

# Economics and Quality Estimation of Open Access E-journals

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## Abstract

In university libraries and the scholarly community, there is growing concern with the high costs of scholarly journal publishing and a rising movement in favour of Open Access publishing. There are many factors that will influence the success of non-profit and Open Access journals; economic power, economic survival, political values, and status changes are only a few of these. This article provides a critical introduction to two of these areas – economic survival and status – in order to illustrate two important factors of Open Access survival. In particular focus is the idea of the value of information and the Journal Impact Factor (JIF) as a potential measurement of journal quality. It is argued that an institutional approach may add a broader perspective that may serve to contextualise both these ideas.

**Keywords:** scholarly publishing; Open Access; electronic journals; economics of information; scientometrics; Journal Impact Factor

## Introduction

The area of scholarly publishing is facing changing conditions and opportunities that may or may not be lasting. New technology, primarily in the form of the Internet, is one of the stimulating factors in this change, in that it facilitates distribution of research results. However, not only technological but also political and ethical issues influence development. Contrary to the changes that public libraries are facing, that have to do with "market orientation and privatization" (Audunson 1999, 523), scholarly publishing seems to move in the opposite direction, towards Open Access and public financial support. However, there are still many problems on the way to success for the scholarly Open Access e-journal,<sup>1</sup> and there are powerful actors who are opposing the idea, which is one of the reasons why it is interesting to look closer at this move from market economy to the view of information as a public good. Björk (2004) identifies a number of different types of barriers to change in the area of Open Access journals, namely the information technology infrastructure, the legal framework, indexing services and standards, business models, the academic reward system, critical mass, and marketing (Björk 2004). Of these barriers, he considers the four latter to be

of most importance. In this article, particular attention will be paid to the barriers of business models and academic reward systems, which will be discussed in terms of economics of information products and of how the quality of journals can be estimated. The issue of critical mass is relevant to all of the other barriers in a complex interplay, in that it is important to overcome the other barriers if critical mass is to be reached, at the same time as many barriers can only be mastered with critical mass.<sup>2</sup>

Peter Suber sees 2003 as the year when the Open Access "debate has finally shifted from ideology to science" and taken an "empirical turn" (Suber 2004). I have taken advantage of the emerging results of empirical studies to look closer at how Open Access publishing handles the problems of the cost of publishing and the status of journals, which impacts academic reward systems. These issues will be discussed with particular focus on Open Access but set against a theoretical discussion concerning on the one hand the economics of information and on the other the Journal Impact Factor system. These two areas of economics and academic reward systems are of particular interest since they may reveal something concerning the future success of Open Access journals, as they address two of the barriers identified by Björck (2004).

## Economics of information

Machlup claims that it is impossible to speak of quantifying the use made of information; the only way one can approach the problem is by looking at demand and supply, at how much consumers are prepared to pay for it, or producers for making it available (Repo 1987, 69). Repo confirms that this classical approach of measuring information products' exchange values is the only approach which is useful in empirical studies, but concludes that it does not provide a full account of the value of information, since it leaves out for instance the value-in-use aspect (Repo 1987, 81). In the area of scholarly journal publishing, focusing on the exchange value of information products means that we can look either at how much libraries, institutions, or individual scholars are prepared to pay for accessing articles (through subscriptions, single issue purchases, or pay-per-view) or – the only option in Open Access – look at the price that producers are prepared to pay to make the journal available. There are different ways to finance journal production when the funds do not come from the reader-side. Hedlund, Gustafsson, and Björk identify the following business models: community service, advertising, grants, author charges, and institutional membership (2004, 202). Their research shows that the majority of Open Access journals are kept up as community service, paid for by universities and university departments, with a substantial amount of the investment being in the form of individual academics' time, which is usually not measured or accounted for. The conclusion that Hedlund, Gustafsson, and Björk draw is that since many Open Access journals do not have reliable budgets, it is best to measure costs in terms of "time spent working on a task" (2004, 208).

