THE CHANGING ECONOMIC MODEL OF SCHOLARLY PUBLISHING: UNCERTAINTY, COMPLEXITY AND MULTI-MEDIA SERIALS

By John Cox

Scholarly publishing is undergoing a transformation that affects every participant in the information chain. Serials used to be a relatively uncomplicated activity, driven by the need of scholars and researchers to publish (see Fig 1). Until the 1980s, libraries found it possible to maintain coherent collections of the journals required to serve the teaching and research needs of their individual institutions, albeit at the expense of their monograph collections. Since that time, both journal price inflation and the growth in the number of journals and the numbers of papers published have outstripped the ability of even the most lavishly funded library to purchase what faculty and students demand. At the same time, modern technology has, in the last few years, offered us the opportunity to develop new media of distribution for scholarly literature: media that offer the researcher facilities and qualities that cannot be undertaken in the print medium.

There is a great deal of data to demonstrate that the number of papers has increased at roughly the same rate as expenditures on research and development in western economies (1). The number of papers published per scholar has remained level over the past twenty years; it is the number of scholars that has doubled. In the USA in 1975, 2.64 million scientists are estimated to have published 312,200 articles; in 1995, there were 5.74 million scientists and 577,100 published articles (2). Meanwhile, library expenditure has increased by less than half that rate. The broad funding outlook remains gloomy; for example, in the UK, student numbers have increased by 15 per cent in the three years up to 1996, but funding per student decreased by 30 per cent.

The geographical distribution of subscriptions has also changed. For many years after World War II, the major research libraries in the USA maintained complete collections of all the literature published in the field; they were a dependable and significant body of subscribers. In the mid-1970s this started to change. For most publishers, the USA has declined as a proportion of the total world market. While south-east Asia and western Europe have, until recently, been expanding markets, the decline in US library spending has removed a stable growth factor. Most
publishers now expect volatility: more cancellations or non-renewals, and more new subscription orders.

Suddenly our simple model has become more complex and uncertain. Change is relentless. The development of resource sharing means a single subscription where once there were many. Document delivery now provides a ‘pay by the drink’ model that potentially and fundamentally changes the pattern of income a publisher receives (see Fig 2). The number of papers seeking publication continues to rise relentlessly, causing information overload in even the most specialised areas of interest.

What has happened to the underlying costs of producing a journal? It is worth noting at the outset that paper, printing and distribution account for a small portion of the total subscription price. Between 60 and 70 per cent of the cost of publishing a journal is incurred in processes that are inescapable, regardless of the medium of output. Tenopir and King, in an excellent article in the Journal of Scholarly Publishing (2), analyse the factors that characterise our economic model:

- The average fixed cost of producing the first copy of an article is about US$ 4,000, covering direct costs such as review and refereeing, editorial work, preparing illustrations and making the master copy (i.e. printing plates), and indirect costs such as subscription maintenance, marketing and author administration. Naturally, costs vary from one journal to another, depending on the subject and the complexity of the text.
- While price increases typically will result in reduced subscription numbers, a greater influence will be the size of the market served, being the readers interested in the information conveyed by specific journals.
- Publishers are, on average, publishing more articles and more issues per journal, and more pages per article. The average number of issues increased from 6.5 in 1975 to 8.3 in 1995, and total pages from 820 to 1723 in the same period.
- In the 1980s, there was a distinct shift from individual subscriptions to library-provided materials. Thus subscription numbers dropped, and the high fixed costs had to be spread over fewer, mainly library, subscriptions, thus increasing institutional prices at a rate greater than inflation and size increases alone explain.

To Tenopir and King’s list, I would add the following:
• Editors’ expenses are much higher than they were 20 years ago. Editors now need a personal computer, fax, e-mail facilities and an answering machine.

• Institutions that were once prepared to carry the cost of the editorial office and the secretarial assistance required are no longer so willing. Many require the publisher to pay the full cost of such facilities.

• Journal editors are increasingly unwilling to work for the love of it. They require payment in the form of editorial fees or, in some cases, a royalty on sales.

