



RESEARCH INFORMATION NETWORK

ACTIVITIES, COSTS AND FUNDING FLOWS IN THE SCHOLARLY COMMUNICATIONS SYSTEM IN THE UK

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Modelling Assumptions Book (Annex C)

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1. INTRODUCTION

This document presents the numerical assumptions that Cambridge Economic Policy Associates (CEPA) inputted into the RIN scholarly communications model ('the model'). The document states the specific number used for each input assumptions in the model and the source of that number. The assumptions presented here were inputted into the model in order to generate calculated outputs of costs and funding flows of the scholarly communications system.

A series of tables are set out in the following sections which describe:

- the name of the each input assumption required to run the model;
- the classification of each input assumption to show whether it is; a percentage allocation; a unit cost per article or per journal; a simple count of something, etc, as well as a short description of each input assumption;
- the purpose and use of the input assumption;
- the data sources CEPA has identified and used to establish an estimate of each input assumption; and
- the number used for each input assumptions.

Many of the input assumptions have been acquired from Expert Panel members who provided primary data based on their studies, as well as from interviews with a range of value chain participants. Input assumptions have been *derived* using a combination of benchmark data and assumptions, where specific data is not available.

The remainder of the document is structured as follows:

- Section 2 sets out the layout of the model and describes the purpose of its worksheets.
- Section 3 outlines all key *high-level* assumptions that apply across different parts of the model.
- Section 4 presents the assumptions used to determine the activity cost of publication/ distribution and access to scholarly journals.

We suggest this document is read alongside the model structure document. For abbreviations please refer to the glossary of the main report.

2. MODEL LAYOUT

The model is a cell-protected Excel spreadsheet, and is laid out in the following worksheets:

Sheet	Purpose
1. Notice	To briefly describe the purpose of the model and its intended use.
2. Key Results	To summarise the key numerical and graphical results.
3. Scenarios	To present key results of scenarios and shows changes in cost and funding flows in relation to the base case.
4. Inputs	To capture in a single worksheet, all of the model inputs relating to article allocation, journal cost, library portfolios, consortium deals, and funding flows.
5. Module 1 – allocation	To allocate the supply of published articles to different journal types based on a series of decision points, namely: subject, payment, journal category, rejection rate, delivery format, publisher type etc.
6. Module 1 – activity cost	To calculate based on the inputted assumptions, the set of activity costs involved in publication and distribution of scholarly journals (fixed, variable, direct and indirect costs).
7. Module 1 – journal cost	To calculate article first copy cost, total journal cost, break-even prices for different journal prices
8. Module 2 – library portfolios	To define a set of journal subscription portfolios for types of UK library, including by delivery format and average level of usage of journals.
9. Module 2 – activity cost	To define the set of library journal access activities and usage cost.
10. Module 2 – library cost	To calculates library access and usage costs for different library types.
11. Module 3 – funding flows	To calculate the allocation of UK and global funding flows for cash and non-cash cost incurred.

The key inputs cells are contained in the Inputs worksheet, with some additional lower-level input cells contained in the Module 1 and Module 2 activity cost worksheets. User ‘inputs cells’ contain numbers in blue-coloured font. ‘Calculations cells’ are in black font.

Sections 3 and 4 of this document set out the input assumptions for the model sheets *Inputs*, *Module 1 – activity cost*, and *Module 2 – activity cost* only.

3. CENTRAL INPUT ASSUMPTIONS

The *Inputs* worksheet captures the key model assumptions used to define sets of activities and costs incurred in the scholarly communications process including the allocation of articles across journal types, journal production unit costs, definition of library types and portfolios, usage of journal types and the calculation of funding flows. Input assumptions also define UK share of article production, levels of peer review and access units cost in relation to the cost of the global system. This worksheet also captures input assumptions required to ‘contextually’ model research production and usage activity¹. Inputs assumptions for specific activity costs of article production and access are explained in detail in Section 4.

3.1. Contextual modelling inputs

Contextual inputs define the costs incurred in the scholarly communication system for research production (reading, core research activities and manuscript writing).

Input	Unit of classification	Purpose	Identified sources	Assumption
R&D expenditures	Total funding for R&D	Contextual Modelling – derives total number of researchers and article production	<ul style="list-style-type: none"> • OECD Science and Technology Indicators 2007 estimate about US\$ 774bn of OECD R&D funding, and a global funding of about US\$ 974bn. • The UK’s funding is about US\$ 35bn. • UNESCO Science Report 2005 puts global R&D funding at about US\$ 830bn 	<ul style="list-style-type: none"> • Global R&D expenditures £439bn • UK R&D expenditures £17.8bn
Average cost per	Unit cost of one researcher per	Contextual Modelling – derives	<ul style="list-style-type: none"> • OECD Science and 	The total global and UK research funding was divided by

¹ A USD:GBP exchange rate of 2:1 has been used throughout (as at 2007).

Input	Unit of classification	Purpose	Identified sources	Assumption
researcher	year for <ul style="list-style-type: none"> • UK • Global 	total number of researchers	<p>Technology Indicators 2007 estimate a total of about 5.3 million global researchers (including non-OECD countries) and 180,000 UK researchers</p> <ul style="list-style-type: none"> • UNESCO estimate of 5 – 6 million researchers in the world 	<p>the total number of researchers to calibrate the average cost per researcher</p> <ul style="list-style-type: none"> • Global: £421bn/ 5.3m researchers = ~ £79,500 per researcher per annum • UK: £17.8bn / 180,000 researchers = ~ £99,000 per researcher per annum <p>The average cost per researcher in the UK is higher than the global average because research funding and the number of researchers quoted by OECD figures include a significant amount of emerging market countries with lower research funding volumes on a per capita basis.</p>
Share of 'active authors'	Share of researchers who (regularly) publish in scholarly journals	Contextual Modelling – derives number of 'active' researchers who the model treats as the authors of scholarly articles	<ul style="list-style-type: none"> • Thomson Scientific (ISI) estimate of 1 million unique authors who publish each year (2001) and 2.5 million authors who have published at least once every five years (2001) • US National Science Board data (2005) suggests that about 30% of R&D funding are for non-industrial R&D, 	<p>There are no firm figures on the number of 'active authors' responsible for scholarly article production.</p> <p>Evidence suggests however that the overwhelming majority of articles are produced in an academic setting. With funding levels for non-industrial (academic) research at about 30-35%, the model assumes that</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
			<p>which is largely related to academic research and a high level of scholarly article production.</p> <ul style="list-style-type: none"> As regards funding levels, in the UK, according to SET statistics, £6.5bn of funding is allocated to Research councils and the higher education sector, which equals about 35% of total research funding US National Science board data further suggests that 75% of scientific articles are published by university researchers 	<p>the share of ‘active’ researchers/authors, largely based at universities is about 35%.</p> <p>Based on this the model assumes about 1.9m ‘active authors’ globally, and 63,000 in the UK, of which close to 60,000 are probably research active academics at HE institutions.</p> <p>All these input assumptions are used for contextual modelling purposes and calibrated to match the existing global article production of about 1.5 – 1.6m.</p>
<p>Proportion of total UK researcher base at different universities (FTE academic / other researchers)</p>	<p>The direct model input is not the number count FTE equivalent of academic/ other researchers but a proportion of the total UK researcher base that is based at different university types.</p>	<p>This input is used to derive the total FTE researcher base at different universities / other research institutions.</p> <p>It derives the level of usage (variable access provision cost), user search/print and reading cost for researchers at universities / special research libraries.</p>	<ul style="list-style-type: none"> OECD 2006 estimates of a total of 180,000 researchers in the UK HESA data in 2001 suggests there were 116,405 active full time and 23,535 part-time academics in the UK Higher Education institutions. This is largely in line with SCONUL data for 2006/07 which suggests 134,000 FTE at HE institutions 	<ul style="list-style-type: none"> We assume about 47,000 non-academic researchers, and 133,000 academic researchers in the UK Whilst the number of non-academic researchers is estimated at 116,000 (total R&D employees), this is a very broad definition including employees that work in “corporate development”. As a consequence, we decided to calibrate the total number of researchers to match

