

# Activities, costs and funding flows in the scholarly communications system in the UK

Report commissioned by the Research  
Information Network (RIN)

## Summary Report

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In association with:



**RLUK**  
Research Libraries UK





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## Foreword

Communicating the results of research is an integral and vital part of the process through which research expands the frontiers of knowledge and understanding. The scholarly communications system has changed fundamentally over the past decade, as researchers, publishers and librarians have embraced new technologies; and the pace of change continues to increase. Such changes have brought tensions, as different groups debate how best to exploit the opportunities presented by new technologies to maximise access to the information resources that researchers create. The debates have sometimes generated more heat than light, however, and have often been limited by lack of reliable evidence about key features of the scholarly communications system.

It is in this context that the RIN joined together with the Publishing Research Consortium (PRC), the Society of College, National and University Libraries (SCONUL), and Research Libraries UK (RLUK) to commission a study to investigate the costs incurred by key agents in the various stages of the scholarly communications process, from the production of research outputs to the reading of those outputs; and the sources, nature and scale of the funding and other resources provided to meet those costs.

We commissioned Cambridge Economic Policy Associates (CEPA) – an economics and finance policy consultancy ([www.cepa.co.uk](http://www.cepa.co.uk)) - to undertake the study; and we are most grateful to the CEPA team – Daniel Hulls, Alan Rennison and Stefan Rattensperger – for all the work they have done in gathering and analysing the evidence and in building a sophisticated model that enables us not only to present a picture of the current situation, but to analyse the effects of possible changes. CEPA has also benefited from input from John Cox Associates and from the advice of an Expert Panel, including Mayur Amin (Elsevier), Frank Fishwick (formerly Cranfield School of Management), Michael Jubb (RIN), Tony Kidd (University of Glasgow), and Professor Donald King (University of North Carolina at Chapel Hill). We are very grateful to them also for all that they have contributed to the project.

We believe that this summary and the full report available on the RIN's website present interesting and important findings that give for the first time an overall picture of the costs that are involved in the scholarly communications system, and how they are met. The findings and the modelling are based of course on input assumptions and data that may be subject to change. One of the key outputs from the study, however, is the detailed model; and the RIN is working with CEPA to consider how best that can be made available to other researchers who may wish to test it with other data.

### *Important Notice*

It is important to stress that this report and the modelling carried out by CEPA relies on input assumptions and data that have not been independently verified. CEPA and the RIN make no warranty and accept no liability as to the accuracy of the information used, or for the use of the report by any third party.

## 1. Executive Summary

### *Nature and scope of this study*

The purpose of this study has been to enhance understanding of the scholarly communications process by

- identifying the cash and non-cash costs incurred by the key agents in the various stages of the process;
- analysing the sources, nature and scale of the funding and other resources provided to meet those costs; and
- developing and analysing the impact of possible changes.

The study covers all stages of the scholarly communications process, from the production of research outputs to the reading of those outputs. Detailed modelling focuses on the publication, distribution, and provision of access to articles in English-language scholarly journals. Such articles are by far the most important information outputs produced and read by researchers in most subject areas, and they account for over half the acquisitions budgets of UK academic libraries. We recognise that other forms of scholarly communications, including monographs and conference proceedings, are important in some areas; but we do not cover them in this study. Nor do we consider the costs and revenue flows associated with secondary publishing, republication, or the provision of e-print repositories.

### *Key findings: global*

We estimate that the global cost each year of undertaking and communicating the results of research reported in journal articles is £175bn, made up of £116bn for the costs of the research itself; £25bn for publication, distribution and access to the articles; and £34bn for reading them.

- *Publishing and distribution.* The global costs of publishing and distributing articles is £6.4bn:
  - £3.7bn in fixed first copy costs, including £1.9bn in non-cash costs for peer review; and
  - £2.7bn in variable and indirect costs, and the generation of surpluses by publishers.

Academic institutions meet about 53% of global publishing and distribution costs in the form of library subscriptions, and a further 23% in the form of the unpaid costs of peer review.

Non-academic subscriptions meet about 11% of global publishing and distribution costs.

The average total publishing and distribution costs per article amount to about £4,000, and we provide estimates in the full report about variations for different kinds of journal.

### *Key findings: UK contribution*

We estimate that UK researchers constitute 3.3% of the global research base, and that they produce 6.6% of the global supply of journal articles.

- The UK is a net contributor to the global provision of peer review, contributing £165m a year in non-cash costs, which is 8.7% of the global peer review cost. On average, 7.1% of all published articles are peer reviewed in the UK.
- The total UK contribution to all stages of the scholarly communications process from peer review through to the provision of access in libraries amounts to £408m. Its contribution is less than the proportion of articles it produces, but significantly greater than its proportion of all the researchers in the global research base.

- UK libraries spend £163m on journal subscriptions, and a further £72m on the provision of access facilities, making a total of £235m. Academic libraries account for £173m (74%) of that expenditure.
- The average annual access costs for UK libraries (excluding journal subscriptions) range from £715k for RLUK libraries to £242k for higher education colleges, and £156k for special libraries.
- Annual costs of journal subscriptions vary from £1386k for RLUK libraries to £208k for special libraries.

### *Possible changes and their impact*

We have modelled the impact of four possible changes to the scholarly communications system. The results are instructive, but clearly reflect the range of assumptions in the model.

#### 1. Electronic-only publishing.

Currently, most journals are published in both print and electronic formats. If 90% of all journals were to be published in electronic format only, the global costs of publishing, distribution and access would fall by £1.08bn (12%), offset by a rise of £93m in user costs for printing.

- By far the largest part of that reduction in costs would be accounted for by a fall of £758m (36%) in libraries' costs in providing access to journal articles.
- Global publication and distribution costs would fall by c£318m (7% of total costs excluding peer review).
- Falls in advertising revenues, membership fees and personal subscriptions would mean that less than two-fifths of the publication and distribution savings would be passed on to libraries through a reduction in subscriptions.
- UK academic libraries' costs in providing access to articles would fall by £23m. Within this total, the fall of £4m in subscription prices for academic libraries would be more than offset by an increase of £5m in VAT payments.

#### 2. Author-Side Publication Fees

There have been moves in recent years to change the traditional journal business model, in order to make journal articles open access; that is, available to anyone who wants to read them, free of charge immediately upon publication. The models vary, but some journals now (especially in biological and medical sciences), instead of charging a subscription for access by readers, charge a publication fee to authors so that their articles can be open access. Currently, about 2% of articles are published in open access or "hybrid" journals (where most articles are available for reading only if a subscription has been paid, but authors have a choice to make their articles open access by paying a fee).

If 90% of all articles were made open access upon payment of a publication fee in this way, we estimate that the total saving in the global costs of publishing, distribution and access would be £561m, split almost equally between savings to publishers and to libraries. These savings would be on top of the savings from a move to e-only publishing. Our modelling assumes that there will be some costs to publishers in administering author-side payments; but any time and administrative costs to authors, their institutions and funders have not been modelled here. Some of these savings could therefore be offset if the costs to publishers, authors, institutions and funders are higher than we have modelled.

The key results of our modelling are that:

- The subscriptions paid by academic libraries globally would fall by £2.91bn. But these savings would be offset by an increase of £2.92bn in the charges that the academic and

research institutions of which they are a part (or their funders) would have to meet in author-side publication fees.

- The costs and benefits would be unevenly distributed across institutions: research-intensive institutions would tend to pay more in publication fees than they currently do for library subscriptions, while institutions where research constitutes a lower proportion of activity and expenditure would tend to see reductions in overall expenditure.
- In the UK, libraries in the HE sector as a whole would benefit by c£128m. But the UK's contribution to publication fees would amount to c£213m. The UK's share of funding to meet the costs of publication, distribution and access would rise from 5.2% to 7.0%.
- The main beneficiaries would be other institutions that currently purchase journal subscriptions, but are not major producers of research outputs.

