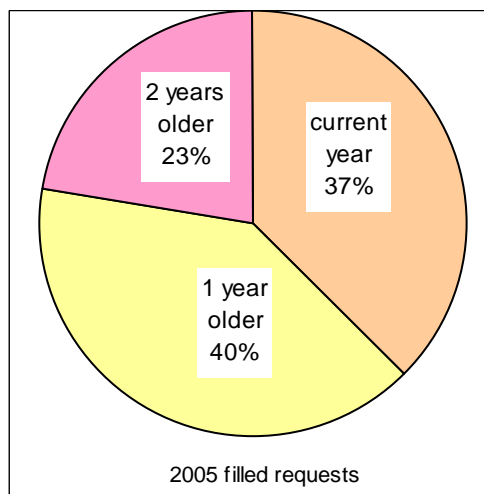


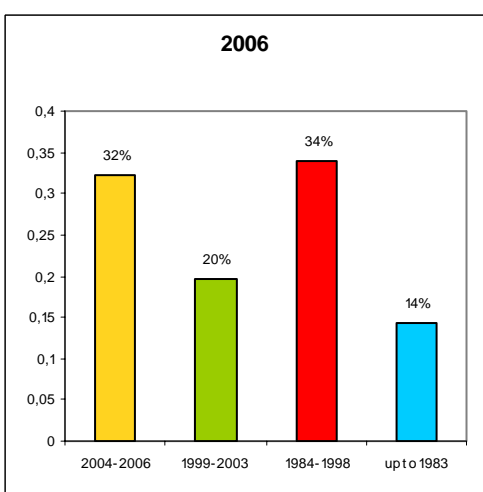
Figure 3: Requests distribution per publication date.



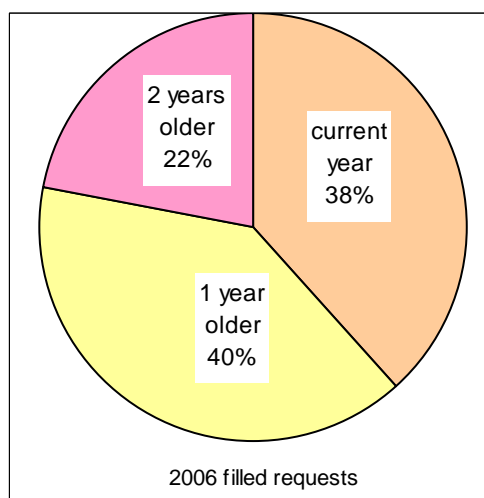
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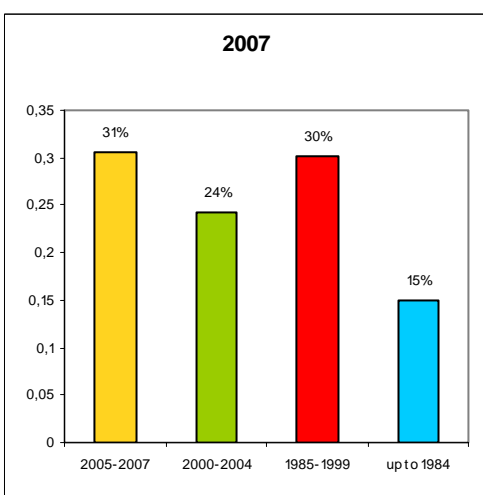
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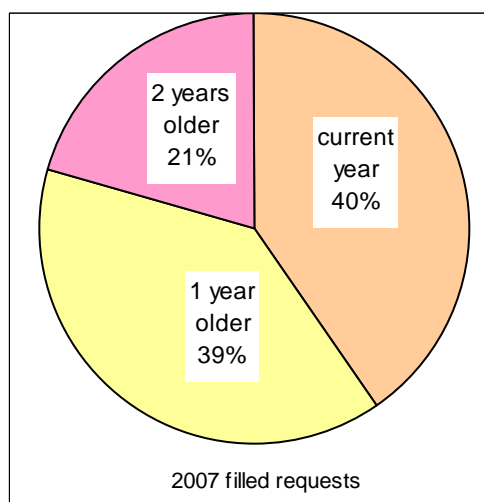
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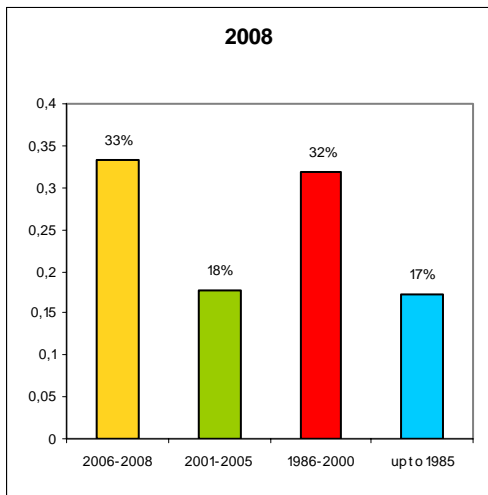
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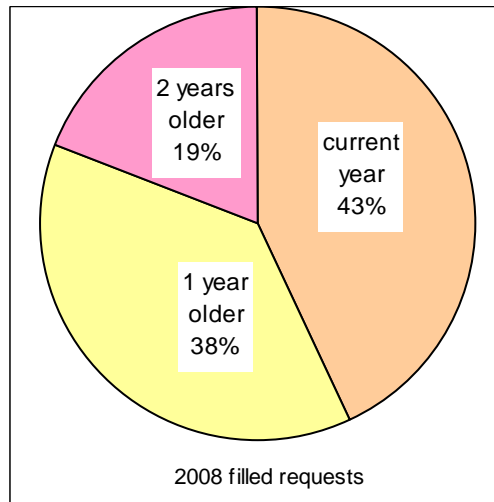
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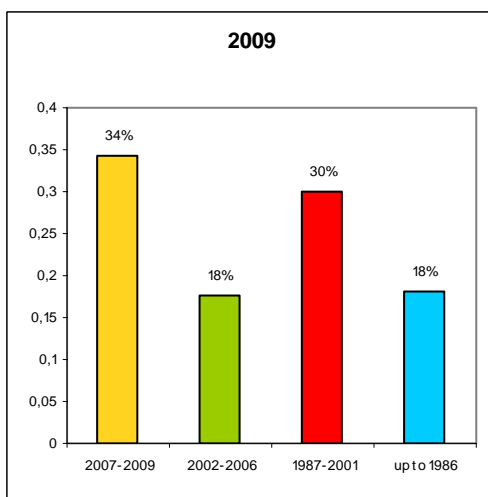
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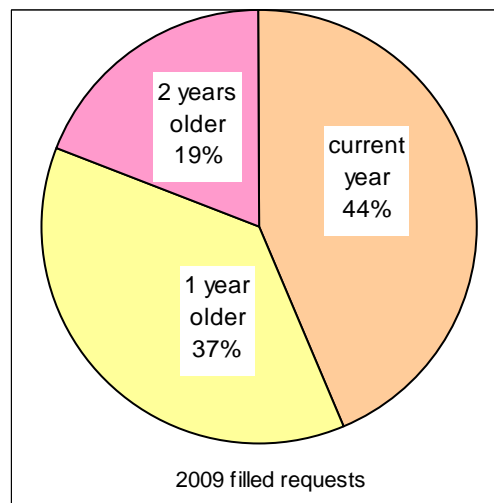
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e'