• Both commercial and non-profit publishers are under pressure to produce profits or surpluses for the journal owner, be it a learned society, a university or the company’s shareholders. Many learned journals have in the past been published at a loss; support for such loss makers is increasingly difficult to find.

• New journals are launched only in response to the emergence of new areas of academic research. But they have to be financed from existing resources - i.e. from the revenues earned from existing titles. The risk for the publisher is considerable, with the accumulated loss on a new STM title reaching US$ 150,000-200,000 by the end of the third year; it will not cover its accumulated investment till volume 6 (3). In the humanities and social sciences, the break-even may be achieved sooner, but still requires the original decision to invest for the future.

Publishers have compensated for the underlying cost increases they face, in an under-funded market, in various ways:

• They have tried to develop links with learned societies to sell more copies to individual society members at discounted prices, thus covering a portion of the fixed costs that have to be recovered;

• They have developed non-subscription revenues such as advertising, supplements and special editions sold to industrial or special interest groups, and licence revenue from document delivery services and CD-ROM publishers who reach markets that are unlikely to subscribe to the journal.

• Publishers have been putting more words on the page, by increasing the size of the page, reducing type sizes, using double column setting and narrower margins.

• Most important, the production systems used have been transformed by technology. Computerised typesetting and page layout software is commonplace. Journal articles are frequently submitted on disk; publishers apply their skills in quality management, presentation and layout to material
already in machine-readable form. The printed product may look traditional, but it has been output from a system that our forebears would find unrecognisable.

Nevertheless, journal prices have increased dramatically in the last three decades. Journals in the humanities and social science now average US$ 185, in medicine US$ 506 and in science and technology US$ 902 (4). Overall, journals are 30 times more expensive in 1997 than they were in 1970. This represents an average annual increase of over 13 per cent. Clearly, the train has to hit the buffers some time.

Publishers have started to output their journals in electronic form, in response to vocal demands from librarians, many of whom clearly believe that technology holds to solution to the economic problems they face. When one examines the benefits and disbenefits of the electronic and printed media, the future is much less clear. From the financial point of view, electronic publishing eliminates paper, printing, binding, storage and transportation costs. Nevertheless, it is just as costly to employ highly skilled editorial and technical staff to prepare data for electronic publication as it is for paper-based publishing. There are no obvious cost savings on marketing, as users still have to be identified and reached with information about the product. Moreover, the technology requires heavy capital investment in computer equipment that needs to be renewed every eighteen months or two years.

There is also a marked ambivalence about electronic publishing in the academic community, that goes beyond a reluctance to learn how to use new technology. Academic readers are not yet using many electronic journals, whether they are free or on subscription, though most use the Web frequently. The power and rigour of searching secondary databases to identify literature to read is universally appreciated. When it comes to primary research literature, many academics are openly sceptical. They want to publish in print. Their reading will generally be done at home, using the printed word. Many social scientists go further, and decry the loss of authority and status that they believe is inherent in electronic publication. This has been described as the ‘cartooning’ effect: such material is not worthy of serious study because it comes in the same format as ‘The Simpsons’ or ‘Beavis and Butthead’, and is therefore to be treated with the same level of seriousness and attention. That publishers are reluctant to abandon print and embrace the new technologies wholeheartedly is a reflection of the concerns of their authors and editorial boards.

So we publishers proceed with caution. Nevertheless, publishing printed and online editions of journals in parallel represents the start of a process of developing
truly multi-media scholarly publishing, where the electronic edition of a journal paper may display features like video, sound, moving graphics and models, as well as interactive features, that the paper edition lacks. But the paper edition has the authenticity and permanence that the electronic version still appears to lack.

So both publishers and librarians are locked in to a multiple medium environment for the foreseeable future. The paper-based journal will survive, but electronic products, particularly material delivered over the Internet, will become more important, when and where the unique features of the medium become important in relation to the research to be reported. The problem is that publishers cannot see how they can publish the electronic version at a level that will cover the cost of peer review and of the multimedia and interactive features that will be needed to complement the article text and to exploit the unique capacity of the medium.