Input	Unit of classification	Purpose	Identified sources	Assumption
			<ul style="list-style-type: none"> • The Office of National Statistics & DTI OSI indicators for 2003/04 estimate 116,000 FTE researchers in the UK's science, engineering and technology sectors. Researchers in the HE sector are not included in this figure • SCONUL serials data estimates average number of FTE academic staff for each university/library type 	<p>OECD estimates which follows a narrower definition.</p> <p>The model calibrates FTE staff through the input of the relative share of the UK researcher base for each university type. Current input assumptions are</p> <ul style="list-style-type: none"> • CURL – 32.1% • OLD – 14.7% • NEW – 18.4% • HEC – 8.9% • Other researchers – 25.9% <p>This results in a number of researchers by university type, which was calibrated to be broadly in line with SCONUL/HESA figures</p> <ul style="list-style-type: none"> • CURL – 2000 • OLD – 700 • NEW – 650 • HEC – 500 • Special libraries – 450
Average article productivity per	Number count of average successfully submitted manuscripts per 'active' researcher per year	Contextual Modelling - derives the total global number of research articles authored and published each year	Tenopir & King 2000 estimate the global ratio of unique authors to papers between 0.8 and 1.1 articles	Productivity figures were calibrated to match actual global/UK number of articles produced based on a fixed

Input	Unit of classification	Purpose	Identified sources	Assumption
researcher				<p>number of assumed researchers.</p> <ul style="list-style-type: none"> • An estimated global average of 0.80 articles per non-UK researcher per year • UK average of 1.65 articles per researcher per year, • The difference is based on a higher UK research productivity
Average cost of researcher per hour	<p>Unit cost of research/ writing/ reading per hour in £</p> <ul style="list-style-type: none"> • UK • global 	Contextual Modelling – derives the total system cost of research, writing, reading activities	<ul style="list-style-type: none"> • UK government statistics and OECD data put the total level of UK research funding at about £17.8 bn. • At a given number of 180,000 researchers this results in an annual cost per researcher of about £99,000. This includes all overheads • 228 working days * 7.5 hours = ~ 1,700 working hours 	<ul style="list-style-type: none"> • Assumed cost of about £58 per hour for UK researcher and £47 for average non-UK researcher <p>This does not account for the fact that researchers might work longer hours, which would discount their cost on an hourly basis.</p>
Average reading time per article	Time count in minutes	Contextual Modelling – derives the reading cost per researcher and of the system as a whole	<ul style="list-style-type: none"> • Tenopir & King 2002 estimate of 52 minutes per article • Tenopir & King 2002-2006 studies quote the following time per reading: S/T/S 36min, M 22 min, A/H 36min 	<ul style="list-style-type: none"> • S/T/S – 36 • M – 22 • A/H – 36

3.2. Module 1 – article allocation inputs

This section sets out the input assumptions used to allocate the total production of research articles to specific journal types. Using percentage splits, the assumed annual supply of articles is allocated across through specific decision points regarding journal subjects, business models, journal categories, delivery format, rejection rates and publisher types.

Input	Unit of classification	Purpose	Identified sources	Assumption
Article allocation – journal subjects	Percentage distribution of articles by subject area: <ul style="list-style-type: none"> • Science/Tech/Social Sciences (S/T/S) • Medical (M) • Arts / Humanities (A/H) 	Article allocation to journal types	<ul style="list-style-type: none"> • Thomson Scientific (ISI) estimates S/T/S 73%, M 27%, A/H 3% • SCOPUS estimates S/T/S 70%, M 27%, A/H 3% • There are 6,000 titles not indexed by either ISI nor SCOPUS, and many of which may be A/H 	<ul style="list-style-type: none"> • S/T/S – 70% • M – 25% • A/H – 5% <p>The relative % of A/H has been increased accordingly to account for a higher number of non-indexed A/H journals.</p>
Article allocation – business models	Percentage of articles made available by business model: <ul style="list-style-type: none"> • Subscription • Open access journals 	Article allocation to journal types	<ul style="list-style-type: none"> • RIN (2006) baseline report quotes about 2000 active author-side payment journals (9 – 10 % of total journals) based on Ulrich’s Periodicals Directory and the Directory of Open Access Journals (DOAJ) • Estimates of percentage breakdown about open access range from 2 – 10%, e.g. Harnad and Brody (2004) • The number of published 	<ul style="list-style-type: none"> • 98 % subscription journals • 2 % Open access journals <p>Many Open Access journals publish only a fraction of the number of articles a conventional subscription journal publishes. The % share of author-side payment journals is therefore deflated to 2%.</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
			articles per author-side payment journal is significantly lower than in conventional subscription journals	
Article allocation – journal categories	Percentage of active journal titles that are: <ul style="list-style-type: none"> • Popular hybrid journals (PopHyB) • Major discipline journals (MD) • Niche journals (Niche) 	Article allocation to journal types	<ul style="list-style-type: none"> • Expert interviews suggest 6-10 PopHyb journal titles • Expert interviews suggest >10,000 Niche journal titles • CEPA assumption based on available evidence 	<p>Total assumed number of journals ~ 23,700</p> <p>Split across journal categories based on CEPA estimates</p> <ul style="list-style-type: none"> • PopHyb – 0.1 % • MD – 34 % • Niche – 65.9 %
Article allocation – split across rejection rates*	<p>Percentage distribution of journals for a given level of peer review and journal subject:</p> <ul style="list-style-type: none"> • High (weighted average 90% rejection rate) • Medium (weighted average 57% rejection rate) • Low (weighted average 45% rejection rate) <p>The actual level of rejection rates, a key driver of peer review costs, is defined in Section 4 on article publishing costs.</p>	Article allocation to journals with a specific level of peer review	<ul style="list-style-type: none"> • Expert and publisher estimates • PRC 2007 of rejection rates by journal type • ALPSP 2000 estimates of more than 200 publisher responses • Sally Morris – American Scientist Open Access Forum data on acceptance rates based on ALPSP study 	<ul style="list-style-type: none"> • PopHyb, High – 100% • PopHyb, Medium – 0% • PopHyb, Low – 0% • MD, High – 40% • MD, Medium – 50% • MD, Low – 10% • Niche, High – 20% • Niche, Medium – 60% • Niche, Low – 20%
Article allocation - journal	Percentage distribution of journals made available in different delivery formats	Article allocation to journals with different delivery formats	The percentage share of electronic journals has increased continuously over the	<ul style="list-style-type: none"> • PopHyb, p only - 0 % • PopHyb, e only - 0 %

