

Article

Considering Non-Open Access Publication Charges in the “Total Cost of Publication”

Andrew Gray

British Antarctic Survey, Madingley Road, Cambridge, CB3 0ET, UK; E-Mail: anday@bas.ac.uk; Tel.: +44-1223-221-312.

Academic Editor: Isabel Bernal

Received: 17 August 2015 / Accepted: 14 November 2015 / Published: 18 November 2015

Abstract: Recent research has tried to calculate the “total cost of publication” in the British academic sector, bringing together the costs of journal subscriptions, the article processing charges (APCs) paid to publish open-access content, and the indirect costs of handling open-access mandates. This study adds an estimate for the other publication charges (predominantly page and colour charges) currently paid by research institutions, a significant element which has been neglected by recent studies. When these charges are included in the calculation, the total cost to institutions as of 2013/14 is around 18.5% over and above the cost of journal subscriptions—11% from APCs, 5.5% from indirect costs, and 2% from other publication charges. For the British academic sector as a whole, this represents a total cost of publication around £213 million against a conservatively estimated journal spend of £180 million, with non-APC publication charges representing around £3.6 million. A case study is presented to show that these costs may be unexpectedly high for individual institutions, depending on disciplinary focus. The feasibility of collecting this data on a widespread basis is discussed, along with the possibility of using it to inform future subscription negotiations with publishers.

Keywords: scholarly publishing; page charges; colour charges; publishing charges; submission charges

1. Introduction

In recent years, there has been a growing interest in identifying the “total cost of publication” to the academic sector [1]. Leaving aside the substantial but intangible costs of scholarly peer

review, the largest single element is by far that of institutional subscriptions to journals [2]. The Society of College, National and University Libraries (SCONUL) report on UK university library spending for the 2010/11 academic year gave a total for print and electronic serial costs of approximately £160 million [3]. These figures are not comprehensive, and omit a number of universities who did not report, along with public sector research organisations outside of higher education; conversely, they do include a small amount of spending on non-academic serials such as print newspapers. Allowing for the omissions, and with a very conservative estimate for inflation and price rises at 3% annually, it suggests at least £180 million was spent on subscriptions to academic journals in 2013/14 by the broader academic sector in the UK.

The second significant element is driven by the rise of “gold” open access, where articles are made freely available online from the journal at the time of publication. Gold open access may be achieved through fully-gold journals, where every article is open access, or through hybrid journals, where open access can be selected by the author on a per-paper basis. Hybrid open access is now a very widespread possibility, with most subscription journals from major publishers offering it, though relatively few papers are actually published this way [4]. A substantial proportion of gold open access—including all open access in hybrid titles—is funded through article processing charges (APCs), which are paid directly to publishers by authors, institutions, or research funding bodies. Information about spending on open access is generally more fragmented than subscription data, as a substantial amount of APCs are paid by individual researchers or departments rather than paid centrally. However, in 2013, Research Councils UK (RCUK) instituted a policy in which eligible institutions would receive a block grant with which to pay publishing charges, rather than supporting them from individual grants [5]. This provided a major impetus to centralise payments and systematise the tracking of payments among British universities and research institutes; as of 2013/14, it was estimated that APCs were equivalent to 11% of the average institution’s subscriptions budget, and would continue to rise. It is noticeable that APCs in hybrid titles tend to be substantially more expensive than those in fully open access titles, and that they absorb a disproportionate share of the RCUK open access block grant [1,6].

Following the adoption of the RCUK open access policy, there were concerns that institutions would find their overall costs increasing sharply, as more money was required for APCs without a corresponding reduction in subscription costs. In response, the government encouraged work to limit the growth in the “total cost of publication”, with models such as offsetting APCs against existing subscriptions [8]. This term was later expanded to encompass the organisational costs to an institution from the increased workload in handling the open-access process [1]. A 2014 survey estimated these organisational costs from the RCUK policy to be around £9 million per year. The majority of this was fixed costs for things such as advocacy, repositories, and policy development, with only around £1 million attributable to processing costs on a per-paper basis [9]. This study focused on the £11 million of APCs funded through the RCUK policy, and did not account for the organisational costs of handling any papers funded from other sources; a reasonable estimate would suggest at least another £1 million to cover these papers, giving an overall indirect cost of about £10 million, or 5.5% of overall subscription costs.

These three elements—subscriptions, APCs, and indirect open access management costs—comprise the total cost of publication as it has so far been defined. It should be noted that there are other indirect costs not yet brought in to the total cost calculations, most noticeably the costs of peer review, and the

costs of managing subscriptions. A 2008 study which looked at these broader aspects estimated that peer review cost around £165 million across the UK—a comparable figure to subscriptions. The costs of maintaining the “subscription system” was subsumed into broader costs of “access” and not considered in detail [2].

In addition to these indirect costs, a recent survey has noted one source of direct costs that has not yet been considered:

“Significantly, the costs identified by this study and that of Pinfield et al. (2015) do not take into account color or page charges traditionally associated with some subscription journal publishing or the time taken to administer them. Interestingly, these charges are rarely considered in costing analyses and tend therefore to be hidden. This is particularly the case since payment of these charges is typically distributed across institutions and taken from a wide variety of different departmental budgets, rather than being centrally coordinated. It would be useful if future research was to encompass this additional cost of publishing [9].”