Electronic journals create the opportunity to provide a range of features of real value to working scholars:

- full reference retrieval;
- linked footnotes;
- complex figures converted into moving pictures;
- embedded links that are continually updated both forwards as well as backwards;
- direct access to the data on which the paper is based; and
- concept, or thesaurus-like, searches, which will require major developments in artificial intelligence.

The problem for publishers, librarians and academics is that the technology does not yet exist to enable publishers to produce, and universities and research establishments to use, all these features systematically. Moreover, the use of high technology effectively disenfranchises many countries who do not have the infrastructure, unreliable though it is, that blesses us in the developed world.

So where do we, as a community serving scholarship, go from here? In the USA, the Association of American Universities and the Association of Research Libraries published a report (5) which broke down scholarly information transfer into three models:

- the traditional ‘classical’ print-based model;
- the ‘modernised’ parallel publishing model; and
- the ‘emergent’ model that by-passes print that uses computing and telecommunications technology exclusively to create what is referred to as knowledge management systems called ‘collaboratories’. 
The AAU/ARL concluded that 50 per cent of scientific literature would still be in print by 2015, and that there would be no single dominant model for the foreseeable future (see Fig 3).

The principal issue facing publishers is how to maintain the viability of their activities, and the role they play in scholarly publishing. That role is especially important in relation to managing and certifying the quality of published output through the peer review process.

The principal issue facing librarians, it seems to me as a sympathetic publisher observer, is how do they meet faculty and student requirements for information in multiple formats that may involve significant support costs out of budgets that do not even keep pace with the cost of information in the traditional medium.

The environment is clearly ready for new business models. Some tentative steps have already been taken to develop new pricing and purchasing models, on two fronts:

- Publishers have begun to develop licensing schemes that provide extended access to their journal material, whether in print or electronic form, on terms that are intended to meet the teaching and research needs of the licensed institution, including copying for the reserve collection, use in course packs etc. Academic Press’s IDEAL scheme is the best known. This provides extended access to the entire list electronically, and discounted rates for new or additional print subscriptions. For the publisher, it stabilises revenue. As these schemes tend to be priced with reference to current subscription rates, questions remain to be answered in relation to future prices and the incorporation of newly launched journals.

- Resource sharing has been developed into formal purchasing consortia, either on a membership basis like the Southern Universities Purchasing Consortium in the UK, or on a regional, state or even national basis. In the USA alone, there are now over 100 purchasing groups. One of the best known is OhioLink, which negotiates electronic licences for all the institutions in the state of Ohio.

Development of these new models is at an early stage, but do offer the prospect for both publishers and libraries of breaking out of the straight-jacket of the individual journal subscription price. Publishers need to be more flexible in meeting the legitimate demand for information they publish, especially if it involves broadening the circulation. Librarians need to concede that effective negotiation requires a centralised, well-briefed office with authority to negotiate on behalf of all the members of the institution or consortium. Both parties need to
recognise and articulate the legitimate concerns of the other in a way that implies a partnering rather than an adversarial relationship.

There is also an important role for intermediaries or aggregators in this scenario. My colleague Albert Prior will deal with this aspect information provision in greater detail. Suffice it to say that subscription agents have always provided an invaluable role in rationalising journal subscription ordering; it is entirely reasonable to assume that they will develop this activity by providing a single access point to electronic information from many publishers competing with different systems. The future is likely to involve more collegial methods of working together. How we do this will be a matter of controversy as well as innovation for many years to come.

References


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THE TRADITIONAL MODEL OF SCHOLARLY PUBLISHING

ACADEMICS AND RESEARCHERS
Authors and Readers

LIBRARIES

PRIMARY PUBLISHERS

SUBSCRIPTION AGENTS

Fig 1
THE '1980s' MODEL OF SCHOLARLY PUBLISHING

ACADEMICS AND RESEARCHERS
Authors and Readers

ABSTRACTING & INDEXING SERVICES

DOCUMENT DELIVERY SERVICES

LIBRARIES

PRIMARY PUBLISHERS

SECONDARY PUBLISHERS
Print, CD-ROM and On-line

ON-LINE INFORMATION SERVICES

SUBSCRIPTION AGENTS

Fig 2
THE NEW MODEL OF SCHOLARLY PUBLISHING

Fig 3