The costs and benefits to the research community of Open Access: A briefing paper

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Summary

Open Access has both benefits and costs to the research community and to the wider public. This briefing paper sets out the main areas where costs are incurred by the community under both the traditional subscription-based system and an Open Access-based one. It also describes where the systems differ in respect of where costs fall: where subscriptions are paid, costs are reader-side costs, whereas under Open Access the costs tend to be production-side. Data are presented on the overall cost of the subscription-based system to the academic community. For an Open Access system, the levels of individual cost elements are provided for projected fully-Green OA (repository-based) and fully-Gold (journal-based) scenarios. Finally, the results of economic modelling studies on the comparative costs and benefits of all three systems are briefly presented.

The types of costs to the research community of different scholarly communication systems

An Open Access scholarly communication system does not mean that the system is free of costs. Certainly, Open Access means that research findings are free to the reader, but there are still costs to the research community in disseminating the research literature under Open Access conditions.

These costs apply differently to the traditional subscription-based system where, apart from author-side costs such as paying for page charges or colour plate charges, the greatest proportion of the costs are *reader-side* ones, accrued through paying for subscriptions to journals and – to a lesser extent – pay-per-view transactions. In an Open Access scholarly communication system, conversely, the costs for the research community are mostly on the *production* side rather than on the consumer side.

A series of studies by the economist John Houghton identified all the relevant costs for both Open Access and traditional subscription-based systems in the UK[1] and in subsequent studies on other countries[2] [3]. These costs are summarised in Table 1.

1 Houghton J *et al* (2009a), Economic implications of Alternative Scholarly Publishing Models: Exploring the Costs and Benefits, JISC EI-ASPM Project, Report to the Joint Information Systems Committee (JISC) (UK), CSES and Loughborough University, January 2009. **http://www.jisc.ac.uk/publications/documents/economicpublishingmodelsfinalreport.aspx**

Basis of the system	Cost types
Subscriptions-based	• Subscriptions to journals • Subscriptions to regularly-published conference proceedings • Library handling costs e.g. managing subscriptions, negotiating purchasing packages, etc. • Author charges e.g. page charges, colour plate charges, etc.
'Green' Open Access (provided via repositories)	• Dissemination costs: the costs of building and running repositories • Storage and archiving costs: the costs of running repositories, storing content and associated content migration and other technical procedures involved in long-term archiving
'Gold' Open Access (provided via journals)	• Cost of article-processing charges (APCs) where levied by journals • Cost of systems within research institutions for processing and recording APC payments

Table 1: Costs to the research community in subscription-based and Open Access scholarly communication systems

The levels of costs to the research community of the traditional subscription-based system for journals

It is estimated that the global market for science, technology and medical publishing is approximately US$25.2 billion (€23 billion) per annum, of which around 40% – i.e. US$10 billion (€9 billion) – is accounted for by revenues from academic journals[4]. Of this, around 70-75% is subscriptions from academic libraries (i.e. circa US$7.5 billion or €7 billion). Approximately one-quarter of this €7 billion is spent by European institutions.

Elucidating further detail is not easy. Most deals between academic libraries and the large publishers are subject to gagging clauses, making it difficult to ascertain what individual universities spend on subscriptions. Recently, though, the use of *Freedom of Information* legislation in the UK has began to unearth some details, including that spending by UK universities on subscriptions has increased by some 24% since 2010 and in some cases subscriptions to the journals of some large publishers has almost doubled[5]. Figures from elsewhere are hard to come by, for the reason already stated, but there would not seem to be any cause to think the situation is different in other research-intensive countries.

The costs of 'Green' Open Access provided via repositories

The costs to the research community of repositories for Open Access articles falls largely on universities, though in some cases funders also incur repository-related costs where they have

2 Houghton, JW *et al* (2009b) Costs and benefits of research communication: the Dutch situation. SURF Foundation, Utrecht. **http://www.surffoundation.nl/en/publicaties/Pages/CostsandBenefitsofOpenAccessPublicationIlTheDutchSituation.aspx**

3 Houghton, JW (2009c) Costs and benefits of alternative publishing models: Denmark. Danish Electronic Research Library (DEFF), Copenhagen. **http://www.deff.dk/content.aspx?itemguid={EACA73FB-2EFE-44CA-92CD-91C4416C0370}**

4 Ware, M and Mabe, M (2015) The STM report (Fourth Edition): An overview of scientific and scholarly journal publishing. STM, The Hague, March 2015. **http://www.stm-assoc.org/2015_02_20_STM_Report_2015.pdf**

5 Lawson, S and Mehgreblian, B (2014) Freedom of Information requests uncover the lack of transparency in journal subscription costs. London School of Economics & Political Science, Impact of Social Sciences, 15 October 2014. **http://blogs.lse.ac.uk/impactofsocialsciences/2014/10/15/foi-requests-uncover-lack-of-transparency/**

established their own Open Access repositories or are financially supporting community-based repositories.