This paper attempts to provide an estimate for the costs of page and colour charges, along with submission fees, and the cost of their administration. A variety of terms have been used for these charges in the literature, many of which are ambiguous; for convenience, we will use “publishing charges” or “publication charges” in the following discussion to refer to any non-APC publication charge which is paid by authors or institutions in order to publish an article under the traditional subscription model. Where APCs are to be considered, they will be mentioned specifically. While we will use “authors” to describe the source of these fees, it should be emphasised that, in the majority of cases, these costs are ultimately borne by institutional funds or by funding bodies, and while authors are responsible for ensuring they are paid, they do not usually pay them directly.

2. A Survey of Publishing Charges

Page charges are a fee paid by authors to the journal in which their paper is published. These provide a way to shift the cost of the journal from the reader to the author, and served as the natural model for the development of APC-driven open access [10]. First instituted in 1930 by the American Physical Society at \$2 per page, these fees became a widespread part of the journals system; at their peak, a 1977 study concluded that 38% of American scientific articles had been published after payment of a page charge. In certain fields, this was much higher—84% in engineering and 91% in the environmental sciences [11]. However, as authors switched to competing journals which did not levy page charges, the journals were forced to reduce or abolish their own charges—and, *inter alia*, raise their subscription fees, helping contribute to the often-discussed “serials crisis” [12,13].

Setting aside APCs for open-access material, traditional page charges are now relatively uncommon, with few journals from the major commercial publishers still using them—a brief survey in 2013 identified only one title from Elsevier, for example, and none at Springer [14]. However, they remain a major funding stream for some smaller publishers, particularly among American-based not-for-profit organisations and learned societies [15]. There are also disciplinary differences; a 2012 survey of major journals found that page charges are substantially more common in the sciences than social sciences, and within the sciences are most frequent in computer science and astronomy—though this may be linked to

the dominant publishers in those fields being non-profit rather than commercial [16]. Historically, most journals levied page charges on a per-page basis, with a small number increasing the fee after papers exceeded a set length [17]. Flat-rate page charges are now also used by some titles, in a similar way to fixed-rate APCs. There does not appear to be any large-scale data available on the structure or size of page charges by journal, and so it is not possible to determine which approaches are currently most common.

Colour charges, as the name suggests, are levied on colour illustrations, and are intended to offset the cost of the more expensive methods required for producing colour illustrations in print journals. They are usually levied on a per-image basis, though some journals use alternative pricing. In 2005, a study estimated that around 60% of journals might charge colour fees [18], and this has remained broadly stable; as of 2013, perhaps half of the journals produced by the major commercial publishers potentially levied colour charges [14]. It should be noted that almost all these journals made them optional, in that authors were able to choose to have their illustrations printed in colour in the digital version and monochrome on paper, and so most authors would be easily able to avoid or decline paying the fees.

It should be stressed that publication charges are not necessarily exploitative or anachronistic; they are a legitimate part of the financial framework that underpins scholarly publishing. “Excess” page charges can offset increased printing or editing costs for longer issues, and colour charges can offset the cost of a more expensive printing process where needed. In these cases, the fees serve to stabilise the overall cost of producing the journal without requiring regular adjustment to the subscription fees due to changes in content. “Flat” page charges, assessed on a per-article basis, can provide a reliable way to partially shift the cost of publishing a journal towards authors, allowing a corresponding reduction in subscription income. Per-page page charges provide some of the benefits from both approaches.

There have historically been a number of other fees charged by journals to authors, such as a submission fee (payable whether or not the paper is accepted), fees for revisions to the manuscript, or fees for including online supplementary information. Many journals (particularly in medicine, biology, and geology [17]) also supplemented their income by selling large volumes of reprints of articles; with the general switch to online access, this is becoming rarer, as the demand for paper reprints has been displaced by easily-circulated PDFs [15].

Of these factors, submission fees may still be significant. A 2010 study found that submission fees were rare in most disciplines but remained widespread in business, economics, and finance journals, with a smaller number identified in experimental biology. The overall amount of money spent on these was not estimated, however [19]. As far as can be determined, the other fees do not appear to have been studied in detail in recent years. However, none of them have been specifically highlighted as a substantial cost element by existing studies, suggesting that they are relatively minor by comparison. They will not be explicitly considered in this study due to a lack of substantive information.

3. Estimating the Overall Cost of Publication Charges

During the mid-2000s, when funding bodies and journals were contemplating a widespread shift to open access, a number of studies were done to assess the existing financial dynamics of scholarly publishing. The most direct approach was to examine the business models of individual journals, which

was done for a sample of journals in scientific and humanities/social sciences (HSS) disciplines [22,23]. On a broader scale, data was aggregated from a large cross-section of publishers in the Association of Learned and Professional Society Publishers (ALPSP) [18]. From the other side, a detailed study considered the aggregated subscription and publishing costs at a set of US universities and compared that to their known subscription budgets [20].