Input	Unit of classification	Purpose	Identified sources	Assumption
delivery format of subscription journals	(format availability) <ul style="list-style-type: none"> • Print only (p only) • Electronic only (e only) • Print/Electronic (p/e) This percentage distribution is inputted for all different journal categories		last years - an ALPSP survey in 2006 estimated that more than 90% of published journals are now available electronically.	<ul style="list-style-type: none"> • PopHyb, p/e - 100 % • MD, p only - 5 % • MD, e only - 5 % • MD, p/e - 90 % • Niche, p only - 5 % • Niche, e only - 5 % • Niche p/e - 90 % Generally, we assume 90 % of journals are available in p/e format. The remaining 10 % are split between ‘print only’ and ‘electronic only’ journals. All popular hybrid journals are available in p/e format.
Article allocation - journal delivery format of author-side payment journals	Percentage distribution of journals made available in different delivery formats (format availability) <ul style="list-style-type: none"> • Print only (p only) • Electronic only (e only) • Print/Electronic (p/e) 	Article allocation to journals with different delivery formats	<ul style="list-style-type: none"> • Expert estimates that 10-20% of author-side payment journals offer an option of delivering print copies of the journal 	<ul style="list-style-type: none"> • p only – 0% • e only – 80% • p/e – 20% We assume that the overwhelming majority of author-side payment journals are available in electronic only, whilst some offer an option to pay for print copies.
Article allocation - publisher type	Percentage distribution of article output by different publisher types	Allocation of journals to different publisher types	Estimates from Mark Ware Consulting (2006) based on Elsevier and ISI Journal Citation database indicate a split of	<ul style="list-style-type: none"> • Commercial Publisher – 60 % • University Press – 5 % • Society Publisher – 35 %

Input	Unit of classification	Purpose	Identified sources	Assumption
			<ul style="list-style-type: none"> • Commercial Publishers – 64 % • University Press – 4 % • (Learned) Society Publishers – 30 % <p>A higher figure by OECD 2005 estimates that 45% of peer reviewed journals are published globally by learned societies, professional associations and university presses</p> <p>A study by Crow, quoted by Sally Morris in (Serials 20(3) 2007) says the breakdown is:</p> <ul style="list-style-type: none"> • Commercially published non-profit journals – 17% • Commercially published commercial journals – 45% 	<p>Despite the OECD figure estimating a higher share for University Press/Society Publishers model inputs account for the fact that many society-owned journals are published by commercial publishers under contract.</p>
Articles per journal per year	Number count of articles published per journal type per year	Based on the total number of articles per journal type this input derives the total number of journals for each journal type	<ul style="list-style-type: none"> • Tenopir & King 2000 estimate an average number of 123 articles per scholarly journal • Tenopir & King's Journal Tracking study suggests 154 articles per year for Science Journals • ISI/Scopus Data finds S/T/S 110, M 121, A/H 30 • Sally Morris, Learned 	<ul style="list-style-type: none"> • S/T/S, PopHyb – 120 • S/T/S, MD – 110 • S/T/S, Niche – 60 • M, PopHyb – 130 • M, MD – 121 • M, Niche – 65 • A/H, PopHyb – 30 • A/H, MD – 30 • A/H, Niche – 30

Input	Unit of classification	Purpose	Identified sources	Assumption
			Publishing 19(1) January 2006 estimates that author-side payment journals publish on average 42 articles per year (observation of 1200 author-side payment journals)	<ul style="list-style-type: none"> • All author pays journals - 42 Niche journals publish a significantly lower amount of articles per journal each year.
Number of journal issues	Number count of issues per journal per year	Derives the cost per journal issue	<ul style="list-style-type: none"> • Tenopir & King's <i>journal tracking study</i> suggests 10.8 issues per year for science journals, 16.4 issues for PopHyb Journals, and 13.7 issues for medical journals • Tenopir & King 2000 estimate 8.3 issues per year for scholarly journals • ISI/Scopus estimates of PopHyb 48, MD 18, Niche 8 	<ul style="list-style-type: none"> • S/T/S, PopHyb – 48 • S/T/S, MD – 18 • S/T/S, Niche – 8 • M, PopHyb – 48 • M, MD – 18 • M, Niche – 8 • A/H, PopHyb – 48 • A/H, MD – 18 • A/H, Niche – 8 MD and Niche journals publish a lower number of issues per year.
Number of pages per article	Count of average number of pages per article for different journal subjects	To derive article first copy cost based on various direct fixed page cost	<ul style="list-style-type: none"> • Tenopir & King 2000 estimate an average 11.7 pages per article • Tenopir & King Journal Tracking Study (1960 – 2001) estimates 14.3 pages/article on average 	<ul style="list-style-type: none"> • S/T/S – 11.7 • M – 11.7 • A/H – 11.7
Journal circulation	Number count of circulation by journal type, depending on	Derives journal break-even and subscription prices	Expert estimates <ul style="list-style-type: none"> • PopHyb journals – estimate 	<ul style="list-style-type: none"> • PopHyb, Academic – 2000 • PopHyb, Personal/Other –

Input	Unit of classification	Purpose	Identified sources	Assumption
	<ul style="list-style-type: none"> journal category and user type 		<ul style="list-style-type: none"> of around 30,000 subscriptions (e.g. Nature) MD journals - estimates of around 2,200 institutional subscriptions Niche journals – estimates of around 320 subscriptions 	<ul style="list-style-type: none"> 28,000 MD, Academic – 1,400 MD, Personal/Other – 800 Niche, Academic – 650 Niche, Personal/Other – 200 <p>Figures for niche journal were uplifted to account for higher amount of academic institution accessing Niche journals electronically through ‘big deal’ contracts.</p>

3.3. Module 1 – cost per journal type inputs

Module 1 calculates the costs incurred in carrying out the activities within the publication and distribution components in the scholarly communication process value chain. The main model input sheet only covers general inputs like peer review, journal rejection rates and tax issues. The specific activity costs for publishing and distribution are captured in a separate worksheet *Mod 1 – Activity Cost* discussed in Section 4.

Input	Unit of classification	Purpose	Identified sources	Assumption
VAT on journal price by delivery format	Percentage of VAT on sales price for different delivery formats	Derives user journal prices	<ul style="list-style-type: none"> VAT is currently 17.5 % on electronic journal subscriptions 5-6 % for journals delivered in electronic AND print format (expert interview) 	<ul style="list-style-type: none"> print only delivery – 0 % electronic only delivery – 17.5 % print/electronic delivery – 5.5 %

Input	Unit of classification	Purpose	Identified sources	Assumption
			evidence) <ul style="list-style-type: none"> • 0 % for print only journal subscriptions 	
Select & Manage – rejection rate	Percentage share of initial manuscripts submitted that are not processed for peer review	Derives total number of manuscripts submitted for each manuscript processed	<ul style="list-style-type: none"> • Interviews with publishers and Expert Panel members • PRC 2007 estimates on acceptance/rejection rates 	<ul style="list-style-type: none"> • High % - 50 % • Medium % - 20 % • Low % - 15 %
Peer review – rejection rate	<ul style="list-style-type: none"> • Percentage of articles processed for peer review that are rejected • As opposed to initial rejection, this is a second stage of selection where articles are considered unsuitable for publication during the process of peer review 	Derives total activity cost of the peer review process	<ul style="list-style-type: none"> • Expert estimates • PRC study 2007 • ALPSP 2000 estimates in <i>Current Practice in Peer Review</i> use 5 groups of classification for acceptance rates (<10%, 10-25%, 25-50%, 50-75%, >75%) and included a sample of 200 journals 	Both rejection rates – during initial acceptance and during peer review – form the total rejection rate commonly quoted in the literature. The total rejection rate is quoted in brackets. <ul style="list-style-type: none"> • H % - 40 % (90 %) • M % - 15 % (35 %) • L % - 15 % (30 %)
Average hours of review per article	Number count of average hours spent on reviewing one article	Derives total non-cash cost of peer review process	<ul style="list-style-type: none"> • Tenopir and King 2000 and King 1997 estimate 3-6 hours per reviewer per article spent on peer review • PRC study median is 5 hours globally and 3 hours for the UK, the mean is 3.9 hours 	<ul style="list-style-type: none"> • 4 hours

Input	Unit of classification	Purpose	Identified sources	Assumption
Average number of peer reviewers per article	<ul style="list-style-type: none"> • Number count 	Derives total non-cash cost of peer review process	<ul style="list-style-type: none"> • Tenopir & King 2000 • 	<ul style="list-style-type: none"> • 2.5 reviewers
Percentage of peer review at academic organisation	Percentage of peer review activity that is undertaken at academic or affiliated institutions	Derives the proportion of funding for peer review that is allocated to academic institutions	Expert estimates	<ul style="list-style-type: none"> • 80%

3.4. Module 2 – UK library subscription portfolios and access cost

The following input assumptions of Module 2 define the subscription portfolios for different library types, the journal delivery format, and the level of usage of journals for research.