### 3. Cash for peer review

We have estimated the unpaid non-cash costs of peer review undertaken in the main by academics at £1.9bn globally each year. If payment were to be made in cash to meet these costs, there would be a significant transfer of funds to academics and the HE sector globally. If universities were able to capture the payments made to peer reviewers, it might be possible to make these payments neutral in terms of university budgets. But our assumption is that the majority of payments would in effect form additions to salaries. Since the estimated breakeven price of a major discipline journal would increase by 43%, the result would be an increase in the costs of subscriptions to academic institutions globally of the order of £1.4bn. The estimated increase in the costs of subscriptions to UK libraries in the HE sector would be of the order of £53m, a rise of 45% compared with their current subscription expenditure.

### 4. Increases in research funding

In recent years, the global increase in research funding has been of the order of 2.5% a year in real terms, with related increases in the number of journals and articles published. Our fourth scenario looks at the impact of sustained increases of this order over the next ten years, with a rise of 11% in the number of journals published, and of 28% in the number of articles (hence, in line with experience over the past decade, the number of articles published per journal will increase by c1.5% a year).

Such a rise in the production of articles will clearly have an impact on costs. Global publication and distribution costs will rise by £1.6bn (26%) in real terms, resulting in increases in breakeven subscription prices of around 12-13% over 10 years. Time spent by researchers in searching for articles will increase substantially. In the UK, the total cost to academic libraries will be of the order of £36m in real terms, or 21% of their current budgets for acquiring and providing access to scholarly journals.

## 2. Introduction

In August 2007, the Research Information Network (RIN) commissioned Cambridge Economic Policy Associates (CEPA) to carry out a study to model the costs and funding flows in the scholarly communications process in the UK. This document is the summary final report. A full version of the report, together with detailed Annexes setting out our methodology and assumptions, are available on the RIN's website<sup>1</sup>.

This summary paper is organised as follows:

- Section 3 sets out the terms of reference, scope and methodology for the work.
- Section 4 provides CEPA's estimates of the costs and funding flows of the scholarly communication process currently.
- Section 5 summarises the results of the scenario analysis carried out as part of the work.

Section references included in the text are to the full version of the report.

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<sup>1</sup> See <http://www.rin.ac.uk/costs-funding-flows>

### 3. Terms of reference, scope and methodology

#### 3.1. *Terms of reference*

The formal scholarly communications process is the final, essential stage in undertaking a piece of scholarship or research project. It provides certification of the work, dates it, identifies the authors as originators and disseminates it. Without the formal scholarly communications process the body of knowledge resulting from scholars' and researchers' work would not be made available for use by other researchers and applied to the benefit of society as a whole.

Despite there being a considerable literature on the costs of individual aspects of the scholarly communications process, there has been no attempt (as far as we are aware) to produce estimates of the costs from a 'system-wide' perspective. This work thus seeks to provide evidence to inform the continuing debate about the impact of technology on the costs and funding of the scholarly communication process. We have also sought to develop a model capable of providing estimates of the costs and funding of the scholarly communications process and to contribute to the understanding of the current system.

The two main elements of the terms of reference for the work were:

- To identify the cash and non-cash costs incurred by the key agents involved in the various stages of the scholarly communications process in the UK.
- To identify the sources, nature and scale of the funding and other resources made available to meet those costs.

#### 3.2. *Scope*

Given the strength of feeling on some of the issues covered in this report it is essential to be clear about the scope and nature of the study.

**First**, in what follows we take the scholarly communications process to be the combination of the publishing and distribution of peer-reviewed articles in scholarly journals, and the provision of access to such journals by publishers, academic and non-academic libraries, and other channels.

Of course we recognise that there are other forms of scholarly communication (e.g. monographs, conference proceedings and pre-publication repositories), but these are not the subject of this report. Articles in scholarly journals are by far the most important form of information outputs produced and read by researchers. They are named by virtually all researchers as the most important information resource, and they are used to generate key indicators of research productivity and performance. They account for more than half of the acquisitions expenditure of academic libraries in the UK. For the avoidance of doubt, our estimates of the costs of the scholarly communications system exclude the costs associated with other forms of scholarly communications. Nor do we consider costs and revenue flows relating to secondary publishing, re-publication, or the provision of e-print repositories.

**Second**, the study is *not* a cost-benefit analysis of a move to 'open access' delivery of peer-reviewed journals. Rather, in accordance with the terms of reference, the study confines itself to analysing the cost and funding flows of the current and the possible future scholarly communications process.

**Third**, as agreed with RIN, the work has:

- Taken a global view of the costs of the publication and distribution element of the value chain (since it is by definition a global sector - in terms of the origin or articles, peer reviewers and publishers).
- Considered only the UK aspects of access (e.g. through libraries and other direct sources).

### 3.3. Methodology

The focus of CEPA's work has been to develop and populate a model that can be used to provide estimates of the annual costs and funding flows of the scholarly communications system. Our approach has therefore been to define the structure and input assumptions for the model 'base' case as a reasonable estimate of the current scholarly communications system. This has been done on the basis of a review of the relevant literature and discussions with the Expert Panel and other professionals in the scholarly communications process.<sup>2</sup>

We have then considered how a number of policy scenarios impact on both the total cost of the system and who pays for it.

Points to note about our methodology are as follows:

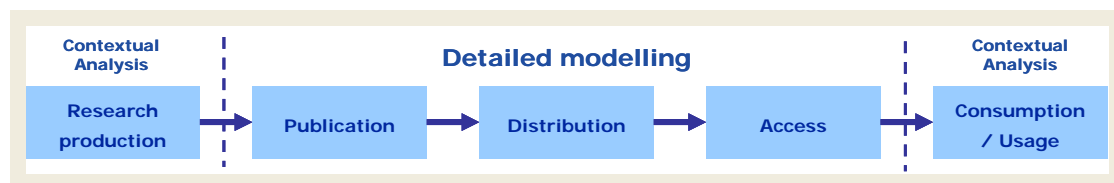
- Although we believe that the assumptions used to generate the estimates in this report are reasonable, we have had to make judgements in the absence of firm evidence on a significant number of inputs. This is inevitable in any work of this sort, but we recognise the importance therefore of being very clear about the assumptions that have been used (and their sources).
- In addition, given the complexity of the system, we have made a number of simplifying assumptions. These are set out in the Model Structure (Annex B). For example, we have not sought explicitly to model the cost structures of actual publishers. Rather, cost estimates are based on a series of activities and associated unit costs that would be carried out by publishers of different types. Our view is that these simplifications do not materially impact the overall estimates of the cost or the analysis of scenarios.
- The policy scenarios considered in the report should not be taken to be CEPA's or RIN's view of what will or should happen to the scholarly communications system. Rather they provide indications of the likely magnitude of cost and funding impacts that result from defined changes.

A final point to be aware of in reading this report is the distinction between the 'core modelling' of the volumes and unit costs of activities associated with the publication, distribution (at a global level) and access to peer-reviewed journals (at the UK level); and the contextual analysis carried out to put scholarly communication in the context of the wider research value chain. (See Figure 1 below)

The core elements of the model are structured so that the user can flexibly specify alternative assumptions at a relatively disaggregated level (e.g. the cost structures of different elements of the process for different categories of journal, subject and publisher). Varying these assumptions allows the user to explore different views of the current scholarly communications process or future scenarios.

In contrast, the contextual elements of the model rely on a small number of input assumptions – based on available evidence – to determine the outputs. Key elements of the context include the cost and volumes of research production; the consumption (or readership) of peer reviewed articles; and estimates of the contribution of UK academic institutions to the cost and funding of the global publication and distribution of peer-reviewed articles.

Figure 1: Detailed modelling and contextual analysis



<sup>2</sup> The model input assumptions are best estimates of the status quo but are fully adjustable. This allows for the modelling of different scenarios and thus changing costs and funding flows. The model is available for use by third parties on application to the RIN.

## 4. Current costs and funding flows (the 'base case')

Section 4 of the full report provides detailed estimates of the current annual cost and funding flows of the scholarly communication process (as defined, and given the data available). We refer to this as the 'base case', and we believe that the outputs provide a reasonable basis on which to explore policy sensitivities.