Data from these studies is given in Table 1, below. Publication charge income has been normalised to a percentage of the journal’s subscription income (or the library’s subscription payments) rather than a proportion of the journal’s overall income; this is to fit with the “percentage of subscription costs” modelling used elsewhere when discussing total cost of publication [1]. It was noted above that page charges are substantially more common among society journals than commercially published titles, and this was very marked in the 2005 publisher data, where a majority of respondents were societies though they represented only around a third of the journals published [18]. Accordingly, I have provided normalised data for 2005 as well as a more speculative adjustment based on a figure of 80% commercial titles in 2011 [21].

Table 1. Publication charges as a percentage of subscriptions in various studies.

Year	Notes	Percentage
2004	Sample of ten society-published scientific journals [22]	4.4%
2005	All papers published by a sample of US universities [20]	4.2%
2005	Aggregated financial data from ALPSP members [18]	5.3%
2005	ALPSP data [18] adjusted to 2/3 commercial titles	3.3%
2005-7	Sample of eight society-published HSS journals [23]	2.2%
2011	ALPSP data [18] adjusted to 80% commercial titles	2.4%

All these studies distinguished “author revenue”, “fees”, *etc.*, from subscriptions, but exactly what was considered under this heading varied. The 2004 study of scientific journals used the 2002-04 records of ten journals, which included one (small) all-OA title and one larger journal with a low level of hybrid open access, and included page, colour, and submission charges along with APCs in their definition of author revenue [22]. Details elsewhere in the study give an indication of the APC income of the all-OA title and the hybrid title for 2004 only, allowing us to produce an adjusted estimate for the cost of non-APC charges for that year. The 2007 study of humanities journals (by the same author) used the same methodology, and did not include any OA titles [23]. As a result, it is possible to identify an average for the three years 2005-07, but also for each individual year; this shows publishing charges moving from 2.6% of subscriptions in 2005 to 2.1% in 2006 and 2.0% in 2007, for an overall average of 2.2%.

The 2005 study of ALPSP members included submission, colour, and page charges as well as reprint charges [18]. This study reported a higher proportion of charges than any other, which may in part be explained by the inclusion of reprints—unfortunately, no breakdown is available. The 2005 universities study included page and colour charges and submission fees, though with a caveat that submission fees were rare in this particular sample [20].

Two other studies are worth noting. A 2008 study of the economics of the global publishing industry appears to suggest payments from authors are equal to around 3.3% of subscriptions, but it is very ambiguously worded and may refer only to APCs, or to a combination of various publishing charges and APCs [2]. Given this ambiguity, it has not been listed above. In addition, a 2002 study had a sharply different conclusion—it reported publishing charges providing 12% of income for HSS journals and a negligible amount for scientific titles [24]. This is greatly at odds with other descriptions of the sector and requires further investigation. However, it has not been possible to identify the original source of these statistics; the citation for the data is to “Journal Publishing”, which appears to suggest the information is drawn from a 1999 survey of that name, but the version of this report I have been able to locate does not contain any information on publishing charges [25]. As a result, it is not clear how this remarkable discrepancy arises, and for the time being, it has been reluctantly set aside as an anomaly.

There is an apparent decline in the relation of subscriptions to publishing charges, though the wide variation in the samples of journals covered makes it difficult to draw any firm conclusions. A gradual decline would fit with some of the well-understood changes in scholarly publishing over recent years. Commercial publishers, which are substantially less likely to raise significant income from page charges, have taken over many society journals, and launched others, giving them a greater market share [26]. In addition, expressing publishing charges as a percentage of subscription costs would cause a proportional decline as long as subscription charges continue to increase faster than any other costs—which has been the case for some time [21].

Omitting the studies focused only on a particular discipline, and adjusting for society versus commercial publishers, the 2005 estimates of the cost of publishing charges varied from 3.3% to 4.2% of subscription costs. An extrapolated estimate for 2011 placed publishing charges among ALPSP member publishers at 2.4% of subscription costs. Assuming a slight further decline, a conservative estimate would suggest that, globally, publishing charges represented around 2% of subscription costs by 2013/14. The data for HSS journals in 2005–7 does not generalise well, as it deals only with a particular discipline, but it is striking that it is the only source with data across three consecutive years, and supports a consistent decline in the proportion of publishing charges over this period.

Adding this estimate for publication charges (2%) to those for direct (11%) and indirect (5.5%) costs of open access indicates a cumulative total cost of publication at around 18.5% above the cost of subscriptions. Drawing again on the SCONUL figures, which suggested a subscription spend around £180 million, this would give total spending of approximately £213 million in 2013/14 across the entire UK academic sector. A breakdown of the elements contributing to this total is shown in Table 2.

These total figures are still very provisional estimates, with a wide margin of error, and as they are across the sector they conceal a number of important questions. We cannot determine what proportion of these costs came from page, colour, or submission charges (or from related fees not otherwise identified), and we have no information on their distribution between institutions. The discussion earlier has highlighted that submission charges are mostly used in certain disciplines, and page charges tend to be concentrated with particular publishers—which may also imply a disciplinary focus. Because not all institutions have the same patterns of research, and some are highly focused, this may mean their relative exposure to the cost of publication charges varies unpredictably.