Input	Unit of classification	Purpose	Identified sources	Assumption
Number of libraries	<ul style="list-style-type: none"> Count of libraries categorised under each library type 	Defines the total access and usage cost for UK libraries	<ul style="list-style-type: none"> SCONUL classifications SCONUL data No official estimates of number of special libraries 	<ul style="list-style-type: none"> CURL – 29 OLD – 36 NEW – 48 HEC – 26 SPECIAL – 104 <p>Number of special libraries calibrated to match an assumed 450 users per library, at a total non-academic researcher base of 47,000.</p>
CURL Library portfolios – subscription rates	<p>Percentage subscription rates (% of total) for different journal types by</p> <ul style="list-style-type: none"> Journal category Publisher type 	Defines the libraries portfolio of journals	<ul style="list-style-type: none"> SCONUL serials subscription data estimates total subscriptions Expert estimates on subscription rates to specific journal types 	<p>Percentage figures based on CEPA estimates, calibrated to SCONUL serial subscription data, including big deals.</p> <ul style="list-style-type: none"> Commercial, PopHyb – 100 % Commercial, MD – 85 % Commercial, Niche – 60 % University Press, PopHyb – 100 % University Press, MD – 60 %

Input	Unit of classification	Purpose	Identified sources	Assumption
				<ul style="list-style-type: none"> • University Press, Niche – 50 % • Society, PopHyB – 100 % • Society, MD – 50 % • Society, Niche – 30 %
<p>OLD Library portfolios – subscription rates</p>	<p>Percentage subscription rates (% of total) for different journal types by</p> <ul style="list-style-type: none"> • Journal category • Publisher type 	<p>Defines the libraries portfolio of journals</p>	<ul style="list-style-type: none"> • SCONUL serials subscription data estimates total subscriptions • Expert estimates on subscription rates to specific journal types 	<p>Percentage figures based on CEPA estimates, calibrated to SCONUL serial subscription data, including big deals.</p> <ul style="list-style-type: none"> • Commercial, PopHyb – 100 % • Commercial, MD – 60 % • Commercial, Niche – 26 % • University Press, PopHyb – 100 % • University Press, MD – 25 % • University Press, Niche – 20 % • Society, PopHyB – 100 % • Society, MD – 15 % • Society, Niche – 10 %
<p>NEW Library portfolios – subscription rates</p>	<p>Percentage subscription rates (% of total) for different journal types by</p> <ul style="list-style-type: none"> • Journal category 	<p>Defines the libraries portfolio of journals</p>	<ul style="list-style-type: none"> • SCONUL serials subscription data estimates total subscriptions • Expert estimates on subscription rates to 	<p>Percentage figures based on CEPA estimates, calibrated to SCONUL serial subscription data, including big deals.</p> <ul style="list-style-type: none"> • Commercial, PopHyb – 100

Input	Unit of classification	Purpose	Identified sources	Assumption
	<ul style="list-style-type: none"> • Publisher type 		specific journal types	% <ul style="list-style-type: none"> • Commercial, MD – 60 % • Commercial, Niche – 24 % • University Press, PopHyb – 100 % • University Press, MD – 22 % • University Press, Niche – 20 % • Society, PopHyB – 100 % • Society, MD – 15 % • Society, Niche – 10 %
HEC Library portfolios – subscription rates	Percentage subscription rates (% of total) for different journal types by <ul style="list-style-type: none"> • Journal category • Publisher type 	Defines the libraries portfolio of journals	<ul style="list-style-type: none"> • SCONUL serials subscription data estimates total subscriptions • Expert estimates on subscription rates to specific journal types 	Percentage figures based on CEPA estimates, calibrated to SCONUL serial subscription data, including big deals.. <ul style="list-style-type: none"> • Commercial, PopHyb – 100 % • Commercial, MD – 15% • Commercial, Niche – 5 % • University Press, PopHyb – 100 % • University Press, MD – 10 % • University Press, Niche – 5 % • Society, PopHyB – 100 %

Input	Unit of classification	Purpose	Identified sources	Assumption
				<ul style="list-style-type: none"> • Society, MD – 10 % • Society, Niche – 5 %
Special libraries portfolios – subscription rates	Percentage subscription rates (% of total) for different journal types by <ul style="list-style-type: none"> • Journal category • Publisher type 	Defines the libraries portfolio of journals	<ul style="list-style-type: none"> • Expert estimates that a typical special/corporate library has a particular subject focus within which it covers a high proportion of journal available • CEPA assumption based on available evidence 	Percentage figures based on CEPA estimates, assuming a relatively high subscription within a particular subject field, but overall journal portfolio much smaller than those of large university libraries. <ul style="list-style-type: none"> • Commercial, PopHyb – 50 % • Commercial, MD – 15 % • Commercial, Niche – 10 % • University Press, PopHyb – 50 % • University Press, MD – 10 % • University Press, Niche – 5 % • Society, PopHyB – 50 % • Society, MD – 10 % • Society, Niche – 5 %
Library portfolios – delivery format of journals	Proportion of journals of a certain library type delivered in print only, electronic only or print/electronic format.	Derives effective library subscription portfolios for different delivery formats	<ul style="list-style-type: none"> • SCONUL serials data estimates on subscription formats • Expert estimates on 	In line with SCONUL median benchmarks for each library type: <ul style="list-style-type: none"> • CURL: 28% p only, 60% e

Input	Unit of classification	Purpose	Identified sources	Assumption
			<p>subscription rates to specific journal types</p>	<p>only, 11% p/e</p> <ul style="list-style-type: none"> • OLD: 15% p only, 67% e only, 18% p/e • NEW: 12.5% p only, 78% e only, 9.5 % p/e • HEC: 10% p only, 76% e only, 14% p/e • Special: 15% p only, 65% e only, 20% p/e
<p>Average number of articles read per year</p>	<p>Number count of the total number of articles read per researcher at different universities (library types)</p>	<p>Derives level of usage for different journal types and universities</p>	<p>Tenopir and King 2002 estimate an average of 130 readings per researcher per year</p> <p>Tenopir and King (2002-2006) studies estimate the following for universities</p> <ul style="list-style-type: none"> • S/T/S – 252 • M – 322 • A/H – 145 <p>And for non-university researchers</p> <ul style="list-style-type: none"> • S/T/S – 149 • M – 337 • A/H – 180 	<p>Input assumptions do not distinguish between subject types. We used a weighted average of total readings based on different subjects for university users and special library (non-university) users</p> <ul style="list-style-type: none"> • CURL – 258 • OLD – 258 • NEW – 258 • HEC – 258 • Special – 197 <p>The inputs allow for varying levels of readings for different library types. If the level of reading is assumed to vary across library types this would imply different researcher reading profiles</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
Articles requested per article read	Ratio of the total number of articles requested (“hits”) to the total number of articles read, by different library types	Derives the total number of readings for each university/library type.	<ul style="list-style-type: none"> • King and Montgomery 2002, results from Drexel University show a ratio of 1.337 • King 2004, results from the University of Pittsburgh user study estimate are 1.42 	<ul style="list-style-type: none"> • CURL – 1.40 • OLD – 1.40 • NEW – 1.40 • HEC – 1.40 • Special – 1.40
Relative frequency of reading	Sets the frequency of readings of Popular Hybrid and Niche journals relative to Major Disciplines	Derives the split of reading time, and number of readings per year for journal types based on the defined number of total articles read per researcher	<ul style="list-style-type: none"> • CEPA assumption based on available evidence 	<ul style="list-style-type: none"> • PopHyb journal – 300% • MD journal – 100% • Niche journal – 50% <p>We have assumed that a PopHyB journal is on average read three times as often as an MD journal. A Niche journal is on average read only half as often as an MD journal.</p> <p>It is assumed that all researchers reading time is for library subscriptions and open access journals only; the average number of personal subscriptions has been falling constantly to below 2 copies and has therefore been excluded.</p>
Average time spend searching/accessing articles	Number count of minutes spent on locating, downloading, printing, browsing articles	Derives non-cash user search cost	<ul style="list-style-type: none"> • Expert estimates 	Model inputs assume an average of 12.5 minutes per article for both for print and electronic access.