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Figures 4a-4e: Requests per publication date grouped in time-ranges.

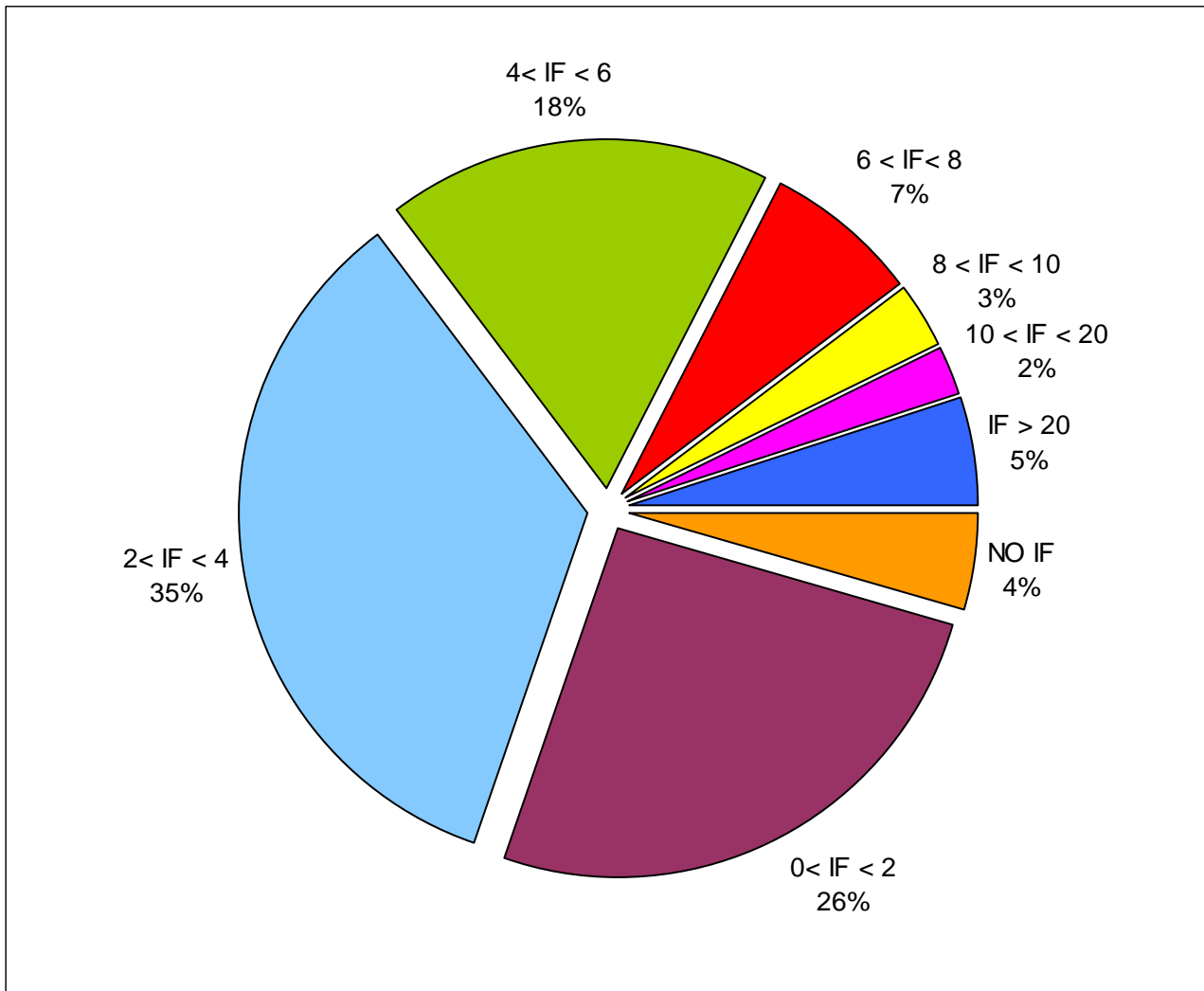


Figure 5. Core titles distribution per Impact Factor