There is a certain amount of idealism behind much Open Access publishing. Information is perceived as a "public good" (Repo 1987, 72), and it is considered desirable that publishing should occur at cost price, if it is not possible to provide capital for it entirely through public funds. An important condition underlying this perception is the characteristics that information, when represented in journal articles, shares with other types of public goods, such as streets and public libraries, namely that "consumption by one person does not reduce the amount available to others" (Repo 1987, 72). This is particularly true in the case of electronic journals, where there is no real limit to how many people can access the article simultaneously without the physical artefact becoming occupied or worn.<sup>3</sup> Nevertheless, there may be good reasons for making the distinction emphasised by Repo between information and an information product (1987, 73). Even though information may be perceived as a public good in some circles, there is a real cost involved not only in producing the research results or discussions (here understood as constituting the information), but also in producing the journal, the means for distributing the information. Even though the cost of producing a scholarly journal may in some cases be reduced if it is in electronic form only (no costs for printing and distribution by mail), the cost must be paid in some way, either through the editors' (spare) time or through funding. Most Open Access advocates realise that funding is needed to cover the cost of the information product, although they propose shifting it from the reader to the author side through new business models. What they oppose is that there should be a charge for the text itself (using this rhetoric, the 'information'), one that is added on top of the cost of the information production. If Open Access journals are going to reach critical mass and be a lasting alternative, it is most probably necessary to move away from the situation where journal publishing is carried out in one or a few people's spare time and to find methods for turning publishing into a sustainable enterprise, but without demands for profit on top of costs.

Open Access e-publishing makes it possible to by-pass some of the activities and agents involved in traditional journal publishing. Some of these are quite costly, such as printing, distribution and subscription management. Even though electronic journals do not have costs for these activities, there are still costs that need to be funded, such as for the editing and review process, copy editing and the preparation of the articles for electronic publishing, and for technological equipment. A report commissioned by The Wellcome Trust estimates that a cautious comparison between commercial print and electronic journals should assume similar total costs for similar quality (SQW Ltd. 2004, 2; cf. also Tenopir & King 2000, 371f.). The total cost for Open Access e-journals could be assumed to be slightly lower since there are no subscription or licensing costs. It is difficult to get reliable figures about the cost of journal publishing even from the commercial publishers,<sup>4</sup> but it has been estimated that total costs for the production of an article in a subscription journal of good-to-high-quality<sup>5</sup> is \$ 2,750, excluding overhead and profit. The corresponding figure in an author-pays journal would be \$ 500-2,500 (SQW Ltd. 2004, 2). Hedberg, Gustafsson, and

Björk report that the article processing charge in the Public Library of Science initiative (PLoS) is \$ 1,500, although there is a possibility of circumventing the charge if the authors do not have means to do so (e.g. researchers from developing nations) (2004, 203; see also PLoS 2005).

The business model with author charges builds on the idea of a switch in who should pay for publishing from one of the primary beneficiaries to the other, that is, from the readers who get access to high quality research to the authors who get to distribute their work, with rewards in the form of attention from their peers and, from a more materialistic standpoint, of increased possibilities for tenure or similar career moves (cf. SQW Ltd. 2004, 18). Author charges can be applied once an article has undergone a review process and been accepted for publication. It can also be in the form of a two-part tariff (SQW Ltd. 2004, 20), with one (lower) submission fee that covers the review costs and one publication fee which is paid once the article has been accepted. Important big Open Access initiatives such as BioMed Central and PLoS apply author charges in order to cover their costs, although a substantial grant was needed to get PLoS started (PloS 2005). BioMed Central (PLoS have a similar system) have also supplemented author charges with institutional membership, which means that universities, departments, or libraries can become members by paying a yearly fee which both supports the BioMed Central initiative, gives the members increased, complementary facilities on the web site, and means that their employees or associates will be charged no or reduced author fees for publication. (BioMed Central 2005)

Characteristic for all Open Access publishing is the fact that somebody other than the reader covers the costs. If it is not done by the authors directly through their research grants or employers, then departments, learned societies, or funding agencies can decide to sponsor a whole journal. This can be done explicitly, by providing time and resources for journal staff, or by allowing individuals to carry out work as part of their general work load. One study from Svenska Handelshögskolan in Helsinki (Hanken) showed that this latter form was very common:

The main business model has been to minimise costs and to fund the operations as a form of open source project, where hardly any transfer of money is involved and all costs are absorbed by the employers of the individuals participating. A recent Web survey involving the editors of fifty-five open access journals carried out by Hanken confirmed this to be the predominant business model: only approximately ten percent of the journals had explicit budgets. (Björk 2004)

Some journals, primarily in the area of medicine, have also managed to get financing from advertising (Björk 2004). However, advertising does not seem to be a possible source of income in all areas of research, and may not be desirable for ethical reasons. Furthermore, there are hybrids of different kinds, such as journals that make their

back issues freely available, and journals where it is possible to choose between paying author fees and having the article become Open Access, or not paying fees, in which case the article is only accessible to subscribers (Hedlund et al. 2004, 203; Björk 2004).<sup>6</sup>

The Wellcome Trust report draws the conclusion that economic efficiency "is achieved more effectively if individuals who demand products or services bear the cost of supplying them." (SQW Ltd. 2004, 4) This system is distorted in the area of scholarly journal publishing since the research libraries and not the individual researcher bear the subscription costs. Furthermore, the journal market does not work quite like most other markets, since one article is usually not replaceable by another article, and researchers are not likely to be content with an article from a cheaper journal with slightly lower quality. Therefore, market prices are not subject to open competition. At least in the short run, journals that switch from a subscriber-pays system to an author-pays system may gain readers but would risk losing authors who would prefer to publish in journals where they do not have to pay. (SQW Ltd. 2004, 4) However, there are indications that not only economic factors are at play. Proponents of Open Access are working hard at making scholarly publishing a political issue by raising awareness among researchers of the current publishing market situation.

Repo (1987) identifies two approaches to the study of the value of information: one statistical decision theory approach based on the information theory conception of information and one cognitive approach. He concludes that the information theory approach is theoretically interesting, but practically useless in empirical studies, while cognitive approaches can be used to some extent in studying value-in-use.<sup>7</sup> In determining the value of information in the case of scholarly journal articles, it seems restrictive to only apply a cognitive perspective, to view information as more or less valuable in the solving of a task. For instance, the cognitive approach does not provide an explanation for the emphasis that is put on publishing in high status journals or, for that matter, why it is in some circles considered better to publish in print than in electronic journals. Similarly, only some aspects of the exchange value of information products can be captured by what Repo calls "classical economics methods," (1987, 81) that is, by investigating supply and demand. One aspect that needs to be taken into consideration is the social acceptability and status of information products. The status attributed to certain authors and journals may influence the credit that the individual researcher is prepared to give to the information represented in the article, particularly in cases where that information does not support the researcher's own claims. It is vital for a journal with a business model based on author charges to convince authors and readers of the fact that author charges do not mean that the review process is less rigid. Furthermore, we need a better explanation to the widespread notion within academia and among librarians of research as a public good. In relation to this, it is interesting to consider that the information represented in journal articles can actually become more symbolically valuable with increased use. Common indications that a journal is of high quality include a large number of

subscribers, many downloads from the web site, and many citations to the articles in the journal (measured by journal impact factors; see below).<sup>8</sup>

Repo draws that conclusion that "the cognitive approach emphasizes the use of information in the communication process, and [...] pays no attention to the 'product' side." (Repo 1987, 77) He goes on to point out the importance of studying both the individual information user and the task the user is trying to perform (1987, 79), but excludes other factors that may be of interest. I would argue that a social or institutional perspective would be more useful for focusing on the "product" side than is a statistical decision theory view of information as the reduction of uncertainty. The scholarly journal is a product highly governed by a set of norms and rules, which decide how journal articles should be composed and how the research they are reporting on should be carried out. The journal constitutes an institutionalised form of discussion and conflict in the scholarly community (cf. e.g. Knorr-Cetina 1981). (Journal) publishing is also an important institutionalised forum for deciding who has first claim to an invention or idea. The practice of determining priority to an idea based on publication is accepted in most cases regardless of how well it reflects the truth in the individual case. It is thus possible to view the scholarly article in terms of Cohen and Orbuch's definition of institutionalisation as "the development of a regular system of circumscribed norms, statuses, and roles that are accepted by society [and through which] spontaneous and unpredictable behaviour is replaced with behaviour that is regular and predictable." (Cohen & Orbuch 1990, 37) This aspect needs to be included in discussions of the value of information represented in scholarly journals.