Input	Unit of classification	Purpose	Identified sources	Assumption
Percentage of article copied/prints	Percentage of journal articles read by researchers that are either printed (electronic readings) or copied (print journals)	Derives the user copy/print cost of article access	<ul style="list-style-type: none"> • Expert estimates 	<ul style="list-style-type: none"> • Readings of print journals – 20% prints • Electronic access of journal articles – 69%
Average share of library space for scholarly journals	Percentage of library space used for usage/archiving of scholarly journals	Derives the library access cost incurred for storage space of scholarly journals	<ul style="list-style-type: none"> • SCONUL library study • CEPA estimates for special libraries 	<ul style="list-style-type: none"> • CURL – 10% • NEW – 10% • OLD – 10% • HEC – 10% • Special libraries – 50%
Big deal increase in publisher revenues	Percentage increase in revenues for certain journal types with big deal bundling, by publisher type and journal category	Derives the impact of big deals on journal break-even prices	<ul style="list-style-type: none"> • Publisher surveys in the 2004 Science and Technology Committee paper estimate about 10% revenues increase 	<p>The estimated revenue increase is</p> <ul style="list-style-type: none"> • Commercial, PopHyb – 5% • Commercial, MD – 10% • Commercial, Niche – 10% • University Press, PopHyb – 0% • University Press, MD – 5% • University Press, Niche – 2% • Society Publishers, PopHyb – 0% • Society Publishers, MD – 0% • Society Publishers, Niche –

Input	Unit of classification	Purpose	Identified sources	Assumption
				5 %
Big deals % increase in electronic journal subscriptions	Percentage increase of library subscriptions to specific journal types with big deal bundling.	Derives the impact of big deals on library subscription portfolios	<ul style="list-style-type: none"> • Publisher surveys in the 2004 Science and Technology Committee paper estimate that journal subscription numbers more than doubled for certain publishers with big deals 	<p>With big deals journal subscriptions are estimated to increase as follows:</p> <ul style="list-style-type: none"> • Commercial, PopHyb – 10 % • Commercial, MD – 25% • Commercial, Niche – 100% • University Press, MD – 15% • University Press, Niche – 25% • Society Publishers, MD – 10% • Society Publishers – Niche – 15% <p>The impact is assumed to be most profound for Niche journals of Commercial Publishers. Their subscriptions are supposed to double with big deals.</p>

3.5. Module 3 – funding of cash / non-cash cost inputs

The following input assumptions to Module 3 define the funding sources of different journal types and determine the UK's share of cash/non-cash cost caused and funding contributed to the scholarly communication system.

Input	Unit of classification	Purpose	Identified sources	Assumption
Percentage split of subscription funding	Academic subscription revenues as a percentage share of total subscription revenues (total subscription revenues = academic + other subscription revenues from corporate and government users) Other subscription revenues are derived automatically.	Derives the total subscription funding for different journal types	Expert estimates	<ul style="list-style-type: none"> • S/T/S, PopHyb – 50% • S/T/S, MD – 80% • S/T/S, Niche – 85% • M, PopHyb – 50% • M, MD – 80% • M, Niche – 85% • A/H, PopHyb – 50% • A/H, MD – 80% • A/H, Niche – 85%
Advertisement funding as % of total	Advertisement revenues as percentage share of total journal funding for different journal subjects and categories	Derives the total amount of advertisement funding for different journal types	Expert estimates	<ul style="list-style-type: none"> • S/T/S, PopHyb – 45% • S/T/S, MD – 5% • S/T/S, Niche – 4% • M, PopHyb – 45% • M, MD – 10% • M, Niche – 4% • A/H, PopHyb – 45% • A/H, MD – 5% • A/H, Niche – 4%

Input	Unit of classification	Purpose	Identified sources	Assumption
Advertisement funding as % of total – electronic only journals	Advertisement revenues as percentage share of total journal funding	Derives the total amount of advertisement funding for electronic only journals	Expert estimates	<ul style="list-style-type: none"> • PopHyb – 22% • MD – 3% • Niche – 2% <p>For electronic only journals funding from advertisement is assumed to be 50% lower, on average, than for conventional print journals.</p>
Author-side payment as % of total funding	Revenues from author side payment as a share of total journal funding for different <ul style="list-style-type: none"> • journal subjects and • journal categories Inputs are for conventional subscriber-pays journals, not for author-side payment (open access) journals.	Derives the total amount of funding from author-payments for different journal types	<ul style="list-style-type: none"> • Expert estimates • No official sources 	It is estimated that author-pays revenues account for <ul style="list-style-type: none"> • 0 % in PopHyb journals • 2 % in MD journals • 1 % in Niche journals Input assumptions are adjustable for different journal subjects
% of membership fees and individual subscriptions	Revenues from membership fees and individual subscriptions as a share of total journal funding for different journal categories	Derives the total amount of funding from membership fees and individual subscriptions for different journal types	Anecdotal estimate suggests that membership fees account for about 10 percent of society publishers' revenues	<ul style="list-style-type: none"> • PopHyb – 19 % • MD – 5 % • Niche – 2 %
% of peer reviews based in the UK	Percentage share of peer reviews conducted in the UK for different journal subjects	Derives the UK's contribution to non-cash journal cost	<ul style="list-style-type: none"> • Analysis of SCOPUS and ISI data based on 1,039 journals 	<ul style="list-style-type: none"> • S/T/S – 6.4 % • M – 9.1 % • A/H – 7.1 % <p>There was no data for A/H so the assumption represents</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
				<p>an average of all journals</p> <p>These figures is lower than the UK's total contribution to non-cash peer review cost, since the UK's average hourly cost per researcher is assumed to be higher than the global average</p>
<p>% of article authors based in the UK</p>	<p>Percentage share of articles authored in the UK for different journal subjects and publisher types</p>	<p>Derives the share system cost caused of articles published by UK authors</p>	<ul style="list-style-type: none"> • Analysis of SCOPUS and ISI data based on 1,039 journals 	<ul style="list-style-type: none"> • S/T/S, Commercial – 7.1% • S/T/S, University Press – 8.1 • S/T/S, Society – 5.7 % • M, Commercial – 6.7% • M, University Press – 11.9% • M, Society – 5% • A/H, Commercial – 8.9% • A/H, University Press – 12.3% • A/H, Society – 2.2%

4. ACTIVITY COST ASSUMPTIONS

This section sets out the activity costs input assumptions used in the model to calculate the total article publishing/distribution cost and the total costs incurred by libraries to provide access to journal articles. The inputs also include cash/non-cash usage cost incurred by readers of scholarly articles.