Acquiring data from individual institutions may help shed some light on these questions.

Table 2. Breakdown of the estimated total cost of publication by proportion of subscription cost.

Expenditure	Proportion	Estimated 2013/14 Cost
Subscriptions	100%	£180 million
Article processing charges	11%	£19.8 million
Indirect costs of managing OA	5.5%	£9.9 million
Publishing charges	2%	£3.6 million
Total	118.5%	£213 million (approx.)

4. Publication Charges Reporting: A 2014 Case Study

The open access block grants given to many UK universities and research institutions by RCUK in 2013 and onwards had a reporting requirement; recipients were expected to report back the total spend with individual publishers and, where possible, provide article-level detail on exactly what payments had been made [5]. RCUK requested institutions to provide summary reporting for review and analysis in late 2014, and encouraged the use of article-level spending data where possible.

The author's institution, the British Antarctic Survey (BAS), was one of the institutions in receipt of funding. Prior to 2013, all publication spending had been carried out at a departmental level and had not been tracked in detail, but discussions had identified a perceived high volume of page and colour charges as a potential concern. As a result, we made a concerted push to capture all payment information for articles published during 2013-14 alongside the information being gathered for RCUK—this covered any spending on a paper, whether it was a publication charge or an APC, and whether it came from internal funds or from the RCUK block grant. Broadly speaking, our experience was positive; once we had contacted an author to obtain a suitable version of the paper for the repository, or once they had contacted us to mention a paper had been published, the additional effort of checking and recording the financial arrangements was relatively small—most authors turned out to have this information to hand. In addition, a substantial proportion of payments had been made directly through the library, who had offered to handle invoices and payments on behalf of authors, which meant that the desired information was recorded at source for these papers. To simplify the process, we presumed that the first author's institution was responsible for any payment, as this policy had been adopted informally for some years, and did not investigate further unless informed otherwise. Of the 271 papers with an external first author, there were only three cases where we were made aware of a charge paid by BAS.

BAS published 428 papers in this sixteen-month period, predominantly in the earth and biological sciences, of which we identified 42 papers with APCs (£50,718) and 50 with publication charges (£36,773), equivalent to around £38,000 and £27,500 per year respectively. The majority of the publication charge spending was due to page charges, with a smaller amount from colour charges; there were no reported submission charges or other fees in this sample [27]. This is in sharp contrast to the provisional estimates above, where APCs were expected to be around five times as high as author charges. Publication charges as a percentage of subscription costs is harder to calculate (BAS operates its library services as part of a consortium and so does not have a specific subscription budget), but a

rough estimate would suggest annual subscriptions are in the range of £150,000–180,000. This would place the 2013/14 APCs at 21%–25% of subscriptions, and publication charges at 15%–18%.

Data for 2014-15 is still being compiled and will be published later in 2015, but provisional totals at the time of writing are approximately £49,000 for APCs and £28,000 for publication charges, over a one-year period. This corroborates the 2013-14 data, with the publication charge spending remaining stable—this would be expected in a situation where overall output of papers remained flat. The increased APC spending is consistent with the increased RCUK block grant allowing more papers to use APCs.

This is, clearly, a remarkably high amount of spending compared to subscriptions. The percentage spent on APCs is twice that expected from the national studies, though this can perhaps be explained by BAS receiving almost all its research funding from RCUK and so being required to comply with the mandate for all its outputs, rather than just a proportion as in the case of the universities. The proportion spent on publication charges is, however, five or ten times that which was suggested by our earlier estimates, and requires some examination. A probable explanation is that this is driven by a high volume of papers with particular publishers who levy such fees as standard. Titles from the American Geophysical Union, American Meteorological Society, and International Glaciological Society made up 23% of the 2013-14 papers published, but 76% of the papers with publication charges and 74% of the author charge spending. The majority of these were for page charges rather than colour charges.

This data is clearly not generalisable to most institutions, who would be expected to have a more varied output and less focus on individual titles or publishers. However, it very sharply demonstrates that single institutions—or perhaps individual departments within larger institutions—can face unexpectedly high costs due to publication charges. The corollary is, of course, that some institutions may have very few publication charges.

5. The Indirect Costs and Total Volume of Publication Charges

Having a sample of publication charges allows us to address the question of indirect administrative costs, which vary with number of payments rather than overall cost. The total cost of publication calculations discussed earlier included both the direct cash costs of open access—the APCs—and the indirect organisational costs involved in administering the system [1,9]. As a substantial portion of the indirect costs stem from the payment of invoices, publication charges may also give rise to similar costs. In an earlier study, the process of paying an APC invoice, and the associated administrative work, was covered as the “payment” and “closure” stages of the open access process, and estimated to take around 60 min of work per paper, adding £34 to the cost of each payment [9].