### 4.1. *Scholarly communications process in the context of research production and reading*

Figure 2 below shows our estimate of the system-wide cost of the full research value chain. This is the highest-level of aggregation of information presented in the report, with costs captured on a global level.<sup>3</sup> It shows that the total annual cost of English-language research system activities is estimated to be around £175bn: £115bn for production of research articles; £25 billion (14% of the total) for the scholarly communications process; and £34bn for reading costs. Our analysis assumes that the scholarly communication process comprises three components: publishing & distribution, access provision, and user searching and printing.

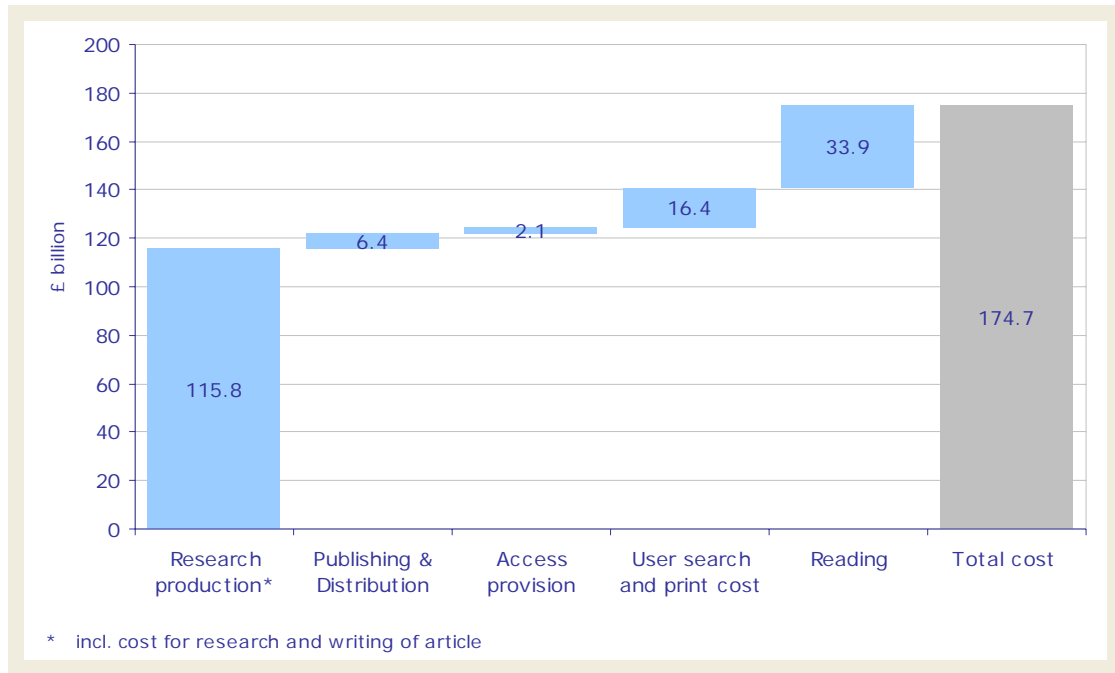
The key points are as follows:

- **Research production** costs account for by far the largest share of the research system-wide cost, £115.8bn (66%) of the total, comprising the cost incurred by researchers in carrying out field and laboratory research activities and in consolidating and writing-up the results of their research.
- **The scholarly communications process.** The largest component in the costs of the process (£16.46 bn) are accounted for by users' costs in searching for and printing the articles they need. Publishing and distribution costs c£6.4 bn, and libraries' costs (excluding the costs of subscriptions) in providing access to journals amount to £2.1 bn.
- **Reading.** The final block captures an estimate of the cost of researchers reading time – as a separate research input cost – at the end of the value chain and is estimated to be around £34bn, or 19% of the total research system cost.

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<sup>3</sup> Excluding non-academic research & development costs (e.g. research carried out by companies) for article production, and including the reading cost of all researchers.

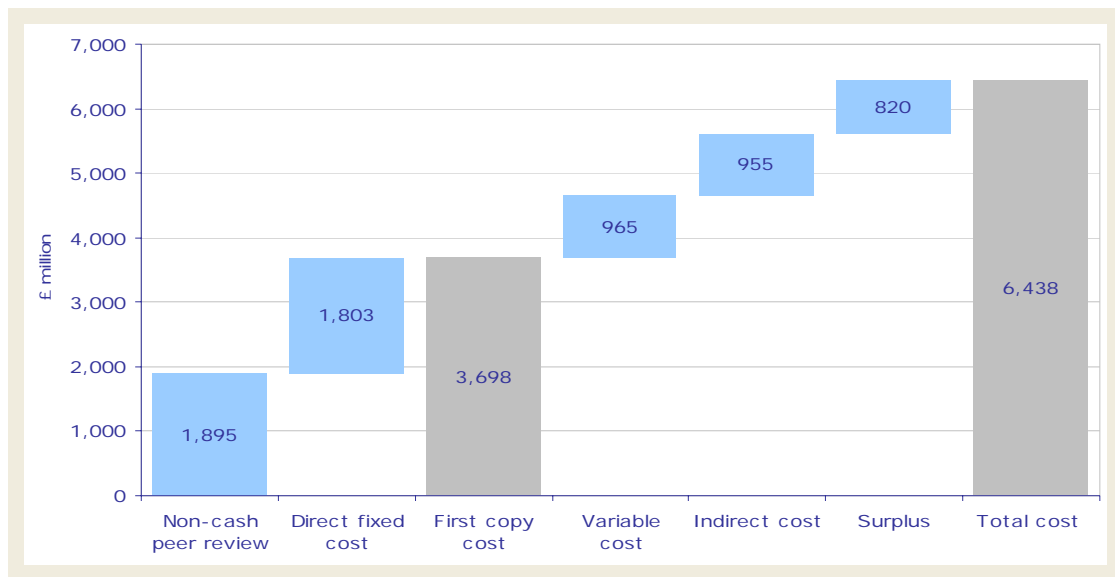
Figure 2: Global, annual cost incurred in the research production and communication process



#### 4.2. Components of the global scholarly publication and distribution

Figure 3 disaggregates our estimate of the annual, global cost of publication and distribution activities of £6.4bn. Excluding (non-cash) peer review costs from the estimate suggests a total incurred cash cost of £4.5bn. This is broadly consistent with estimates of the annual global scholarly publishing market revenue.<sup>4</sup>

Figure 3: Total publishing & distribution costs incurred in the global scholarly communication process, by activity



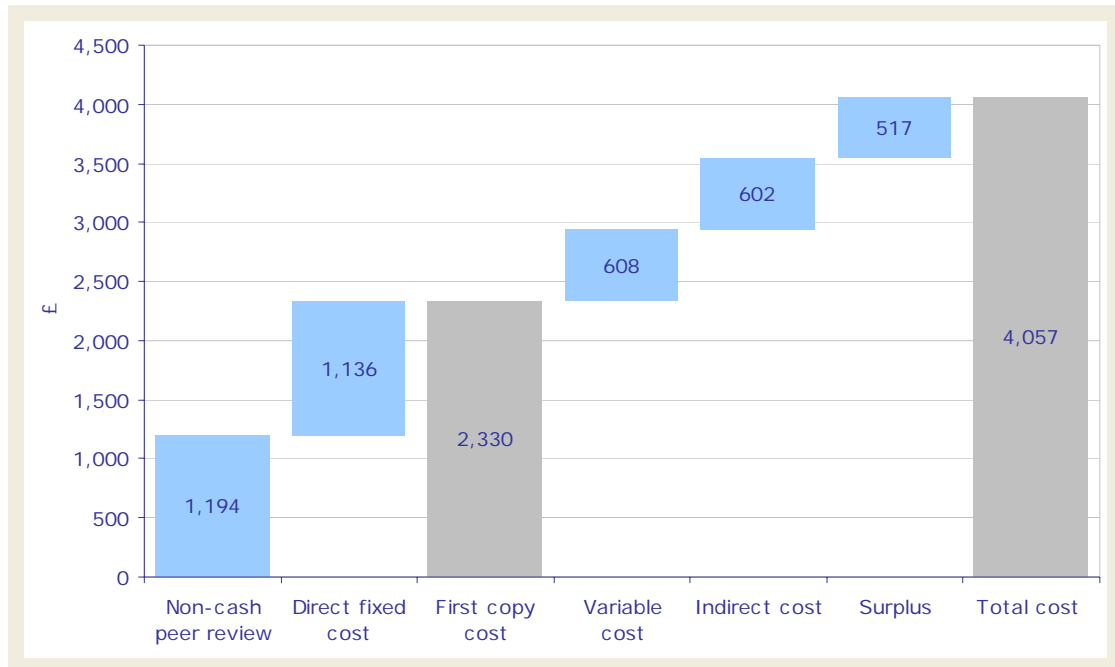
<sup>4</sup> See Section 2.5.3 of the full report for details.