One attempt to quantify the status of scholarly journals based on a social measure of importance is the journal impact factor, which will be discussed in the subsequent section.

## Journal Impact Factors

Economists discuss information, as well as other resources, in terms of supply and demand (Repo 1987, 72). Demand can be linked to quality, where high quality under certain circumstances results in higher demand for a certain product or service. The trick is to determine what constitutes high quality. When attempting to measure the quality of scholarly journals, one evaluation measure that is used extensively is the *journal impact factor* (JIF) (Garfield 1998, 68).<sup>9</sup> However, using JIF as a measure of quality involves a number of different restrictions (Wormell 1998). Several of these restrictions have direct impact on the JIF of Open Access journals. For the future success of this Open Access publishing form, it is important to be aware of which of these restrictions are advantageous to Open Access publishing, and which are disadvantages that need to be overcome.

The JIF system, along with many other bibliometric and scientometric measures, has developed from the citation indexes invented by Eugene Garfield in 1964 (Garfield

1998, 70). In Wormell's words, JIF is "the ratio of the number of citations [to articles published over the previous two years] which a journal receives in the course of a given year to the number of articles published by that journal within the two preceding calendar years" (Wormell 1998, 594). This is how the ISI (Institute for Scientific Information) calculate JIF for the ISI *Journal Citation Reports*, which they publish every year based on the ISI citation databases *Science Citation Index* and *Social Sciences Citation Index*. When doing the calculations, the ISI work with a so-called citation window of one year and a publication window of two years (Wormell 1998, 586).

Given the impact of the JIF in academic evaluations as well as in libraries' journal collection management (Garfield 1998, 68; Wormell 1998, 585), it is likely to influence authors in their choice of journal to publish in. If Open Access journals consistently receive a low JIF, or if they are not included at all in the citation databases (and thereby perhaps not in the calculations), this may deter authors from publishing in Open Access journals (cf. Björk 2004). It is therefore interesting to look closer at how Open Access journals are portrayed in bibliometric studies with regard to impact factors. It is also important to consider reasons why the JIF is a difficult evaluation measure of journal quality.

Hedlund, Gustafsson, and Björk claim that Open Access journals are so far not very visible, that is, they have low impact factors, a fairly low number of articles are published per volume, and they are not always included in subject-based indexes (2004, 205). In their study, only 10 % of the Open Access journals were included in the ISI citation databases (2004, 205). A study by Thomson ISI of 148 Open Access journals included in the *Science Citation Index* partly supports this claim. The study showed that 66% of the Open Access journals were below the 50th percentile, while about 6% were above the 91st percentile<sup>10</sup> (Testa & McVeigh 2004, 3). This means that they more often have low ranks than their subscription counterparts, but that there are a number of titles that rank very high. Thus it was concluded that distribution model was not a factor that significantly influences a journal's performance (McVeigh 2004, 2, 16). The Open Access journals showed patterns similar to that of subscription journals with regard to citation velocity, that is, how soon after publication articles are beginning to be cited and to what extent, although there was a very slight tendency towards a higher citation velocity for Open Access. (Testa & McVeigh 2004, 6; supported in McVeigh 2004)

Contrary to these results, Open Access proponents have often argued that free availability would bring about higher rather than lower visibility by being instantly accessible through web search engines and so forth. There are indeed indications that this may already be the case in certain restricted areas. As with JIFs for print publications, it is important not to draw general conclusions about JIFs for Open Access journals, since JIFs are highly susceptible to the norms and values concerning citation behaviour in different disciplines.