We have seen that the payments at BAS averaged £735 per transaction. However, these payments did not include any submission charges, which are known to rarely exceed \$500 (approximately £325) [19]. In addition, the methodology for identifying probable page charges (which are predictable on a per-journal basis) was probably more robust than that for identifying colour charges (which are less predictable), suggesting that missing records were more likely to be colour than page charges; our experience was that colour charges were usually for smaller sums, meaning that an estimated average taking account of such omissions would be lower. These factors, taken together, suggest that a more representative average transaction size might be substantially lower—say, £500.

A transactional cost of £34 on an average transaction size of £500 means that, overall, indirect costs due to payment processing would be around 7% of the cash value of publication charges, and thus around 0.1% of subscription costs. This is relatively insignificant in the context of the overall costs of publication, and does not materially increase the estimates for the total cost of publication. However, this estimate is very sensitive to assumptions regarding transaction size, and may need to be reconsidered should more data become available.

6. Other Publication Charge Reporting

As noted earlier, RCUK requested institutions to provide summary reporting for review and analysis in late 2014, and encouraged the use of article-level payment information where possible. The interim report on the policy in March 2015 noted that “the data collation exercise tried to take account of ... page and colour charges”, but did not go into detail on what this had involved [7].

The block grants were originally interpreted by many recipients to cover APCs only, but were later explicitly revised to give flexibility to spend on publication charges if appropriate. Institutions took a variety of positions on this—the University of Birmingham and Durham University, for example, had a firm APC-only stance [28,29], while St. George’s University of London allowed page but not colour charges [30], and the University of Leeds allowed any other publication costs [31]. This variation made it likely that some publication charges would have been reported in the article-level information.

Following the submissions, an aggregated dataset was produced covering all article-level records reported to RCUK, a total of 3,721 payments from 29 institutions across the sixteen-month reporting period [32]. Only 19 payments were explicitly marked as containing “additional charges” in some form. Five were from Lancaster University, who reported that one payment of £296 was a colour charge; the remainder, all £25 or less, were presumably transaction fees of some form. One was from the University of Exeter, who noted one payment of “£240 additional charges”, probably a colour charge payment (the journal in question does not levy page charges). The remaining thirteen were all from the University of Leeds, whose payments varied from £240 to £1440, suggesting they were all page or colour charges. In their individual submissions, the University of Edinburgh noted a further five papers where publication charges were paid instead of, and two in addition to, an APC [33], while Imperial College London mentioned three cases where they paid page charges, but did not give specific details [34].

It is possible that some publication charges were reported without being distinguished from APCs. To find these, we could parse the detailed reports looking for unusual sums, particularly when a journal offers a flat-rate APC; these odd amounts might indicate either a publication charges with no APC (if noticeably less than normal), or a publication charge in addition to an APC (if noticeably higher). Unfortunately, due to taxes and currency conversion fluctuations, not all figures quoted are round numbers, and two nominally identical amounts paid to a given journal at different times may show up as substantially different costs. Other complications are introduced by APCs split between institutions, institutional discounts, and fee waivers. For example, *PLOS ONE* has a standard APC of \$1350 and charges no additional fees, which would suggest it would be recorded as a payment of around £880, or £1060 with tax. 225 papers were reported from this journal in the RCUK aggregated data, 174 of which identified a payment. However, these payments averaged £933, with a range of £343.95 to

£2625.60. This dramatic variation for a journal with (theoretically) a simple single-price APC structure demonstrates that more complex analysis to find publication charges in spending data is likely to fail.

It is clear that very few non-APC payments were explicitly reported—and, it should be acknowledged, RCUK had not specifically asked for them. This is probably to be expected. As publication charges are routinely billed to individual researchers, and frequently paid from grant/project budgets, there is normally no centralised record of them from within the institution—indeed, the institution may have no real awareness that they have been paid. Retrospective studies are hampered by the fact that it is not easy to systematically identify journals with such charges, or to precisely predict what the charges would be—a recent survey found that a majority of journals with colour charges did not give a clear cost, and several merely “hinted” at their potential existence [16]. Many journals declare their page charges to be optional, meaning that there is a moral imperative for the author to pay, but no requirement that they do so. As a result, what was actually paid may only be known to those involved with a specific paper.

7. Recording Publication Charges in the Future

While they may not be being widely recorded at present, a potential framework for recording and reporting such payments is coming into existence at many institutions. The 2014 RCUK reporting guidelines did not ask for information on publication charges, but the 2015 guidelines have been revised, and now explicitly ask for a record of money spent on “page and colour charges and other publisher fees (e.g., submission fees)”, broken down by publisher [35]. This will hopefully drive additional reporting on these charges in the coming year. However, it is restricted to money spent on implementing RCUK policy and, as noted above, a substantial number of institutions have explicitly stated that they will only use RCUK funds for APCs. This will mean that any publication charges are more likely to be paid from non-RCUK funds, and so may not reliably be reported through this system.