4.1. Publishing/distribution activity cost

Module 1 calculates the costs incurred in carrying out the activities within the publication and distribution components in the scholarly communication process value chain. The global nature of the scholarly communications industry means that this module will consider the publication and distribution of all journals and does not assume different cost structures depending on the geographic location of the publisher. The specific activity costs are captured in a separate worksheet.

Mod 1 – Activity Cost.

Input	Unit of classification	Purpose	Identified sources	Assumption
Select & Manage – Initial acceptance decision making	<ul style="list-style-type: none"> • Unit cash cost per article • Includes cash costs associated with receiving and reading manuscript for initial disposition • The model splits activity cost between “initial acceptance decision making” and “review processing”. 	Derives total activity cost of initial article selection & management.	<ul style="list-style-type: none"> • Interviews with publishers • Tenopir & King 2000 quote a range of US\$ 15 – 50 per manuscript page for receiving, processing and reviewing a manuscript, US\$ 20 per page is assumed on average 	<p>Based on Tenopir & King figures the model assumes that 50% of a publisher’s peer review cost is on average incurred at initial article acceptance, whilst another 50% is incurred for peer-review processing activities.</p> <p>The unit cost per submitted ARTICLE (manuscript), at an assumed number of 11.7 pages is therefore as follows for different journal types:</p> <ul style="list-style-type: none"> • H% - £50 • M% - £50

Input	Unit of classification	Purpose	Identified sources	Assumption
				<ul style="list-style-type: none"> • L% - £50
Select & Manage – redirection of articles	YES/NO, indicates for different publisher types whether the article can potentially be redirected to another, more suitable, journal.	Defines which publishers are able to redirect articles and consequently reduce selection & management cost.	<ul style="list-style-type: none"> • Interviews with publishers and Expert Panel members 	<ul style="list-style-type: none"> • Commercial – Yes • University press – Yes • Society – No
Peer review – rejected articles redirected to others	Percentage share of initially rejected articles that are redirected to a journal with a more suitable subject or lower rejection rates	Derives the effective rejection rate and avoids double cost counting	<ul style="list-style-type: none"> • Interviews with publishers assume that about 25 % of rejected articles are redirected 	<ul style="list-style-type: none"> • H % - 25 % • M % - 25 % • L % - 0 %
Peer review – cost of processing	<ul style="list-style-type: none"> • Unit cash cost per article • Includes cash costs associated with choosing peer reviewers, managing and processing manuscript for review 	Derives total publisher's activity cost of peer review process	<ul style="list-style-type: none"> • Interviews with publishers • Tenopir & King 2000 • Rowland 2002 cites a number of studies that confirm Tenopir & King's estimates of about US\$ 20 per page • Donovan 1998 figures are also in line with Tenopir & King's estimates 	In addition to initial acceptance making the model assumes 50% of Tenopir & King's estimate, US\$ 10 per page for this set of activities. The cost per article is assumed to be £57. Article unit costs are based on an assumed 11.7 pages per article, and this activity cost is assumed to be fixed, i.e. independent of page numbers.
Edit – Editing and proofreading	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input (including freelance costs) 	Derives total cash cost of article editing	<ul style="list-style-type: none"> • Tenopir & King 2000 presented estimates on editing and proof reading 	To adjust for 2007 price levels we assume cost in the range of £250 – 350 per article.

Input	Unit of classification	Purpose	Identified sources	Assumption
	<p>required to edit and proofread each peer reviewed article</p> <ul style="list-style-type: none"> Excludes allocation of other overheads 		<p>based on seven sources and assumed an estimate of US\$ 50 per page (~ £250 per article)</p> <ul style="list-style-type: none"> Waltham 2005 in a survey of 13 learned society journals estimated an average of £506 for content creation cost (which includes all editorial cost incl. overheads) An ALPSP benchmark for total copy-editing estimated ~ £230 Dryburgh 2002 estimates costs of £30 – 305 	<p>This is split as follows across subjects:</p> <ul style="list-style-type: none"> S/T/S - £350 M - £350 A/H - £250 <p>It is assumed that Art/ Humanities journal articles, on average, require less time for editing, since their contents is less technical.</p>
<p>Edit – Composition, typesetting</p>	<ul style="list-style-type: none"> Unit cash cost per article Includes staff required to implement type setting per (to be published) article Excludes allocation of other overheads 	<p>Derives total cash cost of article editing</p>	<ul style="list-style-type: none"> Tenopir & King 2000 presented an estimate for composition and typesetting of US\$ 35 per page (~ £175 per article) Dryburgh 2002 estimates a cost of £50 – 920 for typesetting 	<p>Adjusted for 2007 prices we assume an average of £200 per article which is split as follows across subjects</p> <ul style="list-style-type: none"> S/T/S - £220 M - £220 A/H - £150 <p>The total costs assumed for editing activities (copy-editing, proofreading, composition, etc.) vary hence between £400 – 570 and are in line with other sources cited.</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
Edit – Illustration and graphic preparation	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff (including freelance costs) and materials input required to illustrate graphics • Excludes allocation of other overheads 	Derives total cash cost of article editing	<ul style="list-style-type: none"> • Tenopir & King 2000 presented estimates on illustration and graphic presentation and assumed approximately US\$ 60 per page 	<p>Adjusted for 2007 prices we assume an average of £35 per page with the following number of graphical illustration and resulting cost per article across subjects:</p> <ul style="list-style-type: none"> • S/T/S – (1.5/ article) £52.5 • M – (2/article) £70 • A/H – (1/article) £35 <p>We assume that medical journals, on average, contain a higher number and more costly graphic/illustrations.</p>
Edit – Quality assurance of e-content	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input (including freelance costs) required per article made available electronically to ensure the quality and robustness of electronic content • Excludes allocation of capital cost of hardware 	Derives total cash cost of article editing	<ul style="list-style-type: none"> • ALPSP benchmark estimated ~ £25 per article 	<ul style="list-style-type: none"> • £25 for electronic articles only
Edit – Non article processing cost	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input required to create non-refereed content in a journal such as contents pages, cover, book reviews, and letters pages 	Derives total cash cost of article editing	<ul style="list-style-type: none"> • Tenopir & King 2000 estimate US\$ 65 (~ £32) per page, which equal £320 for a ten page article 	<ul style="list-style-type: none"> • PopHyB - £300 • MD - £300 • Niche - £250 <p>Estimates assume higher cost for PopHyb journals and</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
				<p>lower than average cost for Niche journals.</p> <p>The figures might be revised downward once new data becomes available.</p>
Rights management	<ul style="list-style-type: none"> • Unit cash cost per article • Includes the staff input required to administer the author's copyright assignment, etc. 	Adds to total cash first copy cost of article	<ul style="list-style-type: none"> • Expert estimates 	<ul style="list-style-type: none"> • Estimate of £50 per article • An additional £ 20 per article is assumed for author-side payment processing (this is adjusted to £ 50 in Scenario 2 of the report)
Administer sales	<ul style="list-style-type: none"> • Unit cash cost per subscriber • Includes the staff input required to process one additional sale of one title (e.g. data entry per new subscription) together with discount to subscription agent, if any 	Derives variable cost of journal publishing/distribution	<ul style="list-style-type: none"> • Discount to the subscription agent runs at an average of 4-5% of subscription prices • Median journal prices reported by SWETS were £526 in 2008 	<ul style="list-style-type: none"> • £10 <p>This includes a notional average of 1-2% of subscription agent discounts deflated by effects of big deals and direct subscriptions. Includes an assumed admin cost of £5 per subscription.</p>
Online user management	<ul style="list-style-type: none"> • Unit cash cost per subscriber • Includes staff input required to provide usernames and password to subscribers to allow them to access an online version of a journal • Excludes capital cost of 	Derives variable cost of journal publishing/distribution	<ul style="list-style-type: none"> • CEPA assumption based on available evidence 	<ul style="list-style-type: none"> • PopHyB - £3 • MD - £10 • Niche - £10 <p>Lower cost for PopHyb journals on a per subscription basis.</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
	server and other IT equipment required to enable and maintain online hosting			
Produce/print	<ul style="list-style-type: none"> • Unit cash cost per subscription • Includes staff and materials inputs required to physically produce an additional hardcopy of a single journal title: production staff plus unit paper, printing and binding cost • Excludes unrelated overheads 	Derives variable cost of journal publishing/distribution	<ul style="list-style-type: none"> • Tenopir & King 2000 estimate US\$ 17 (~ £8) per subscription per year 	<ul style="list-style-type: none"> • PopHyB - £5 • MD - £10 • Niche - £10 <p>Lower assumed cost per subscription for PopHyb journals due to economies of scale</p> <p>No costs assumed for electronic journals.</p>
Manage Inventory	<ul style="list-style-type: none"> • Unit cash cost per subscription • Includes staff and physical space (rent per annum) cost required to store undelivered hardcopies of print journals 	Derives variable cost of journal publishing/distribution	<ul style="list-style-type: none"> • CEPA assumption based on available evidence 	<ul style="list-style-type: none"> • £2 <p>No costs assumed for electronic journals.</p>
Delivery/ Fulfilment	<ul style="list-style-type: none"> • Unit cash cost per subscription • Includes the staff input required to ensure that each subscription request received is serviced (postage of hard copy, email of soft 	Derives variable cost of journal publishing/distribution	<ul style="list-style-type: none"> • Tenopir & King 2000 estimate US\$ 14 (~ £7) per subscription per year 	<ul style="list-style-type: none"> • An average of £5 <p>Costs are assumed to be 75% lower for electronic only journals.</p>