Lawrence (2001) studied the impact that online availability had on citation rates in conference articles in computer science and related disciplines (the conference article is a prestigious publication type in the domain). He found statistical support for the probability that an article was online if it was highly cited, and draws the conclusion that this is because it is easier to access and it is published with less delay than print counterparts. It can be noted that computer science is one of the disciplines which became part of the Open Access repository *arXiv.org* early on, so the acceptance for electronic material seems to be well founded in the community. This means that the findings would probably not transfer to all other disciplines, although studies in astronomy and physics show similar patterns (Harnad & Brody 2004).

Recently, Antelman carried out a study which supports Lawrence's findings. She looked at how articles in a number of leading journals from four different disciplines (Philosophy, Political science, Electrical and electronic engineering, and Mathematics) were cited depending on if a pre- or postprint of the article existed online or if it was only accessible in a subscription version. She concluded that the former group had higher mean citation rates (Antelman 2004, 376).

When articles are online and freely available, JIFs become less important for librarians in collection development. Garfield has expressed several times that he is quite critical of another important use of JIFs, namely as a research evaluation tool (e.g. Garfield 1998, 67f.; Garfield 1994). Antelman argues that it is more relevant and true to look at article citation rates than at JIFs in evaluating an individual researcher (Antelman 2004, 380). A similar claim is made by Harnad and Brody (2004), who point out that basing a study on whether journals are Open Access or not slightly misses the mark. Rather one should look at article level and distinguish articles from non-Open Access journals that have been made freely available through author self-archiving from those that have not.

One such study was conducted by Wren (2005) in the area of medicine. Wren used a computer program to construct automated query formulations that were submitted to the Google search engine in order to retrieve all occurrences on the Web of articles that had been published between 1994 and 2004 in 13 subscription journals with varying JIFs and in four Open Access journals with JIFs around 10. He was primarily interested in articles that were published on non-journal sites, that is, different forms of self archiving or information sharing alongside the journals' own initiatives. The study shows some problems with recall, due to a number of reasons such as the fact that the search engine's indexing does not cover all web sites, and the fact that Wren only retrieved PDF files, where some self archiving may occur in HTML, PS or DOC files, for instance. Similarly, the precision reported from a manual examination of a subsection of the search results showed figures in the 70s, but it is likely that a different method for measuring precision would have yielded a different result. Bearing these potential flaws in mind, Wren's study indicates that a larger fraction of articles from

journals with a high JIF will be found online on non-journal sites than from journals with a low JIF. It is also more likely for newer material to be available (Wren 2005, 3). The explanation given by Wren to the results is that articles that are more attractive to readers will be made openly accessible in some way. Given the timeframe, it is unlikely that the NIH initiative for making material freely available in PubMed Central would have had any influence on the results of the study, but it is likely that it will influence future developments, since there is a possibility that many studies funded by NIH or other important agencies will publish in the high ranking journals.

It is quite likely that in the future articles that are freely available on the Web will be used less as part of a journal issue and more as a separate entity, although the journal's name will become perhaps even more important as a guarantor of good quality. Therefore, it could be that JIFs will in fact become even more important in an Open Access environment than it has been in print, but for the purpose of source criticism rather than (or in supplement to) academic evaluation. Consequently, it is important to include high quality Open Access journals in the ISI (and other) citation databases, since this involves a review process that gives a stamp of good quality to the journal. But at the same time it may be useful to look at other ways of measuring impact factors if it is to be used in evaluating researchers for appointments or tenure.

It has been noted several times above that the practice of using impact factors for academic evaluation is often called in question. There are several reasons for this. One is that evaluators have in some cases concentrated on JIFs to the exclusion of everything else, with the result that the evaluation becomes highly skewed. The domain-specificity of citation behaviour has been pointed out above. In the humanities and in some social sciences, for instance, it is often more prestigious to publish a book or a book chapter than a journal article. These publication types are not included in the ISI citation databases, although citations *to* them are noted.<sup>11</sup> There is also a fairly strong geographical focus in the ISI citation databases, where nearly 90% of the journals are from North America and Western Europe (McVeigh 2004, 4). This means that locally important journals, as well as journals in other languages than English may be unfavourably represented. For instance, in 1991, Persson noted that Soviet journals were probably underrepresented in the ISI citation databases (Persson 1991, 20). Wormell (1998) showed a major North American, and to some extent European, dominance in some of the most highly ranked journals in the area of Library and information science. Interestingly, McVeigh's study showed that the geographical distribution of Open Access journals differed significantly from that of subscription journals, with about 30% (of the journals included in *Science Citation Index*) being published in Asia-Pacific (which is 15% of all journals from that region in *SCI*) and about 15% in South/Central America (42% of all journals from the region in *SCI*, compared to the 1% that the Open Access journals make up of the total of Western European journals). (McVeigh 2004, 3f.)