We saw above that it is practical, at a small institution which is actively tracking information on all of its published papers, to record the majority of publication charges. Clearly, the burden of this will scale with size; an institution handling 300 papers a year will find it much more achievable than a large research-intensive university with ten or twenty times as many publications, and the larger institution may find it easier to sample information from a selection of papers—or, perhaps, to focus data collection on those disciplines which are already known to have a high proportion of page charges, identifying the majority of likely spending in a targeted way. In practice, we found that the most important aspect making data collection practical was comprehensiveness. Because we were tracking every paper, not merely those known to have been associated with an RCUK grant or those to have applied for RCUK open-access funds, we were in a better position to ask researchers for information in the course of existing discussions, or to identify all papers which were likely to have attracted page charges (based on the journal) and contact authors to confirm whether these were in fact charged.

Such comprehensive reporting may be approaching. In future, as the Research Excellence Framework (REF) open-access mandates come into force, it is likely that a very substantial proportion of papers produced by British researchers will be subject to a mandate of some form, and thus recorded through some kind of central process to track open-access information. In addition, RCUK grants awarded from 2013 onwards do not include any publication cost support, and so grant-holders will have to engage with

a central process in order to pay any publication charges. In both cases, this gives an opportunity for a central record to capture comprehensive payment information alongside open-access information.

If a group of institutions are able to adapt their monitoring process to easily capture “other charges”, or are able to make the additional staff investment to search out and follow up such payments, then we may be able to get robust and timely information on this currently little-understood aspect of the scholarly publishing economy at relatively little expense. The most reliable way to gather information would be at the point of payment, but unless this is fully centralised, it is unlikely to be comprehensive. One promising approach would be to include a question in the deposit form on their institutional repository; under the new HEFCE (Higher Education Funding Council for England) open-access mandate, papers should be deposited at or shortly after the time of acceptance [36], which means that the author should be engaging with the repository at around the same time they receive any page or colour charge invoice, and would be able to give cost details or confirm “no charges”. (This approach might, however, be less suitable for identifying submission charges.) RCUK have pushed for the use of repository-linked tools such as RIOXX to gather open access compliance information in order to simplify reporting [35], and while RIOXX does not currently record detailed metadata about publication costs [37], this could be an avenue for future development if instigated by RCUK.

An alternative approach would be for a central body, such as Jisc, to engage directly with the publishers (perhaps as part of the existing offsetting and subscription negotiations) and request that they provide information on publication charges paid. However, if this information is to be used for negotiating purposes, requesting it from the other party might be seen as problematic. This would also favour reporting from the large commercial publishers, and might not reliably reach smaller society publishers who are outside of the large-scale negotiation programs. As we have seen earlier, these smaller publishers may be more likely to levy publication charges, and omitting them might give a skewed view of the costs.

Such information would be valuable on three counts. Most obviously, it would help us better understand the dynamics of the scholarly publishing market, and be more transparent about the amount of money spent by institutions on publishing. While this paper has proposed an overall estimate for the cash cost of publication charges, we have only limited data on the average size or indirect costs of these charges, or of the relative scale of page charges, colour charges, submission charges, or other fees. We also do not know how the pattern of charges varies between disciplines or countries, though there are clear indications that substantial variation may exist.

Secondly, recording and examining this information could also help an institution understand their own spending—for example, by determining which departments or faculties would require most support to handle previously hidden publication costs, or by determining whether to allow centralised support for (optional) colour fees. It is worth considering, for example, that the prohibition of page charges by some institutions, coupled with a policy by RCUK to no longer support publication costs in grants, could potentially lead to a situation where some grantholders at these institutions are unable to publish in their normal journals.

Finally, and perhaps most importantly, this information could be used for negotiating purposes. There is a growing pressure for publishers to take into account the money spent on both APCs and subscriptions, with the intention being to develop a transitional offsetting scheme which would avoid

the total cost of publication for particular institutions increasing dramatically during the shift to open access [6]. It is clear that the amount spent on publication charges is, overall, less than that spent on APCs—but it is far from negligible. However, as of mid-2015, none of the existing offsetting schemes take spending on publication charges into account, instead relying on some combination of subscription charges and open-access APCs [7]. There is a risk that, if not considered alongside other costs, publication charges could become a new revenue stream for publishers seeking to increase income outside of a capped total-cost model, particularly in hybrid journals.

One substantial element of the total cost of publication still remains to be addressed, and is outside the scope of this paper—the institutional cost of maintaining the subscription system. Existing work towards a total cost of publication has identified the extensive organisational costs of administrative support, advocacy, repository management, and so forth to support open access. However, the subscription system comes with its own indirect costs—for example, the workload of negotiating and paying licenses, or the infrastructural costs of managing proxy servers and authentication systems. To correctly understand the total costs of publication—and certainly the “total costs of ownership”—we should consider these indirect costs of subscription as well.

It is also significant that most of the work done on the total cost of publication (including this paper) expresses the results as a proportion of overall subscription spending. However, it is not clear what a baseline figure for this should be—the most recent SCONUL survey is now five years old, and the journal market has changed substantially in that time. An updated figure for spending on journals across the UK academic sector, including an estimate of how much of this is now covered by various offsetting schemes, is required to place the total costs in context.