Points to note are as follows:

- Peer review costs incurred by academics of £1.9bn are assumed to be the only non-cash cost in the publication and distribution element of the value chain<sup>5</sup>.
- Fixed first copy costs, including the non-cash cost for peer review, account for approximately £3.7bn (57%) of the total publishing and distribution cost. It is important to note that these are essentially fixed costs per article (or journal). That is, although they vary by type of article and journal, they are incurred irrespective of the number of subscriptions or readers.
- Costs varying with subscription numbers include printing, hosting, distribution (physical or electronic), sales administration and user account management. We estimate these costs to amount to around £0.97bn, although this is clearly sensitive to the number of subscriptions assumed.
- Indirect costs of close to £0.96bn are the overheads incurred by publishers and cover marketing, online hosting, customer service, management, other admin and investments.
- ‘Surplus’ is profit (in the case of commercial publishers) or surplus (in the case of society / non-profit publishers) and is estimated to account for £0.82bn of the cost. This amount can be varied according to publisher type and also takes account of differential tax treatments by publisher type.

Figure 4 shows the same analysis for the average article cost, reflecting assumed article allocation to different notional journal types, which have different cost structures. It suggests that average total publication and distribution costs per article amount to around £4,057 (including ‘non-cash’ peer review costs) and around £2,863 excluding peer review costs. Section 4.3 of the full report provides more information on variations of the cost structures for different types of journal (major discipline, niche, society publisher, print-only etc).

*Figure 4: Average per article publishing & distribution cost incurred in the global scholarly communication process, by activity*



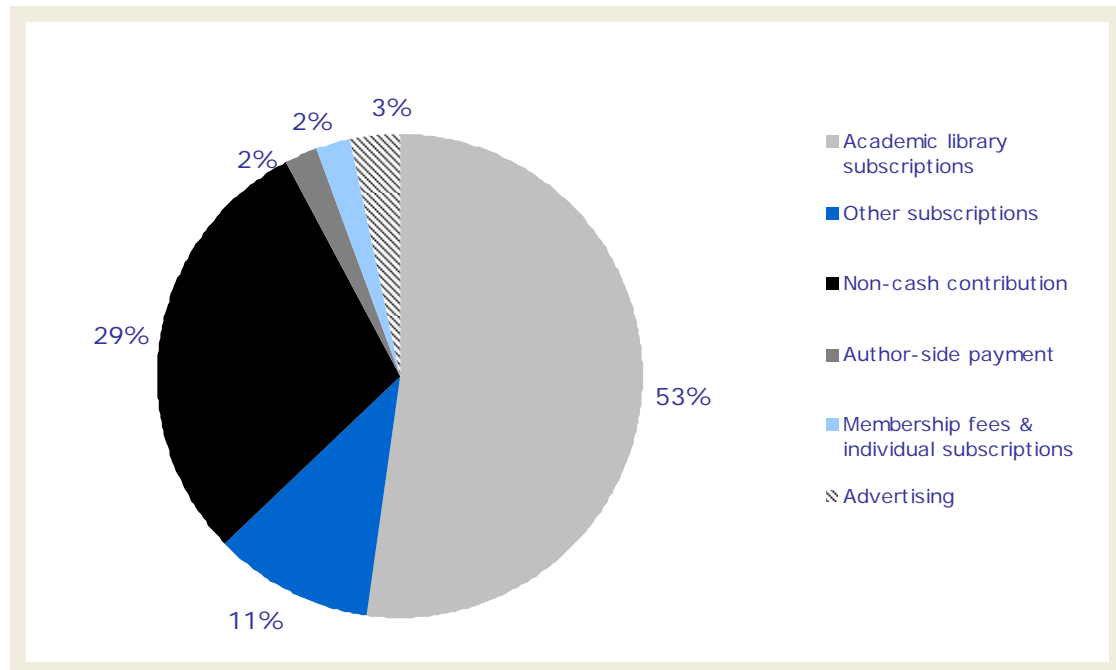
<sup>5</sup> As stated in Section 4 of the full report, for the purposes of modelling we define non-cash costs as costs incurred (typically by academics) which are not directly remunerated as part of the cost of scholarly communications.

### 4.3. What is the UK contribution to these publication and distribution costs?

A key element of the study has been to provide estimates of the contribution that the UK makes to the costs of the publication and distribution elements of the scholarly communication process.

Figure 5 below provides our estimates of who funds the global £6.4bn cost. It reflects input assumptions made about the sources of funding for each of the different journal types specified in the model; together with the assumed article allocation.

Figure 5: Funding contribution to meet global publication & distribution incurred cost (all journal types)



Tables 1(a) and 1(b) compare four measures of the UK's contribution to the costs of the global publication and distribution element of the scholarly communication process with:

- The proportion of the global supply of journal articles accounted for by UK researchers (estimated to be 6.6%<sup>6</sup>). We refer to this as a 'supply-side' measure, since it seeks to illustrate whether the UK contributes to the funding of the publication and distribution elements of the process in proportion to the costs that it imposes.
- The proportion of global readings accounted for by the UK. We refer to this as a 'demand-side' measure. Balance would be assumed to occur if the proportion of publication and distribution costs covered by the UK is equal to the readings of articles by UK residents.

A value of 1 in Tables 1(a) and 1(b) for each indicator should be taken to mean 'balance' for the UK in terms of contribution. A value >1 suggests that the UK is a net contributor; and a value of <1 suggests that UK is a net beneficiary of funds provided from elsewhere.

<sup>6</sup> Our estimate is consistent with those of the US National Science Foundation (see NSF Science and Engineering Indicators 2008, Table 5.19) and of SCImago (see <http://www.scimagojr.com/countrysearch.php?country=GB>, accessed 8 May 2008). It differs from that published by the Office of Science and Technology in its 'PSA Target Metrics for the UK Research Base', which suggests a percentage of 8.8%. The difference is the result of the method used to account for article co-authorships. See full report 4.4.3.

Table 1a: UK contribution to peer review costs<sup>7</sup>

	<b>Contribution measures</b>	<b>UK as % of Global peer review costs</b>	<b>Supply Indicator</b> (defined as UK funding contribution % / UK article contribution %)	<b>Demand Indicator</b> (defined as UK funding contribution % / UK reading %)
A	Contribution of UK to peer review costs	8.7%	8.7% / 6.6% = <b>1.3x</b>	8.7% / 3.3% = 2.7x

Table 1b: UK contribution to total global (publication & distribution) costs

	<b>Contribution measures</b>	<b>UK as % of total Global costs</b>	<b>Supply Indicator</b> (defined as UK funding contribution % / UK article contribution %)	<b>Demand Indicator</b> (defined as UK funding contribution % / UK reading %)
B	UK academic library contribution to funding	1.8%	1.8% / 6.6% = <b>0.3x</b>	1.8% / 3.3% = 0.5x
C	Total UK academic institution contribution to funding	4.0%	4.0% / 6.6% = <b>0.6x</b>	4.0% / 3.3% = 1.2x
D	Total UK contribution to funding	5.2%	5.2% / 6.6% = <b>0.8x</b>	5.2% / 3.3% = 1.6x

Key observations are as follows:

- UK academics appear to be significant net contributors in terms of peer review costs compared with both the proportion of articles originated from UK authors (supply-side measure, where the indicator is 1.3); and the estimate of total readings (demand-side measure, where the indicator is 2.7).
- The contribution from UK academic subscriptions, at less than 1.8% of global publication and distribution costs, is significantly lower than either (i) the UK contribution to global article production (so the supply-side indicator is 0.3) or (ii) the UK contribution to global article reading (so the demand-side indicator is 0.5).
- The full contribution from UK academic institutions (including both subscriptions and peer review contributions) is still, at 4% of global publication and distribution costs, significantly lower than the UK's contribution to article production (so the supply-side indicator is 0.6). But it is greater than the UK article readership (so the demand-side indicator is 1.2).
- Our estimates of the full UK contribution including corporate subscriptions as well as the contribution from HEIs suggest that the UK as whole is a net beneficiary compared with the supply of articles (thus the supply-side indicator is 0.8). Based on the comparison with reading, however, the UK is a net contributor (thus the demand-side indicator is 1.6).