Input	Unit of classification	Purpose	Identified sources	Assumption
	copy etc)			
Marketing	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input and materials required to market a single article/journal – • Excludes cost of other overheads, first copy and variable costs 	Derives total indirect cost of article	<p>King 2007 quotes different sources, with estimates of marketing cost ranging from 6 – 15 % of total publishing cost</p> <p>In a study by Cox (2005), marketing costs per article of about</p> <ul style="list-style-type: none"> • Commercial – £140 • University Press – £120 • Society – £43 • Clarke (2005) assumes US\$ 170 per article for a Association (Society Publisher) and US\$ 2500 per issue for a Commercial publisher 	<p>In line with other studies we assume marketing cost are highest for Commercial publishers and lowest for Society publishers</p> <ul style="list-style-type: none"> • Commercial – £150 • University Press – £125 • Society – £45
Online Hosting	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input required to maintain online access to current and archive articles, and apportioned annual cost of new hardware • Excludes cost of other overheads, first copy and variable costs 	Derives total indirect cost of article	<ul style="list-style-type: none"> • Clarke 2005 assumes US\$ 1,250 per issue for archive management and US\$ 1,250 per issue for indexing for a commercial publisher. At 11.7 articles per journal this would amount to about £104 • Interview evidence suggested £350 for a commercial publisher, £112 	<p>Based on the limited data sources available we assume the following costs for different publisher types</p> <ul style="list-style-type: none"> • Commercial - £250 • University Press - £200 • Society publisher £125

Input	Unit of classification	Purpose	Identified sources	Assumption
			for a society publisher and £248 for a university press publisher	
Customer Service/Helpdesk	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input required to provide on-going troubleshooting and online support services to subscribers • Excludes cost of other overheads, first copy and variable costs 	Derives total indirect cost of article	<ul style="list-style-type: none"> • CEPA assumption based on available evidence 	<p>We approximate the unit cost per article as follows</p> $\frac{(\# \text{ institutional subscribers}) \times (\text{time per year}) \times (£25/\text{hour})}{(\# \text{ articles per year})}$ <ul style="list-style-type: none"> • PopHyb - $\sim £65 = (1000) \times (0.25) \times (25) / (100)$ • MD - $\sim £65 = (1000) \times (0.25) \times (25) / (100)$ • Niche $\sim £20 = (300) \times (0.25) \times (25) / (100)$
Management, other admin and investment	<ul style="list-style-type: none"> • Unit cash cost per article • Includes staff input required to manage, administer and coordinate all of the above indirect cost activities - includes property costs, insurance and professional fees, depreciation • Excludes cost of other overheads, first copy and variable costs 	Derives total indirect cost of article	<ul style="list-style-type: none"> • Tenopir & King quote different sources, with estimates ranging from 21 - 33 % of total publishing cost 	<p>Since the model accounts for a number of administrative activity costs separately we are deflating the average % mark-up. Also unit costs are derived as a mark-up on total direct costs only, since variable cost vary massively with journal circulation numbers.</p> <ul style="list-style-type: none"> • Commercial – 25 % • University Press – 20 % • Society publisher – 20 %

Input	Unit of classification	Purpose	Identified sources	Assumption
Average surplus per journal in %	Percentage surplus (operating margin) on the cost of article production/distribution, for <ul style="list-style-type: none"> • Publisher types • Journal categories 	Derives total journal cost and break-even prices	<ul style="list-style-type: none"> • House of Commons report – Science and Technology Committee paper 2004 cites commercial Publishers in 2003: Reed Elsevier 34% operating profit with 17% after tax, Wiley 29% operating profit. • Average across publishing sector is 22% (EPS Market Monitor 2004) • Oxford University Press, operating profit of ~20% in 2006 • Learned and Professional Society Publishers average 17% operating profit 	<p>Surpluses are assumed to be higher than quoted sources since the modelling bases surplus calculations on total first copy costs instead of total operating costs (incl. variable and indirect costs)</p> <ul style="list-style-type: none"> • Commercial Publishers – 35% • University Presses – 25% • Society Publishers – 20% <p>The % surplus is assumed to be higher for commercial publishers since they may have to meet a higher tax liability.</p> <p>We appreciate that surpluses vary across publisher types vary, but for modelling purposes average assumptions have been applied.</p>

4.2. Access provision activity costs

Module 2 calculates the costs incurred in providing access to scholarly journals and the costs of journal usage. The model requires specific input assumptions on the direct/indirect activity costs for different library types and user activities. The activity costs for library access are based on adjustable elasticity assumptions which vary with the change in journal subscriptions and users.