8. Conclusions

In the discussion above, we have estimated that the total journal subscription spend in the British academic sector is around £180 million for 2013/14. Further contributions to the total cost of publication come from open-access APCs, indirect costs of managing the open-access process, and (non-APC) publication charges, predominantly page and colour charges. An estimate for APCs comes to around 11% of subscription costs, and a slightly revised estimate for indirect open-access administrative costs comes to around 5.5% of subscription costs. Finally, a provisional estimate for other publication charges suggests they represent around 2% of subscription costs. However, this cost is not evenly distributed across the sector, and may be heavily concentrated in particular institutions. A revised total cost of publication, containing all these elements, is thus 118.5% of subscription costs, equivalent to £213 million for the UK academic sector in 2013/14. The indirect cost of administering these additional charges is around 0.1% of subscription costs and does not substantially affect the totals.

These figures are necessarily provisional. Further research to produce a better estimate for publication charges, and to understand their distribution, is still needed. The work done to build open-access finance reporting infrastructure for RCUK, and the broad scope of the upcoming HEFCE open-access policy, suggests that British universities may be well placed to gather meaningful spending data at relatively low cost in the coming years; practical experience suggests it can be done, at least on a small scale. This information would be of great value in helping inform future negotiations about the ways in which

scholarly publishing should be funded, and to help ensure that institutions keep control of the money they are paying to publishers.

Acknowledgments

This paper was developed from work done internally for the British Antarctic Survey, a research institute funded by the Natural Environment Research Council, though the opinions expressed here are not intended to represent those of either body. Ken Hollywood and Joan Bird at NERC helped establish a figure for BAS subscription costs. The author would like to thank those who commented on early drafts, including Bev Ager, Michael Jubb, Robert Kiley, Stuart Lawson, Alex Tate, and Mark Thorley, as well as four anonymous referees.

Conflicts of Interest

The author declares no conflict of interest.

References

1. Pinfield, S.; Salter, J.; Bath, P.A. The “total cost of publication” in a hybrid open-access environment: institutional approaches to funding journal article-processing charges in combination with subscriptions. *J. Assoc. Inf. Sci. Technol.* **2015**, doi:10.1002/asi.23446.
2. Research Information Network. Activities, Costs and Funding Flows in the Scholarly Communications System in the UK, 2008. Available online: <http://www.rin.ac.uk/system/files/attachments/Activities-costs-flows-report.pdf> (accessed on 23 July 2015).
3. White, S. *SCONUL Detailed Library Statistics 2010–2011*; SCONUL: London, UK, 2012. Available online: <http://www.sconul.ac.uk/sites/default/files/documents/ALS1011.pdf> (accessed on 23 July 2015).
4. Suber, P. *Open Access*; MIT Press: Cambridge, MA, USA, 2012. Available online: <https://mitpress.mit.edu/books/open-access> (accessed on 3 October 2015).
5. RCUK. Policy on Open Access and Supporting Guidance, 8 April 2013. Available online: <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/RCUKOpenAccessPolicy.pdf> (accessed on 23 July 2015).
6. Lawson, S. “Total cost of ownership” of scholarly communication: Managing subscription and APC payments together. *Learn. Publ.* **2015**, *28*, 9–13.
7. Research Councils UK. *Review of the Implementation of the RCUK Policy on Open Access*; Research Councils UK: Swindon, UK, 2015. Available online: <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/Openaccessreport.pdf> (accessed on 23 July 2015).
8. Willetts, D. *Progress Review: Implementing Finch Report recommendations; Letter to Prof Dame Janet Finch*; Department for Business, Information and Skills: London, UK, 2014. Available online: <http://www.researchinfonet.org/wp-content/uploads/2013/02/BIS-Transparency-Letter-to-Janet-Finch-One-Year-On-Response-January-2014.pdf> (accessed on 3 October 2015).