Another critique against the *Journal Citation Reports* JIFs is that the narrow publication and citation windows are misleading in many disciplines where it is common to cite older literature than from the past two or three years. For instance, Wormell suggests that a publication window of five years is more appropriate in Library and information science (1998, 586). Given the slightly higher Immediacy Index figures<sup>12</sup> of Open Access journals in some areas, a narrow publication window may in fact be less of a problem in Open Access journals than in subscription journals. It may be of even less importance if one looks at article impact factor rather than JIFs, due to the occurrence of freely accessible preprints.

One factor that may be influenced by quality, but that is not necessarily linked to it, is market share. A high market share could also be the result of an aggressive marketing strategy. This is an area where Open Access journals have so far not been very successful. Björk (2004) argues that many Open Access publishers have had quite a naïve view of the importance of marketing, relying to a high extent on word-by-mouth or major search engines. Such initiatives as the Directory of Open Access Journals (DOAJ; <<http://www.doaj.org>>) may help increase the visibility of Open Access journals.

These objections would indicate that JIFs can be an important and useful measure to look at when considering the quality of an individual article in an unknown Open Access journal, but that there is also need for caution. A low JIF, or no JIF at all, does not necessarily mean that the journal does not publish high quality material. At the same time, caution needs to be observed in all cases since the JIF is a measure of average quality of a journal, not a measure of the quality of any individual article. For that, we need to look at impact factors at article level.

## Conclusion

With reference to governance, Johan P. Olsen has pointed out that institutions are resistant to change (Olsen 1988, 15) and that "democratic ideology assumes that institutional development is [...] connected to a struggle about which ideals and principles should be at the basis of governance" (1988, 23; my transl.). This seems transferable to the area of scholarly publishing, where such a struggle is going on at the moment. There are many factors that will influence the outcome: economic power, economic survival, political values, and status changes are only a few of these. In this article, I have looked closer at economic survival and status in an attempt to illustrate two important factors of Open Access survival.

The answer to the question of whether or not the Open Access journal will have a potential impact on formal scholarly communication in the future cannot be answered here, but there are some threads in the discussion above that may be interesting to recapitulate. One of these is the issue of information as a public good, which is often

emphasised in the discussion on scholarly publication, and there are indications that it is gaining ground with governmental institutions and other major funding agencies. This may go a step on the way to securing Open Access publishing by other means than the work of dedicated pioneers. If this is the case, Open Access may come to pose a serious alternative to profit-based publishing.

The relatively low status of publishing in Open Access journals is one serious challenge to its success. Open Access publishing needs to be judged on equal terms with subscription journals as long as the quality is comparable. The high ranks of some Open Access journals in the ISI citation databases, alongside with an increased focus on impact factors at the article level, is promising for Open Access, but there are still many impediments to overcome. Important research foundations supporting the idea of Open Access journals could become a substantial incentive for increased status.

Journal publishing and use are highly social activities and it has been argued in this article that these activities cannot be discussed merely in economic terms of cost, demand and supply, or the exchange value of information. Furthermore, the benefits of publishing are very complex, ranging from a macro to a micro level, from providing scholars with information or inspiration that may influence and support seminal work of importance to humanity, to providing these same scholars with stepping-stones to fame. The criteria on which quality estimations of the journals are made are highly socially constructed and dependent on the dominant system for scholarly communication. Open Access publishing may serve to challenge these institutionalised systems of legitimacy, or may end up supporting the existing systems. New institutional theory can provide a valuable framework for informing such studies of the increasingly turbulent area of scholarly publishing.