#### 4.4. What are the access costs incurred by UK libraries and academics?

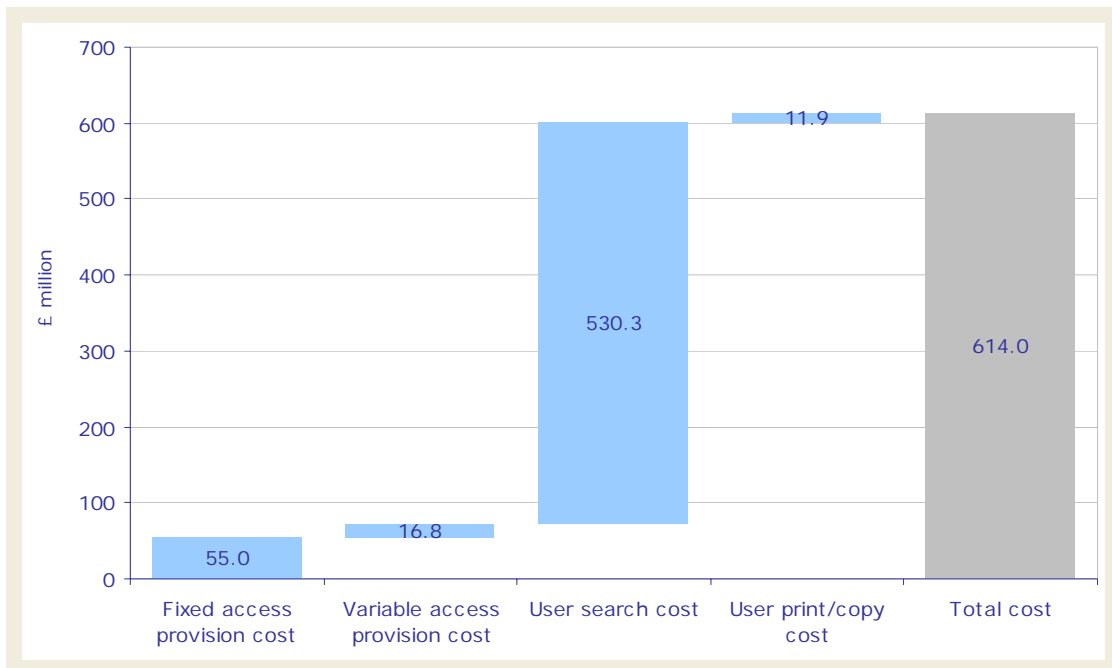
Figure 6 shows estimates of: (i) the total cost incurred by UK libraries in providing access to their stock of journals; and (ii) the cost incurred by researchers within the UK in searching for and printing/photocopying articles.

Key points to note are as follows:

<sup>7</sup> Numbers rounded to one decimal place.

- Access provision (the sum of fixed and variable library access provision cost) accounts for £72m (12%) of the total cost in this component of the value chain. These are the costs that are borne by libraries.
- User search costs of £530m account for the bulk (86%) of the access cost. This is the non-cash cost incurred through the average time spent on locating, displaying, downloading, and browsing articles before they are read by the researchers.<sup>8</sup>
- In addition, printing and copy costs incurred by researchers account for just below £12m. (Note that a small proportion of these costs are also revenues to libraries, but most will arise in printing from users' desktops).

Figure 6: Total annual access provision & usage cost incurred in the UK scholarly communication process



#### 4.5. Allocation of access cost by library type

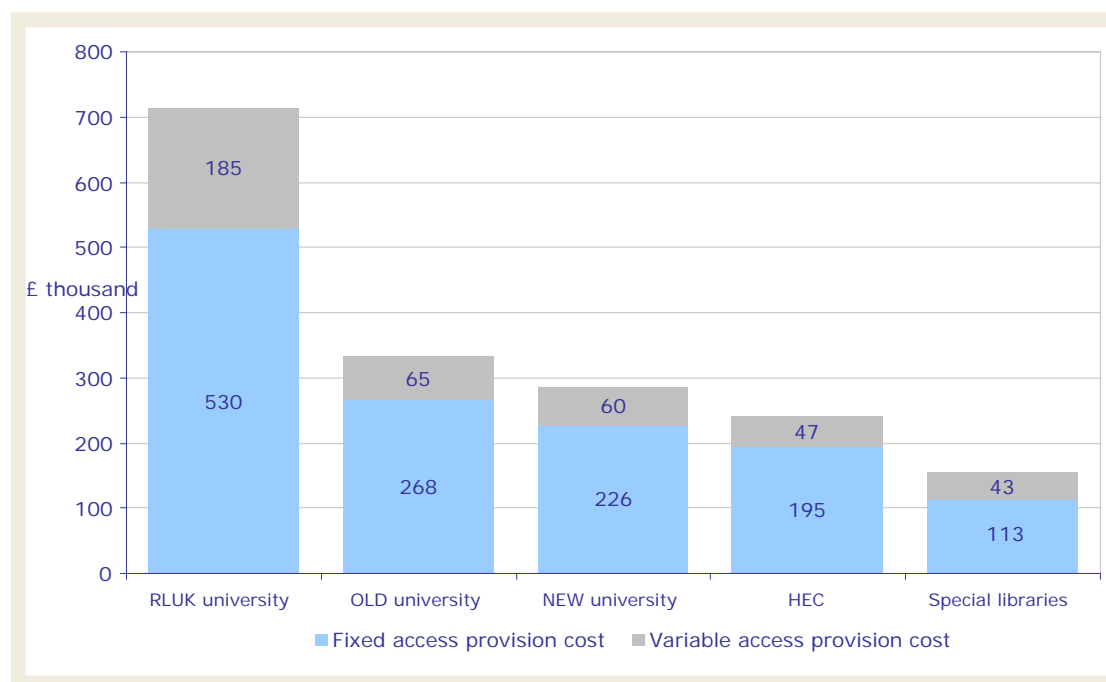
The costs incurred by libraries in providing access to scholarly journals are driven by assumptions about the demand for journals by different library 'types'. For simplicity, the definition and categorisation of UK academic library types follows SCONUL's classification, with the addition of a fifth category - special libraries, which include corporate, government departments, and public libraries.<sup>9</sup>

The total library access costs of £72m for all libraries reflect the number of libraries in each category, the different journal portfolios for each library type and the different level of usage in each library type. Figure 7 shows the assumed annual access costs by library type used in the above estimates of total library access costs.

<sup>8</sup> Search cost is equally applied to articles accessed via libraries and articles accessed in open access journals.

<sup>9</sup> The model counts individual subscriptions as part of the funding contribution from special libraries.

Figure 7: Allocation of total access cost per library for different library types



#### 4.6. Allocation of subscription costs by UK library type

The burden of subscription fees is allocated to the different UK library types on the basis of subscription portfolios that have been calibrated to match SCONUL data. Table 2 shows the resulting estimates of subscription cost/funding for the different library types; and how these totals break down in terms of total cost, cost per journal subscription, and cost per user and reading.