Input	Unit of classification	Purpose	Identified sources	Assumption
Subscription Processing	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to process new subscriptions and/or renewals 	Derives activity cost base and unit cost based on number of journal subscriptions	<ul style="list-style-type: none"> • Schonfeld & King 2004 study on library costs shows split of hours committed across activities but no specific cost • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £24,263, electronic £12,091 • OLD – print £11,625, electronic £7,305 • NEW– print £8,201, electronic £7,337 • HEC– print £7,210, electronic £6,239 • Special– print £3,314, electronic £2,163
Negotiation & licensing	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to negotiate the licensing of consortia / publisher ‘big deals’ and other licence negotiations 	Derives activity cost base and unit cost based on number of journal subscriptions	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £2,035 , electronic £11,626 • OLD – print £975 , electronic £7,024 • NEW– print £688, electronic £7,054 • HEC– print £605, electronic £5,999 • Special– print £278, electronic £2,080
Collection development	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to research demand for new journal titles from 	Derives activity cost base and unit cost based on number of journal subscriptions	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £18,710, electronic £17,782 • OLD – print £975, electronic £7,024 • NEW– print £688,

Input	Unit of classification	Purpose	Identified sources	Assumption
	institution's academics and researchers – includes review and identify materials for selection, cancellation, etc.			<p>electronic £7,054</p> <ul style="list-style-type: none"> • HEC– print £605, electronic £5,999 • Special– print £278, electronic £2,080
Receipt & check-in	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes the staff input required to receive and check in journal issues plus the annual binding, etc. 	Derives activity cost base and unit cost based on number of journal issues	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £81,487 • OLD – print £41,392 electronic £ • NEW– print £28,821 • HEC– print £26,044 • Special– print £11,535
Cataloguing and linking	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes the staff input required to catalogue and fully link new journals received, plus the annual software/subscription costs of maintenance of a linking service 	Derives activity cost base and unit cost based on number of journal issues	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £16,677, electronic £25,448 • OLD – print £8,471 , electronic £16,300 • NEW – print £5,898, electronic £16,157 • HEC– print £5,330, electronic £14,123 • Special– print £2,361, electronic £4,720
Inter-library loans	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to administer ILL/Document Delivery 	Derives activity cost base and unit cost based on number of users	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £59,393, electronic £39,283 • OLD – print £21,212, electronic £14,030 • NEW – print £19,798,

Input	Unit of classification	Purpose	Identified sources	Assumption
	service, plus direct costs of providing service, relating to journal article document delivery (not monographs)			<ul style="list-style-type: none"> electronic £13,094 • HEC– print £15,555, electronic £10,289 • Special– print £14,141, electronic £9,353
Stack maintenance	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to carry out shelf reading and maintenance, collection shifting, collection weeding, cleaning 	Derives activity cost base and unit cost based on number of issues	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £20,295 • OLD – print £10,309 • NEW – print £7,178 • HEC– print £6,486 • Special– print £2,873
Preservation	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to ensure on-going access to archived issues 	Derives activity cost base and unit cost based on number of issues	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £2,263, electronic £1,256 • OLD – print £1,150, electronic £805 • NEW – print £801, electronic £798 • HEC– print £723, electronic £697 • Special– print £320, electronic £233
Management & admin	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print journals • Includes staff input required to manage, administer and 	Derives activity cost base and unit cost based on number of journals	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – print £45,025, electronic £47,381 • OLD – print £21,573, electronic £28,627 • NEW – print £15,219,

Input	Unit of classification	Purpose	Identified sources	Assumption
	coordinate all cost activities			<p>electronic £28,749</p> <ul style="list-style-type: none"> • HEC– print £13,381, electronic £24,450 • Special– print £6,149, electronic £8,478
IT system operations & development	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic and print • Includes on-going IT system development costs, including capitalised IT investment costs - activities that require electronic infrastructure and associates support 	Derives activity cost base and unit cost based on number of journals	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<p>Model input assumptions are split between 1) depreciation of equipment and 2) staff cost for electronic infrastructure and support. Different elasticities are applied for these cost types. Aggregated cost figures are presented below.</p> <ul style="list-style-type: none"> • CURL – print £35,659, electronic £28,310 • OLD – print £17,085, electronic £17,104 • NEW – print £12,053, electronic £17,177 • HEC– print £10,597, electronic £14,608 • Special– print £4,870, electronic £5,065
Library space & journal storage – space for scholarly journals in %	<ul style="list-style-type: none"> • Percentage share of library space dedicated to scholarly journals vs. other usage purposes 	Derives cost of library space attributable to scholarly journal access/usage	<ul style="list-style-type: none"> • SCONUL library study 	<ul style="list-style-type: none"> • CURL – 10% • OLD – 10% • NEW – 10% • HEC – 10%

Input	Unit of classification	Purpose	Identified sources	Assumption
				<ul style="list-style-type: none"> • Special – 50%
Library space & journal storage – space dedicated to print vs. electronic in %	<ul style="list-style-type: none"> • Percentage share of library space dedicated to print vs. electronic journal collection 	Derives cost of library space attributable to scholarly journal access/usage	<ul style="list-style-type: none"> • CEPA assumption based on available evidence 	<ul style="list-style-type: none"> • CURL – print 95 %, electronic 5 % • OLD – print 95 %, electronic 5 % • NEW – print 95 %, electronic 5 % • HEC – print 95 %, electronic 5 % • Special – print 95 %, electronic 5 % <p>Estimates can be varied by library type</p>
Library space & journal storage – opportunity cost for rent, maintenance per m2	<ul style="list-style-type: none"> • Unit cash cost of rent and maintenance per m2 of library space 	Derives cost of library space attributable to scholarly journal access/usage	<ul style="list-style-type: none"> • SCONUL library study 	<ul style="list-style-type: none"> • CURL – £70 • OLD – £70 • NEW – £70 • HEC – £70 • Special – £70
User access management	<ul style="list-style-type: none"> • Total activity cash cost in £ for electronic journals • Includes annual staff input required to administer and maintain library users accounts 	Derives activity cost base and unit cost based on number of users	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – £27,597 • OLD – £9,856 • NEW – £9,199 • HEC – £7,228 • Special – £6,571
Check-in / check-out	<ul style="list-style-type: none"> • Total activity cash cost in £ for print journals 	Derives activity cost base and unit cost based on number of	<ul style="list-style-type: none"> • Schonfeld & King 2004 • SCONUL library study 	<ul style="list-style-type: none"> • CURL – £14,528, • OLD – £4,475

Input	Unit of classification	Purpose	Identified sources	Assumption
	<ul style="list-style-type: none"> Includes annual staff input required to carry out the check-out function for scholarly journals, searching for missing items, etc. 	readings		<ul style="list-style-type: none"> NEW – £3,239 HEC – £2,626 Special – £2,224
Reference & research	<ul style="list-style-type: none"> Total activity cash cost in £ for electronic and print journals Includes annual staff input required to answer directional / access questions, reference assistance, 'off desk' assistance, creation of resources/guides 	Derives activity cost base and unit cost based on number of users	<ul style="list-style-type: none"> Schonfeld & King 2004 SCONUL library study 	<ul style="list-style-type: none"> CURL – print £13,286, electronic £30,701 OLD – print £4,745, electronic £10,965 NEW – print £4,429, electronic £10,234 HEC – print £3,480, electronic £8,041 Special – print £3,163, electronic £7,310
Search and access time	<ul style="list-style-type: none"> Number count of average minutes spent on accessing an article includes time spent on locating, displaying, downloading, printing/copying, browsing articles 	Derives the total non-cash usage cost of journal access	<ul style="list-style-type: none"> Tenopir & King 2002 estimate 8.2 minutes for accessing a print and 18 minutes for accessing an electronic article Tenopir & King 2007 estimate between 8-17 min for article access 	<ul style="list-style-type: none"> Print – 12.5 minutes Electronic – 12.5 minutes <p>Since a higher access time for electronic seems counter intuitive and we have no recent data for both formats, the input assumption is an average of 8-17 min for both formats.</p>
Usage print/copy cost	<ul style="list-style-type: none"> Unit cost in £ of printing/copying one article 	Derives the total cash usage cost incurred for journal/article usage	<ul style="list-style-type: none"> CEPA assumption based on available evidence 	Based on an estimate of 11.7 pages per article and £0.04 per page, we estimate £0.5 per article for print/copying

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