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## Trends in journal prices: an analysis of selected journals, 2000-2006

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## Trends in journal prices: an analysis of selected journals, 2000-2006

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Note: A full report of the study of which this is a summary, is available from the LISU web site.

### Abstract

This paper presents summary results from an analysis of the institutional subscription prices for journals in biomedical and social sciences, for a selection of eleven publishers. Overall price, price per page and price per point of impact factor have been examined between 2000 and 2006. Considerable variation was found between publishers both in their overall levels of price and in the rates of increase observed over the period. There is some evidence that not-for-profit publishers may, on average, offer better value for money in terms of price per page and price per point of impact factor, but this is far from conclusive.

### Introduction

In 2004, LISU was commissioned by Oxford Journals to undertake an independent analysis of trends in journal pricing and related issues amongst a selection of scholarly publishers<sup>1</sup>. Following publication of this report, there was considerable interest in its findings and methodology, largely through informal feedback, and in 2006 Oxford Journals commissioned a further project to update the detailed analyses of biomedical titles included, and to extend the analysis to the social sciences<sup>2</sup>. The methodology used built on, and refined, that used in the previous study, taking account of criticisms made of the first study by some publishers.

This paper presents key results from this second study. Serials pricing models are increasingly complex, with a variety of different regimes for various formats of the same title, different combinations of titles and bundled deals, and even for different customers. In order to make valid comparisons across time and between publishers, the pricing basis used throughout was the institutional price paid by UK academic libraries for a single print subscription to each title. It is also important to note the difference between price and library cost. The cost of a serial title to any particular library may be different from the price ascribed to the same title in this analysis; however the purpose of this study is to present comparable trends in broad pricing policy for selected publishers, rather than to give any direct comparison of library costs.

In order to put the findings into a national context, Table 1 shows trends in UK average periodical prices<sup>3</sup>. Whilst these categories do not map exactly onto those used in this study, it is interesting to compare the broad levels of increase, and to note that the average price of all social sciences journals fell in 2006. ('General' was introduced as a new category in 2006; it is not clear whether journals in this category were previously included in other categories.) The reports from which these figures are derived are aimed at 'providing a comprehensive survey of annual serial price increases'<sup>4</sup>, and in each year, titles are included if their price is directly comparable with that in the previous year. As a result, different journals may be included from year to year, and thus the actual levels of average price quoted may not be directly comparable between years. LISU takes account of this in its *Annual Library Statistics* publication<sup>3</sup>.

Table 1 Average periodical prices 2000-2007<sup>3</sup>

	2000		2001		2002		2003		2004		2005		2006		2007	
	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.	£	Ann Inc.
Soc. Sci.	244	11%	267	9%	324	21%	421	30%	428	2%	494	16%	474	-4%	486	5%
Science	612	10%	615	0%	644	5%	630	-2%	703	12%	780	11%	933	20%	967	8%
Medicine	334	9%	350	5%	377	8%	367	-2%	396	8%	414	5%	451	9%	503	8%
Technology	330	11%	357	8%	385	8%	442	15%	493	11%	514	4%	600	17%	596	7%
Humanities	60	1%	65	8%	71	9%	66	-6%	89	35%	98	10%	109	12%	121	7%
General													301		325	6%
GB average	310	10%	323	4%	357	11%	397	11%	423	7%	465	10%	489	5%	500	6%

Note that the annual increase figures are based on paired sets of titles across each two year period, not calculated from the average costs presented in each year.

Between 2000 and 2006, the period covered by this analysis, the general rate of inflation in the UK, measured by the retail price index, was 16%, while periodical prices are estimated to have risen by 39% over the same period<sup>3</sup>. On average, periodical prices have risen faster than inflation in the UK; however this is a very crude measure, taking no account of the relative value in terms of journal size or quality.

At the same time, data from the Society of College, National and University Libraries analysed in the *LISU Annual Library Statistics*<sup>3</sup> show that academic library budgets have risen by a total of 34% between 1999-2000 and 2005-06, and student numbers rose by 10%. Serials expenditure has increased by 48% over the same period, while the number of titles purchased has increased by 88%, owing in part to the introduction of 'bundles' of electronic journals.