Table 2: Library subscription costs

Library type	Total £ per library type	£ Per library	£ Per journal	£ Per researcher	£ Per reading
RLUK universities	40,194,490	1,386,017	111.14	693	2.74
OLD universities	30,656,218	806,743	138.57	1152	4.56
NEW universities	39,433,727	773,210	138.01	1190	4.70
HE colleges	7,183,981	224,499	141.29	449	1.78
Special libraries	21,658,720	208,257	98.71	463	2.40

The key points to note on libraries subscription costs are:

- RLUK universities have by far the most extensive serials subscription portfolios and hence highest total subscription expenditures. On a per journal basis their subscription expenditures are the lowest, on average, among all academic library types.
- On a per researcher basis library expenditures are lower at RLUK universities than at OLD and NEW universities, mainly because of a higher average number of researchers using the libraries and stock of journals.

- The average subscription cost per reading is largely driven by the size and cost of the subscription portfolios, as well as the number of researchers. Average costs per reading are lowest for HE colleges, which is not a result of lower average journal prices but simply of the limited selection of journal portfolios at HEC.

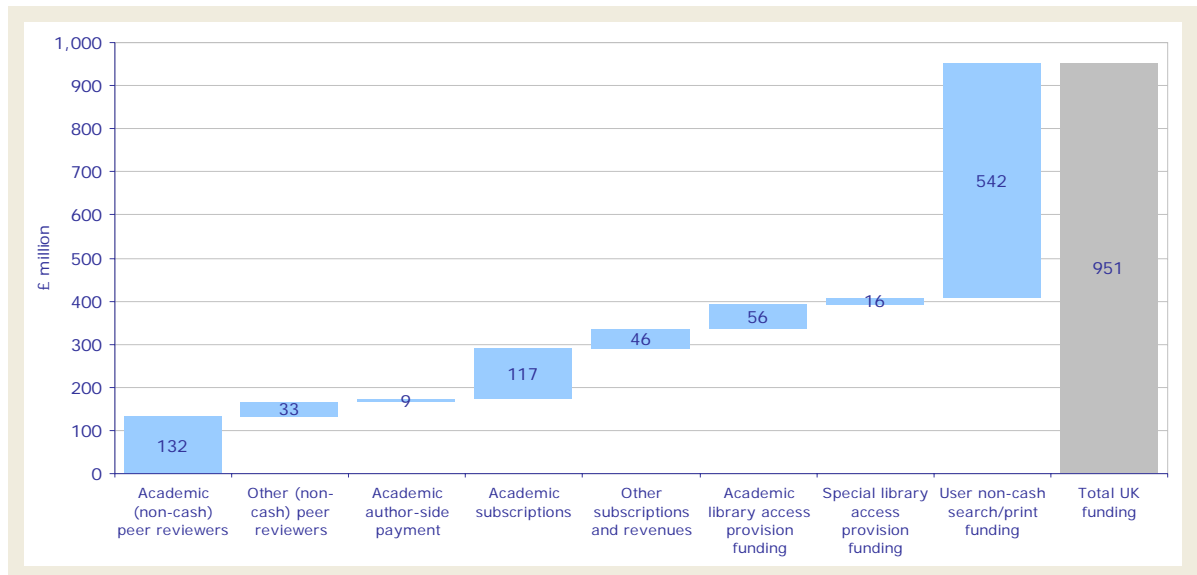
#### 4.7. Total UK funding of the scholarly communications process

Figure 8 is the final component of our analysis of the scholarly communications process in the 'base case'. It shows estimates of the total cost of the scholarly communication process to the UK and who funds it. The total global cost is estimated to be £25bn. We also show in Figure 9 an alternative presentation excluding user search/print costs.

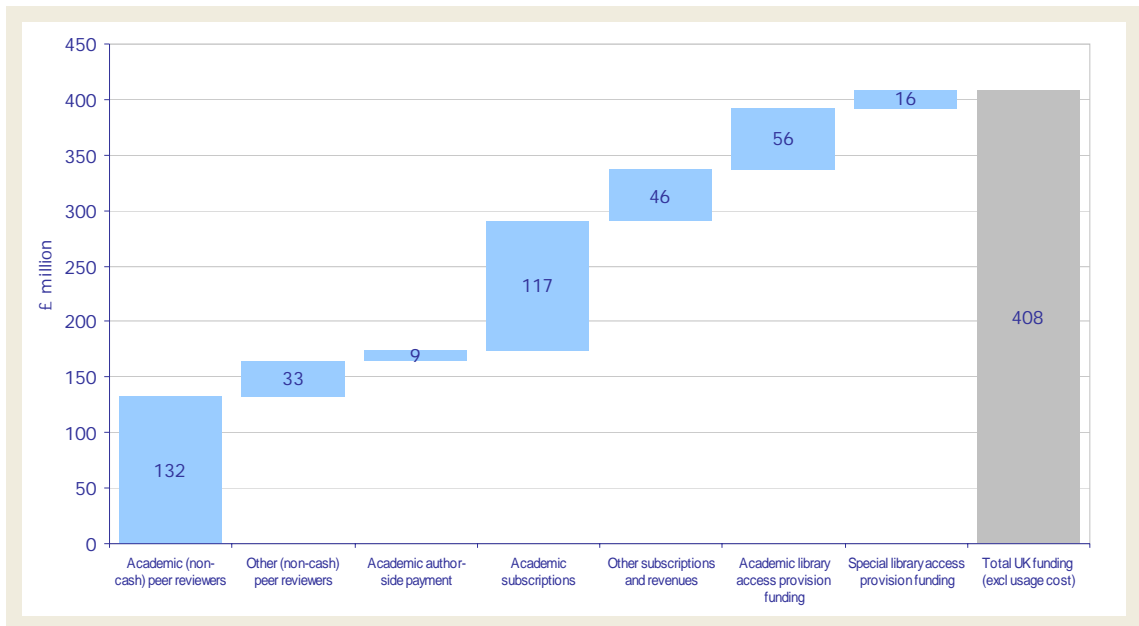
Key points to note are:

- The UK total contribution to the scholarly communication system cost is £951m, or about 3.8% of total global costs. Excluding user search/print cost, the total UK contribution is £408m, or 4.8% of total global costs.
- UK academic institutions contribute a total of £314m in the form of academic peer review, author-side payment for article publications, academic library subscriptions and the fixed and variable access provision costs of university libraries.
- The total funding for user search/print activities is estimated at £542m, of which about £427m can be related to UK higher education institutions.

Figure 8: UK funding contribution to the total cost of scholarly communication



**Figure 9: UK funding contribution to the total cost of scholarly communication (excluding user search/print costs)**



## 5. Scenario Analysis

Section 5 of the full report sets out the results of four policy-related scenarios carried out as part of the work. These scenarios have been developed in order to illustrate certain characteristics of the scholarly communications process, rather than as a representation of a current or future reality. In the full report we present results for each scenario in three parts:

- The impact on the costs and funding of the **global publication and distribution** of the scholarly communications process.
- The impact on **UK access costs** (including the impact specifically on UK library budgets)
- The impact on the **total costs of the global scholarly communications system** – using a simplifying assumption of pro-rating the UK estimate of access costs to get to global access costs.

We present here the key results.