The cost of establishing and then operating a repository vary considerably from case to case. Some indicative costs from different scenarios may help to illustrate this variation and to show that, although ambitious and technically sophisticated repositories *can* be expensive to build, costs certainly do not need to be high. An early study reported the set-up cost of a repository to vary in four different institutions between approximately €4500 and €2 million[6]. A second study of four different-sized universities in the UK estimated that the cost *per annum* of running a repository varied from GBP4000 (€5000) to GBP75000 (€19,000)[7]. The University of Minho in Portugal built its repository in 2003 using staff time that cost approximately €14K and a server at €5K: its annual running cost is the equivalent of 1 FTE. The new Portuguese repository built to act as 'host' repository for some other Portuguese institutions, and built very recently, used about €7.7K of staff time plus server costs and requires around 1-2 FTE in terms of staff time.

Funder repositories, or large community-resourced subject-based repositories (such as the physics arXiv), tend to have higher costs. Where funders are concerned, they take on the cost because there is a business case for a repository (greater visibility and impact for the funded research, greater return on investment from societal access and use of the materials). Where a subject-based repository, such as arXiv, is supported by the community, costs are effectively shared out across that community through sponsorship, mostly from research libraries[8].

The costs of 'Gold' Open Access provided through journals

There are around 11,300 Open Access journals listed in the *Directory of Open Access Journals* at the time of writing. Approximately 25-30% of these charge an article-processing charge (APC), though this figure varies between disciplines, with fee-based journals being much more common in scientific (43%) and medical fields (47%) than in humanities (4%) and arts (0%)[9]: the rest make no charge to reader or author.

Studies show that the average APC in a fully Open Access journal in much less (US$1418) than the average APC (US$2727) for a 'hybrid' journal (a hybrid journal is one sold on subscription that also publishes individual articles in Open Access format on receipt of a fee from the author)[10].

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6 Swan, A (2008) The business of digital repositories. *In*: A DRIVER's Guide to European repositories. Eds: Kasja Weenink, Leo Waaijers and Karen van Godtsenhoven. Amsterdam University Press, Amsterdam, pp15-48. **http://dare.uva.nl/cgi/arno/show.cgi?fid=93898**

7 Swan A (2010) Modelling scholarly communication options: costs and benefits for universities. Report to the JISC. **http://repository.jisc.ac.uk/442/2/Modelling_scholarly_communication_report_final1.pdf**

8 See the details of the business plan for the arXiv and how libraries support the repository financially: **https://arxiv.org/help/support/faq**

9 Kozak M and Hartley J (2013) Publication fees for open access journals: Different disciplines—different methods. *Journal of the American Society for Information Science and Technology,* 64 (12), pp 2591–2594 **http://onlinelibrary.wiley.com/doi/10.1002/asi.22972/abstract** DOI: 10.1002/asi.22972

10 Bjork B-C and Solomon D (2014) Developing an effective market for Open Access article processing charges. Wellcome Trust, London. **http://www.wellcome.ac.uk/stellent/groups/corporatesite/@policy_communications/documents/web_document/wtp055910.pdf**

Measures of the current costs of Gold Open Access on a national basis are difficult to come by. In the UK, the research councils support their policy with a block grant to universities where there are research council grant-holders. The councils have published data on how much has been awarded through these grants (for example, GBP19.83 million in 2014/15), with the average APC over the period 2011-14 being GBP1682. It should be noted that individual UK universities and researchers also pay APCs in addition to this sum funded by the research councils. In the Netherlands, the Association of Dutch Universities (VSNU) has negotiated deals with publishers Springer, Wiley and Sage and an in-principle deal with Elsevier: negotiations are also going on with some smaller publishers. The full details of these deals have not been revealed.

Savings from an Open Access system

The economic modelling work done by Houghton and colleagues[11] identified several areas where there would be savings for institutions from a move to a fully Open Access scholarly communication system. These are shown in Table 2. Some of them are direct cash savings, such as those from the disappearance of journal subscriptions, and some are efficiency savings, especially for researchers.

Source of savings	Savings
Library-related savings	• Subscription savings • Savings from not having to negotiate subscription deals, etc. • Inter-library loan savings
Researcher-related savings	• Time savings from easier search and more efficient discovery and access of research information • Less time spent on seeking permissions and in copyright and licensing-related activities • Time savings from more efficient peer review, reading and writing processes as a result of improved access

Table 2: Savings to research institutions in an Open Access system

How would the costs and benefits compare between systems?

At the moment we are in a mixed situation with respect to scholarly communication. Perhaps 40% of the total research outputs of the world are openly available, and this percentage may be slowly growing, but it will be some time yet before the system is completely Open Access.