## Methodology

The methodology used is described in detail in the full report of this study<sup>2</sup> and is described only briefly here, to aid understanding of the results which follow. Two broad subject areas were examined in depth: biomedical sciences and social sciences. Data were analysed relating to 11 publishers (Table 2), who were selected as being the largest academic journal publishers in the commercial market and the largest university presses, which also have a breadth of subject coverage including biomedical and social sciences titles. While this list cannot be described as exhaustive, and no summary analyses have been carried out across publishers, we believe that the largest journal publishers in the relevant subjects have been included. The median price (the mid-point of the distribution, where half the values are higher and half lower) was chosen as the statistic of interest, in preference to the arithmetic mean, as the mean can be significantly affected by as few as one or two exceptional, expensive, titles. In order for the methodology of examining trends in median prices to be meaningful, the analysis is restricted to publishers which had a reasonable number of titles in each area; no analyses were carried out where a publisher had data for fewer than ten titles in the broad subject area.

Table 2 Volumes of data included

	Biomedical		Social sciences	
	No.	With IF	No.	With IF
Blackwell Science/Publishers*	274	61.3%	210	51.9%
Cambridge University Press	25	48.0%	29	44.8%
Elsevier	388	71.4%	246	66.3%
Lippincott Williams and Wilkins	208	53.4%	17	76.5%
Nature	29	86.2%	0	
Oxford Journals	54	81.5%	48	50.0%
Springer	219	63.5%	48	33.3%
Sage	56	12.5%	162	55.6%
Taylor and Francis	202	44.1%	373	22.8%
University of Chicago Press	#		16	87.5%
Wiley	42	52.4%	39	51.3%

\* Subsequently acquired by Wiley

# Six titles identified – no analyses were carried out.

There is an element of subjectivity as to whether individual subject areas should be considered 'biomedical' and/or 'social sciences'. Sourcing of subject information for each title included is described in detail below. In general, detailed subject areas were included as 'social sciences' where they were listed in the Thompson *Journal Citation Reports (JCR)*

Social Sciences Edition<sup>5</sup>, and/or Swets included them in their social sciences category in the Swetswise database<sup>6</sup>. This has resulted in some subject areas (e.g. Law) being included which might not be considered 'social sciences' under a more restrictive classification. Subject categories were included in their entirety – i.e. all titles which were listed under any subject area classified as biomedical or social sciences were included in the analyses, where a complete set of data was available. It was felt that including or excluding individual titles on the basis of personal subjective familiarity with the journal could lead to accusations of bias. All publishers were also given the opportunity to check and edit their own list of titles.

Continuity of price information was essential, and those journals for which price data were not available for each year covered by the study (2000-2006) were excluded from the main analyses. Titles that had moved to or from another publisher during that time frame, or ceased publication, and new launches were also omitted. This criterion was set in order to ensure continuity of the reported trends. New titles might have special pricing arrangements in their earliest years, in order to attract both contributors and purchasers. Publication patterns can also be irregular in the early years of a journal's life. Moving titles from one publisher to another, either individually, or as a result of mergers/takeovers, could result in a discontinuity in pricing policy. Although this restriction reduced the number of titles available for analysis in some cases, it was felt to produce a more comparable result overall.

The analyses were intended to be based only on scholarly journals – i.e. those of most interest to academic libraries and researchers. A considerable number of general interest and professional journals are included in the Swets price lists. While many of these may be of interest to scholars, many will not, and should properly be excluded from the analyses. In order to achieve this, the Thomson *Journal Citation Reports (JCR)* were used to identify those journals which have an impact factor, indicating that articles have been cited by other researchers in the relevant field. Impact factors have the advantage of being independent of publishers, and objectively calculated, and consistent across disciplines. It is recognised that this approach may have limitations – for example, new journals take time to build a reputation and so to be included in the *JCR*. Because the analyses were based on a consistent set of titles over a number of years, titles which did not have impact factors recorded for every year were excluded, including any relatively new titles acquiring impact factors since 2000.