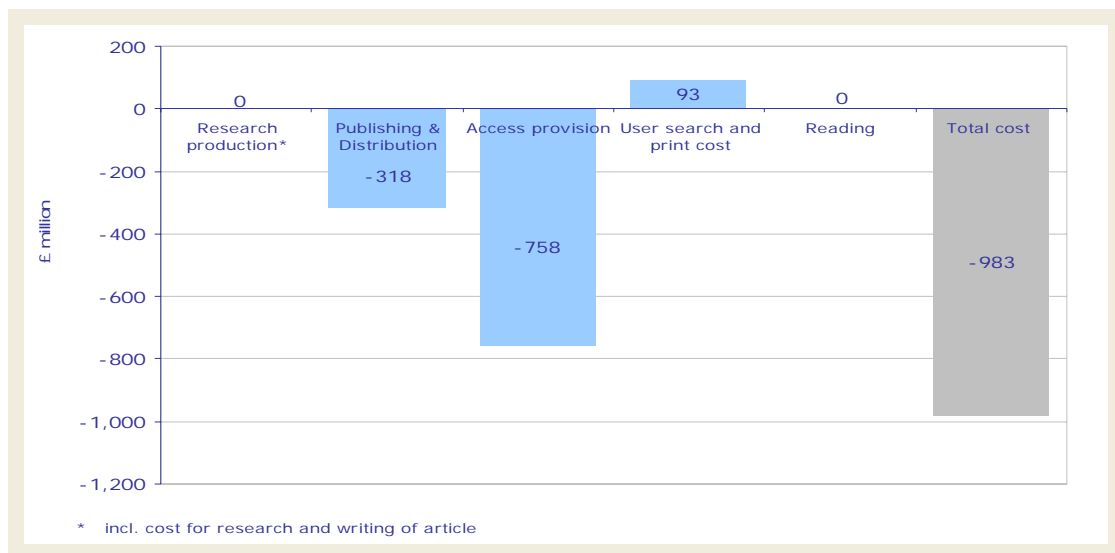
### 5.1. Scenario 1 - Electronic-only publication

This scenario involves changing:

- The formats in which publishers supply journals, such that 90% are assumed to be in electronic format only ('E'); and 10% are in both print and electronic ('P&E'). This compares with 90% P&E, 5% E and 5% P in the base case.
- The formats in which UK libraries demand journals to 80% E only and 20% P&E for all library types. (The proportions in the base case vary according to the library type)

The key result is that the global costs of publishing, distribution and access fall by £1.08 bn (12%), offset by a rise of £93 m in user costs for printing.

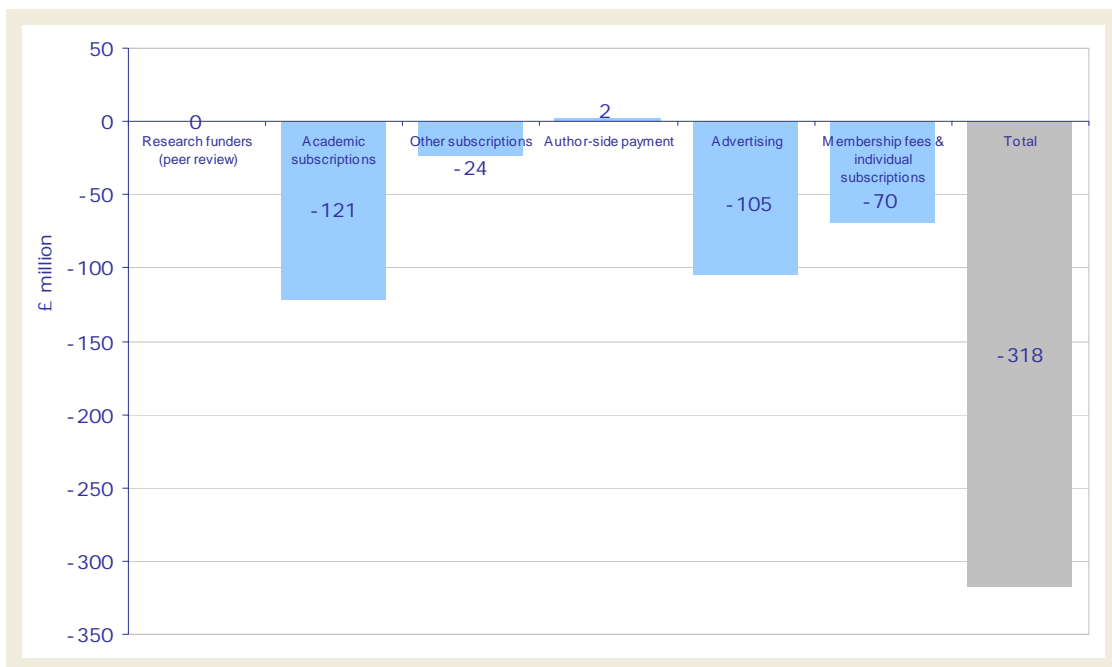
*Figure 10: Key differences in global research system incurred costs between the base case and Scenario 1*



At a more detailed level:

- Global publication and distribution incurred cost falls by around £318m (7% of current costs excluding peer review). This comprises: significant savings (of £342m<sup>10</sup>) in the variable cost of printing and distributing hardcopies of journals to end users; and small increases in fixed first copy costs because of the assumed marginally higher cost of quality assurance of e-content required to make articles available online.
- Less than of two-fifths (£121m of £318m) of these savings are passed on to academic and other subscribers through a reduction in subscription prices. This is because of an assumed reduction in advertising revenues, membership fees and individual subscriptions assumed in an 'e-only' world. Figure 11 shows the key differences in funding flows under Scenario 1.
- Access provision costs of academic libraries in the UK are assumed to fall by £23m mainly as a result of a significant fall in libraries' fixed access costs - due to reduced journal subscription processing and archiving check-in services required for print journals. Variable costs are also assumed to fall slightly. The cost reduction in fixed and variable cost is around 36% of UK library access costs. The falls in library costs are slightly offset by increases of £3.1m in search and print costs borne by researchers.
- In addition to reduced costs associated with access, UK academic libraries would expect to benefit from reductions in subscription prices. However, because the changes in subscription prices are small, the increase in VAT (from the move to electronic format) outweighs the savings.

Figure 11: Key differences in global publication & distribution funding between the base case and Scenario 1



## 5.2. Scenario 2 - A move towards an author-side payment business model

This scenario builds on Scenario 1 and considers the additional implications of a move to author-side payment where 90% of all journals and articles are published under this business model, as compared with the base case assumption in which 98% of articles are published under the traditional subscription model.

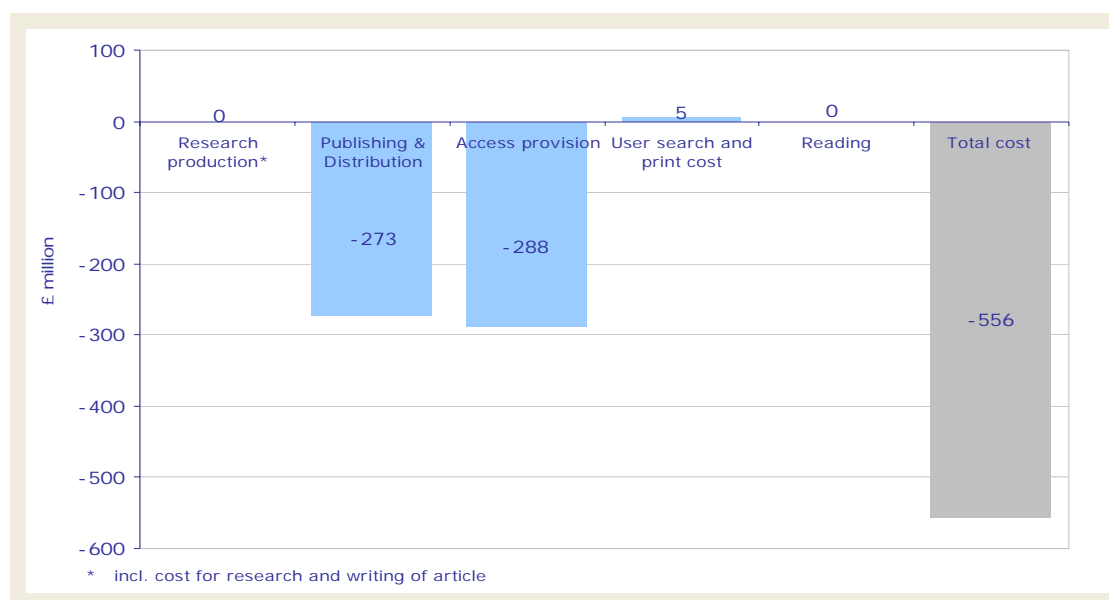
Under such a model, there would be minor changes in the incurred costs of getting to first copy, associated with the management of payment contracts with authors. A shift to author-side payment is, however, expected to result in a significant reduction in the costs of publication and

<sup>10</sup> See Figure 5.1 in the full report

istribution of around £273m (4%) at a global level, in addition to the changes arising from a move to e-only publication. This is largely due to an estimated decrease in variable publishing cost of £385m.