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## Notes

1. In the text, when I speak of Open Access journals I refer to electronic journals on the Internet that publish scholarly articles that have gone through some form of peer review (scholarly is used here as a term which is to be understood as corresponding to the Swedish 'vetenskaplig' or German 'wissenschaftlich', i.e. including the human, social, and natural sciences as well as engineering disciplines and medicine). This use of the term Open Access journals excludes so-called repositories, although many factors apply to both forms of making research publicly accessible.

2. For instance, if publishing in (Open Access) e-journals is given the same status as publishing in print journals (which is not always the case), then it will be more attractive for authors to submit their high quality material to Open Access journals, which will result in more journals and more articles per journal, i.e. increased possibilities of critical mass. Similarly, if new business models, such as author fees, are accepted by funding agencies, so that the cost of fees can be included in research grants, then the possibility of attracting authors increases, but at the same time a critical mass of journals with author fees may be needed in order to make the funding agencies change their policies (although this could be accomplished by political means, which is what seems to be happening in Sweden today, with the signing of the "Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities" by Sveriges Universitets- & Högskoleförbund (SUHF, 9 Dec. 2004) and The Science Foundation (Vetenskapsrådet, 17 May 2005).

3. Servers and networks do in fact have an upper limit to how many requests they can handle at any one time, but presumably this is not a serious constraint for most Open Access journals.

4. This is because it is considered a trade secret, not because there are no explicit budgets as in the case of some Open Access journals.

5. Based on a 12,5 % acceptance rate.

6. Another common form of making scholarly articles freely available on the Internet is through pre- and postprint publishing. This is a type of publishing that is likely to be maintained in a more structured form in the future, since the trend seems to be that authors are encouraged by employers and funding agencies to submit their peer reviewed pre- or postprints to institutional repositories rather than, or in addition to, publishing them on their own web sites. One of the decisions that have gained most attention is that of the American National Institutes of Health (NIH). They require authors who have received some form of funding from NIH to submit a peer reviewed preprint to the PubMed Central repository to be made publicly accessible no later than 12 months after the article's official publication (NIH 2005). With the publication in Open Access repositories of peer reviewed material, articles even from subscription journals have been and will be made freely available, which can result in both support of Open Access and at the same time can mean that the repositories will constitute a potential competitor to Open Access journals, since choosing to publish

in an Open Access journal for political or ethical reasons could become less attractive. The best way for Open Access journals to counter this potential competition is arguably to make sure that they offer such high quality with regard to published material, peer review and editorial work, and reader and author services that they are an attractive publishing alternative regardless of their forms of financing.

7. One alternative method for studying journal articles in use is bibliometric analysis based on citations.

8. I would like to acknowledge Veronica Johansson who brought these ideas to my attention.

9. Another measure of quality could be to look at the perceived value of a journal as a brand or trademark. A common way of measuring the quality of scholarly journals is by looking at rejection rates, where the principle is that the higher the rejection rate, the higher the quality of the journal. Further, Wormell (1998) suggests two criteria of quality to complement the JIF: firstly how international a journal is with regard to authors, subscriptions/readership, and authors citing articles in the journal, and, secondly, the extent to which the journal exports knowledge to other disciplines, that is, how many citations it receives from journals outside of its own domain.

10. Since citation behaviour differs a great deal between disciplines, the percentile was calculated for each journal based on which category in the *SCI* it belonged to. This was done by calculating the ratio between the journal's rank among the journals in the category and the number of journals ranked in that category (Testa & McVeigh 2004). Thus a journal in the 91st percentile is ranked higher than a journal in the 81st percentile. This study from April 2004, based on citation figures from 2002, was repeated in October 2004 with the figures from 2003. This second study confirmed many of the conclusions from the first one. (McVeigh 2004)

11. It should perhaps be pointed out that *Journal Citation Reports* are not published in the arts and humanities area.

12. "An Immediacy Index considers only one year of data and can be calculated after a journal has been indexed and cited for one full year." (McVeigh 2004, 4)