9. Johnson, R.; Pinfield, S.; Fosci, M. Business process costs of implementing “gold” and “green” open access in institutional and national contexts. *J. Assoc. Inf. Sci. Technol.* **2015**, doi:10.1002/asi.23545.
10. Crow, R.; Goldstein, H. *Guide to Business Planning for Converting a Subscription-based Journal to Open Access*, 3rd ed.; Open Society Institute: New York, NY, USA, 2004. Available online: http://www.budapestopenaccessinitiative.org/pdf/business_converting.pdf (accessed on 23 July 2015).
11. King, D.W.; McDonald, D.D.; Roderer, N.K. *Scientific journals in the United States*; Hutchinson Ross: Stroudsburg, PA, USA, 1981.
12. King, D.W.; Alvarado-Albertorio, F.M. Pricing and other means of charging for scholarly journals: A literature review and commentary. *Learn. Publ.* **2008** *21*, 248–272.
13. Scheiding, T. Paying for knowledge one page at a time: The author fee in physics in twentieth-century America. *Hist. Stud. Nat. Sci.* **2009** *39*, 219–247.
14. Kiley, R. *Colour and Page Charges: Results of a Brief Survey*; Wellcome Trust: London, UK, 2013. Available online: <http://www.researchinfonet.org/wp-content/uploads/2013/09/Wellcome-survey-of-colour-and-page-charges-v-02.pdf> (accessed on 23 July 2015).
15. Morris, S.; Barnas, E.; LaFrenier, D. *The Handbook of Journal Publishing*; Cambridge University Press: Cambridge, UK, 2013.
16. Curb, L.A.; Abramson, C.I. An examination of author-paid charges in science journals. *Compr. Psychol.* **2012**, *1*, doi:10.2466/01.17.CP.1.4.
17. Page, G.; Campbell, R.; Meadows, J. *Journal Publishing*; Cambridge University Press: Cambridge, UK, 1997.
18. Kaufman-Wills Group, LLC. *The Facts About Open Access: A Study of the Financial and Non-Financial Effects of Alternative Business Models for Scholarly Journals*; Association of Learned and Professional Society Publishers: London, UK, 2005. Available online: <http://www.alpsp.org/publications/FAOAccompleteREV.pdf> (accessed on 23 July 2015).
19. Ware, M. *Submission Fees—a Tool in the Transition to Open Access? Summary of a Report to Knowledge Exchange*; Mark Ware Consulting: Bristol, UK, 2010. Available online: <http://www.knowledge-exchange.info/Default.aspx?ID=413> (accessed on 3 October 2015).
20. Walters, W.H. Institutional journal costs in an open access environment. *J. Assn. Inf. Sci. Technol.* **2006** *58*, 108–120.
21. Ware, M.; Mabe, M. *The STM Report: An Overview of Scientific and Scholarly Journal Publishing*, 3rd ed.; International Association of Scientific, Technical and Medical Publishers: Hague, The Netherlands, 2012. Available online: http://www.stm-assoc.org/2012_12_11_STM_Report_2012.pdf (accessed on 23 July 2015).
22. Waltham, M. *JISC: Learned Society Open Access Business Models*. 2005. Available online: <http://www.jisc.ac.uk/media/documents/themes/infoenvironment/learnedsocietyoabusinessmodels.pdf> (accessed on 23 July 2015).
23. Waltham, M. The future of scholarly journal publishing among social science and humanities associations. *J. Schol. Pub.* **2010** *41*, 257–324.

24. Pira International. *Publishing in the Knowledge Economy: Competitiveness Analysis of the UK Publishing Media Sector*; Department of Trade and Industry: London, UK, 2002. Available online: <http://www.berr.gov.uk/files/file13777.pdf> (accessed on 23 July 2015).
25. Hourican, R., Martin, N., and TFPL Limited. *Journal Publishing Statistics Survey 1999: a report for the Association of Learned and Professional Society Publishers*; TFPL: London, UK, 2001. Available online: <http://www.alpsp.org/TFPLreport.pdf> (accessed on 3 October 2015).
26. Larivière, V., Haustein, S., and Mongeon, P. The oligopoly of academic publishers in the digital era. *PLOS ONE*. **2015** *10*, e0127502.
27. Gray, A.D. *British Antarctic Survey Submission to the RCUK Open Access Policy Review*. British Antarctic Survey: Cambridge, UK, 2014. Available online: <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/oadocs/BritishAntarcticSurvey.pdf> (accessed on 23 July 2015).
28. University of Birmingham: Funders and open access. Available online: <https://intranet.birmingham.ac.uk/as/libraryservices/library/services/research/open-access/funding/Funders-and-open-access.aspx> (accessed on 23 July 2015).
29. University of Durham: RCUK Open Access Policy FAQs. Available online: <https://www.dur.ac.uk/research.office/research-outputs/openaccess/oafaq/rcuk/> (accessed on 23 July 2015).
30. St. George's University of London: RCUK FAQs. Available online: <http://library.sgul.ac.uk/researchers/open-access-faqs/rcuk-faqs> (accessed on 23 July 2015).
31. APCs—Leeds University Library. Available online: <http://library.leeds.ac.uk/open-access-funding> (accessed on 23 July 2015).
32. Lawson, S. RCUK APC data (2013-14), *Figshare* **2014**, doi:10.6084/m9.figshare.1180122.
33. Andrew, T, et al. University of Edinburgh RCUK Gold Open Access APC data (2013-14). *Figshare* **2014**, doi:10.6084/m9.figshare.1146256.
34. Reimer, T.F. *Imperial College London Submission to the RCUK Review on Open Access*; Imperial College London, UK, 2014. Available online: <https://spiral.imperial.ac.uk:8443/handle/10044/1/15558> (accessed on 23 July 2015).
35. Research Councils UK. *RCUK Open Access Policy: Compliance and Financial Reporting for Year 2 of the Policy (1 August 2014 to 31 July 2015)*; Research Councils UK: Swindon, UK, 2015. Available online: <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/OA/RCUKOAreportingGuidance.pdf> (accessed on 3 October 2015).
36. HEFCE. *Policy for Open Access in the Post-2014 Research Excellence Framework: Updated July 2015*; Higher Education Funding Council for England: Bristol, UK, 2015. Available online: <http://www.hefce.ac.uk/pubs/year/2014/201407/> (accessed on 3 October 2015).
37. Walk, P. *RCUK RIOXX Application Profile Version 2.0 Final Version*; EDINA: Edinburgh, UK, 2015. Available online: <http://rioxx.net/v2-0-final/> (accessed on 3 October 2015).