As shown in Figure 12, when savings in access provision are added to those in publication and distribution, the total saving amounts to £561m (7% of the current total), offset only marginally by a £5m increase in user search and printing costs. Our modelling assumes that there will be some costs to publishers in administering author-side payments; but any time and administrative costs to authors, their institutions and funders have not been modelled here. Some of these savings could therefore be offset if the costs to publishers, authors, institutions and funders are higher than we have modelled.

*Figure 12: Additional differences in global research system-wide incurred costs between e-only publication (Scenario 1) and Scenario 2*



The main impact of an author-side payment scenario, however, is the expected shift in the funding flows for publication/distribution of journals. Key results to note (from Figures 13) are as follows:<sup>11</sup>

- Academic libraries are net beneficiaries, with their total subscription expenditures decreasing by almost £2.91bn at a global level.
- However, since academic libraries are part of the academic / research institutions that need to fund 'author-side payment' publication costs, these savings are expected to be largely offset. Assuming that around 90% of articles are published by academic researchers, their proportion of the increase in author-side payments would be about £2.92bn. As a result, the model suggests that academic institutions at a global level would face a marginal increase in costs of £ 10m from the move to author-side payment<sup>12</sup>.
- Costs and benefits are unevenly distributed across institutions, however: research-intensive institutions would pay more in publication fees than they currently do for library subscriptions, while institutions where research constitutes a lower proportion of activity and expenditure would tend to see reductions in expenditure.

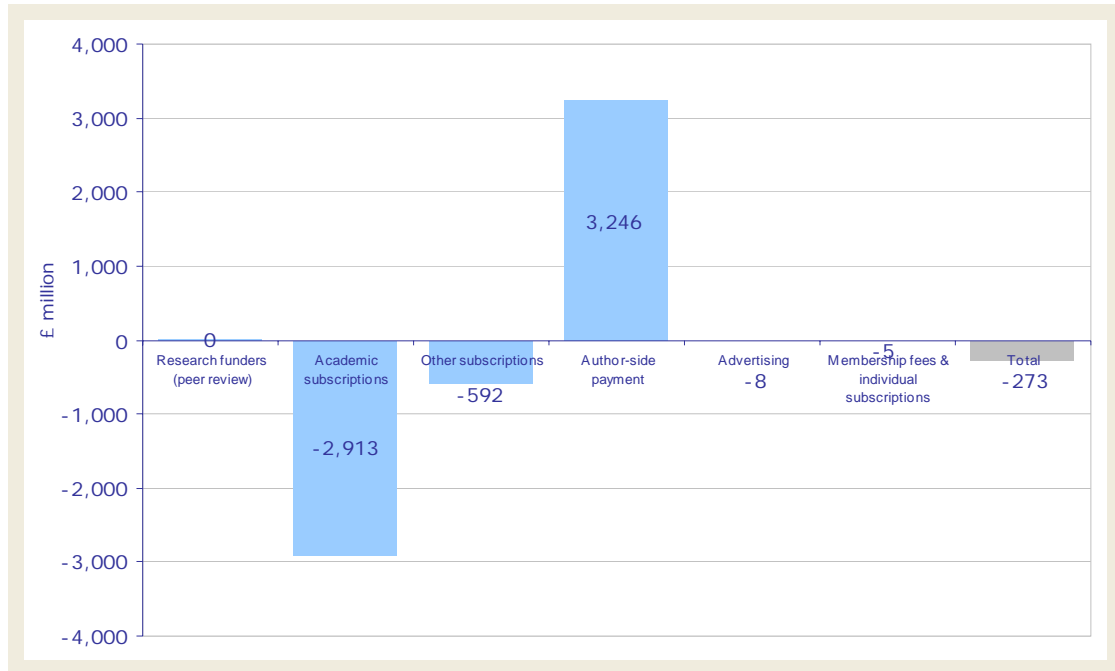
<sup>11</sup> The following points relate to the marginal impact on cost and funding flows in addition to the changes described in Scenario 1, where 90% of journals are delivered in electronic format only. In Scenario 2 electronic publishing is an assumed precondition for a move towards author-side payment and no further impact of a change in electronic delivery format is modelled.

<sup>12</sup> If we assumed that all articles were published by academic researchers, then academic / research institutions would in total bear a cost increase of £333m.

- The main beneficiaries thus of this move are ‘other subscribers’, to the extent that they are ‘consumers’ of published research outputs. They benefit by a cost reduction in subscription expenditures of £592m. If the share of articles published by these other subscribers is assumed to be 10%, the net benefit would be £267m.

What is interesting about these results is that, based on the assumptions in the model, the ‘loss of revenues’ from ‘other subscribers’ has been largely offset by the assumed variable cost savings resulting from a move to author-side payment. The additional funding from academic institutions would otherwise have increased further.

*Figure 13: Additional differences in global publication & distribution funding between e-only publication (Scenario 1) and Scenario 2*



The move to author-side payment also has an impact on the UK’s estimated contribution to the publication and distribution element of the scholarly communication process. UK libraries as a whole would benefit by the order of £128m, or an additional 76% of total library expenditure as compared with Scenario 1. But the UK’s contribution to publication fees would amount to c £213m.

As a result of these changes, the UK’s funding share increases from 5.2% to 7.0% of total costs, and the UK turns from being a ‘net beneficiary’ to being in broad terms a net contributor to the system. This reflects the fact that the UK’s proportionate contribution to total library subscription funding currently is significantly less than the proportion of global articles accounted for by UK academic authors.

### *5.3. Scenario 3: A move towards paying academics cash for carrying out peer review activities*

The only difference between the base case and Scenario 3 is that peer-review costs are assumed to be 100% cash costs. Because our measure of the costs of global publication and distribution costs associated with the scholarly communications process includes both cash and non-cash costs; there are no changes in these totals. However, key points to note are that:

- This increase in first copy cash costs would result in increases in break-even prices and therefore subscription costs. For example the estimated break-even price of an average major discipline journal would increase by 43%. The increases for the average hybrid and niche journal would be 24% and 44% respectively.
- Payments for peer review would create a significant transfer (of the order of £1.9bn) to academics and the HE sector globally.
- If research universities were able to capture the payments received by peer reviewers (e.g. by reductions in salaries or by institutions adopting a 'charge-out' policy), it might be possible for these changes to be neutral in terms of university budgets. However, our presumption is that the majority of these peer-review payments would be in addition to existing salary payments. At the limit, this would result in an increase in the cost to academic research institutions of acquiring journal subscriptions of around £1.4bn globally.
- The estimated increase in costs to UK libraries is also very significant: £53m, an increase of 40% compared with current estimated library subscription expenditure.

#### 5.4. Scenario 4: Impact of increases in research funding

This scenario considers the impact of increases in global research funding on the scholarly communication process. It assumes that research funding increases in real terms by an annual rate of 2.5% over a period of 10 years; and that the average number of articles per journal increases at a compounded annual rate of about 1.5%. These assumptions are broadly in line with what has happened over the last decade.

Some of the key intermediate model outputs are set out below in Table 3. The outputs suggest that the increase in research funding in this scenario results in real increases in existing journal prices of around 1.25% real per annum over 10 years (compounded to get to around a 12-13% increase).

Table 3: Scenario 4 intermediate outputs

Item	Base case	Scenario 4
Number of articles published	1.59m	2.03m (+28%)
Number of journals published	23,700	26,300 (+11%)
Real prices increase (Major Discipline Journals)	-	12%
Real prices increase (Popular Hybrid)	-	5%
Real prices increase (Niche Journals)	-	13%

The estimated impact of the greater number of journals and articles on the scholarly communications process is therefore as follows:

- Global publication and distribution costs increase by around £1.6bn (25%), mostly as a result of the £1bn increase in first copy costs. Funding of these costs is assumed to be in proportion to the funding in the base case.
- Access provision costs in the UK are estimated to increase by around £157m (26%). However, the majority of this relates to increases in user search cost. The increase in libraries' fixed and variable access provision is estimated to be £7.5m (10%).
- The total expected cost burden for UK academic libraries of this scenario is expected to be of the order of £38m (or 20% of total UK library budgets for acquiring and providing access to scholarly journals).