The Houghton studies, carried out on a number of national situations, calculated that a fully Open Access system worldwide would be cheaper for the research community as a whole than the traditional subscription-based system, whether Green or Gold types of OA are adopted. Houghton and his colleagues estimated that in the UK, a switch to an Open Access system based on repositories (so-called 'Green' Open Access), which requires the persistence of the subscription-

11 See footnotes 1, 2 and 3.

based journals, would nonetheless produce economic savings to the research community, as well as providing further economic gains to wider society.

A switch to a completely Gold Open Access system, where every article incurs an article-processing charge, would also prove cheaper under certain conditions. Moreover, a subsequent study, specifically focused on the situation for individual universities, also concluded that an Open Access scholarly communication system would be cheaper for almost all universities, though the most research-intensive ones may find increased costs under certain conditions[12].

These 'certain conditions' are chiefly the level of the article-processing charges levied by publishers. So long as these are low enough, Open Access – even if every article incurs an APC – would be cheaper than the traditional system. If APCs creep upwards, however, then the overall costs of publication rise and could push the costs past those of the subscription-based system.

The modelling showed that where the average APC is below *about* €1200-1500 then an Open Access system based on APCs would be cheaper than the subscription-based system. It seems unlikely that this condition will pertain in real life, however, given that the average APC is currently around €1300 in fully Open Access journals and €2500 for 'hybrid' journals. There may be downward pressure on APCs in a competitive market, but this will need to be both considerable and persistent to keep costs reasonable.

Transitioning from subscriptions to Open Access

As well as understanding what the economic outcome might be if there were a switch to a fully Open Access system across the world, we need to pay attention to the issue of how the transition period might work.

The Houghton studies for the UK, Denmark and the Netherlands indicated that Green OA is the cheapest transition route (Ref 10). Broadly similar findings came from another study, again on the UK's scholarly communication system[13], which calculated that Gold OA with low-level APCs (average APC around €2000) would be next best, and that Gold OA where APCs averaged above €3000 would produce a high net cost for the UK[14].

The UK's seven research councils have implemented a policy based on increasing the levels of Gold OA over the years until it finally reaches 100%. In contrast, the UK's higher education funding councils – not the same as the research councils – have decided upon a Green OA-based policy, to come into effect on 1 April 2016. This example from just one country serves to illustrate the complexities of Open Access policy-making.

12 See footnote 6.

13 Houghton J and Swan A (2013) Planting the Green Seeds for a Golden Harvest: Comments and Clarifications on "Going for Gold". *D-Lib Magazine* January/February 2013 19(1/2) **http://www.dlib.org/dlib/january13/houghton/01houghton.html** doi:10.1045/january2013-houghton

14 CEPA LLP and Mark Ware Consulting (2011) Heading for the Open road: costs and benefits of transitions in scholarly communications. Research Information Network, London.
http://www.rin.ac.uk/system/files/attachments/Dynamics_of_transition_report_for_screen.pdf

It was mentioned earlier that the average APC in fully Open Access journals is about half that for articles in 'hybrid' journals – those that publish single articles in Open Access form in an otherwise subscription-access journal. There is another aspect of 'hybrid' journals that is worrisome, and that is that unless specific measures are put in place by publishers to prevent this, publishers can accrue revenue from two sources at once, from subscriptions and from APCs for the Open Access articles.

This is often called 'double dipping' and publishers are being encouraged to establish systems to ensure that they do not engage in this practice. That is not simple and involves, amongst other things, deciding whether recompense in terms of subscription reduction in return for APCs should go to the individual universities that pay the APCs for their researchers' papers (local offsetting of APC revenue), or whether to reduce subscription levels for all subscribers in relation to the amount of revenue coming in from APCs (global offsetting).

For now, the issue of double dipping is not resolved. Funders and universities are aware of this and some, such as the Dutch science funder NWO, have banned the use of funder money to pay for APCs for 'hybrid' journals[15].

Stakeholders are also addressing other cost-related issues as Open Access develops, such as the lack of transparency and publishing market monopoly by the largest publishers and, in the cases where Gold Open Access' is supported, driving the agenda for full Open Access publishing models? For example, the European Commission is running a pilot for articles still being published from the 7th Framework Programme, providing a maximum of €2000 to cover Article Processing Charges and one of the key conditions for eligibility is that peer-reviewed articles are published in fully Open Access journals (not in 'hybrid' journals).

In the UK, national stakeholders including RLUK, SCONUL, ARMA and Jisc are trying to set a new agenda for discussions on Gold Open Access and have recently published a paper arguing that the current legacy market (subscription and 'hybrid' journals) is dysfunctional. They consider that if the Gold Open Access route is chosen then this should be based on a fully Open Access journal market[16].

15 Open Science, NWO. **http://www.nwo.nl/en/policies/open+science**
16 **https://www.jisc.ac.uk/reports/academic-journal-markets-limitations-consequences-for-transition-to-open-access**