For biomedical science, the researchers felt that impact factor was an appropriate indicator of journals of interest to academic staff, and hence to librarians, and trend analyses of both price per page and price per point of impact factor were carried out on the reduced subset of titles which had an impact factor throughout the study period. For social sciences, as a

relatively large proportion of published titles are not listed in the *JCR*, the decision was taken to carry out the analyses of price per page on all titles which met the continuity criterion described above, regardless of whether or not they had an impact factor. This inevitably led to the inclusion of some general interest, trade and professional journals, but the authors felt that the distortions thereby introduced were less than would occur by restricting the data set. Price per point of impact factor analyses were also undertaken for the small subset of social sciences titles that did have an impact factor.

### Data sources

Price data were sourced from Swets Information Services. This was used as an independent source of title and price information, comparable for all publishers in the study. The prices used were in pounds sterling, as applicable to individual UK academic libraries. Any variation between 'home' and 'overseas' pricing, and any postage charges incorporated into the prices quoted, have not been taken into account. They are as charged at the time – no account has been taken of overall serial price inflation or of the general rate of inflation in the UK. Where journals were originally priced in US dollars, Euros, or any other currency, the prices had been converted to Sterling before being supplied to LISU. Some of the variations in price between years may therefore be attributable to changes in the exchange rate. Table 3 shows Sterling exchange rates against the Euro and US Dollar for information. Where different formats were available at different prices, the price of the print version was used. Online-only journals were not included. Increasingly over the time period studied, a single price covered both the printed journal and online access, and this may have an impact on the trends reported. As such pricing tended to be a matter of publisher policy, applied over much of the list rather than affecting individual titles within a given list, it has not proved possible to make any formal estimate of the effect this might have.

Table 3 Exchange rates

£1 Sterling =	€	\$
31-Dec-99	1.61	1.61
31-Dec-00	1.59	1.50
31-Dec-01	1.63	1.46
31-Dec-02	1.53	1.61
31-Dec-03	1.42	1.79
31-Dec-04	1.41	1.92
31-Dec-05	1.46	1.72
31-Dec-06	1.48	1.96

End year spot exchange rate. Source: Bank of England

The pricing data provided electronically by Swets did not include any subject categorisation. Subject information was therefore taken in the first instance from the ISI *JCR* lists. For journals without impact factors, Swets printed catalogues were examined and subject data extracted. There remained a few titles which had been included in the electronic price lists, but which could not be found in the printed catalogues; the publishers' websites were used as the source of subject areas for these titles. Any remaining titles for which no subject information could be found were excluded from the analyses.

Data on the number of published pages, where not already available from the previous study, were obtained either from Swetswise (Swets Information Services) or from the individual publishers' websites. Publisher sites were the preferred source, as they generally gave the exact number of pages in each journal volume. Swetswise data were virtually complete, but an estimate of the total pages in any year had to be made from the tables of contents. These data were sourced and input manually. Journals which did not have an electronic edition throughout the period did not have sufficient information from either source to estimate the number of published pages. Therefore they did not have a complete set of data for all years, and so were excluded from the analysis of price per page.

### Analysis

Four main analyses were carried out, all by publisher, for each of biomedical science and social sciences:

1. Trends in overall journal prices from 2000 to 2006, including all journals published continuously throughout.
2. Trends in price per page, from 2000 to 2006. For biomedical science, this included only those journals which had impact factors throughout the period; for social sciences, all journals published continuously throughout, for which the total number of pages in each year could be established were included. Price was related to the number of pages in the same year.
3. A snapshot analysis of all titles by 2005 impact factor, based on as many titles as possible for each of the publishers included. In order to be as comprehensive as possible, the Swets price list and *JCR* list of titles were combined for each publisher, and duplicate entries removed. Those titles which were listed in the *JCR* for which LISU had not received price information were excluded. The total number of titles included for each publisher is believed to be as comprehensive as was possible in the time available. For each publisher, all journals were ranked, and classified as being in the top 10% of impact factors for that



subject, the next 15%, the next 25%, and the bottom 50%. Those with zero impact factor, or not listed in 2005, made up the final category.

4. Trends in price per point of impact factor from 2000 to 2006, covering those journals with an impact factor in all years. Price was related to impact factor in the previous year. For social sciences, impact factors for 1999 were not available electronically, so this analysis covered prices from 2001 to 2006

## Results

Price analyses for each publisher showed trends across the full range of their journals, demonstrating the variation both in average prices and in price increases within publishers. In some instances this was extreme, and greater than the variation found between publishers. This paper presents only summary data based on median values.

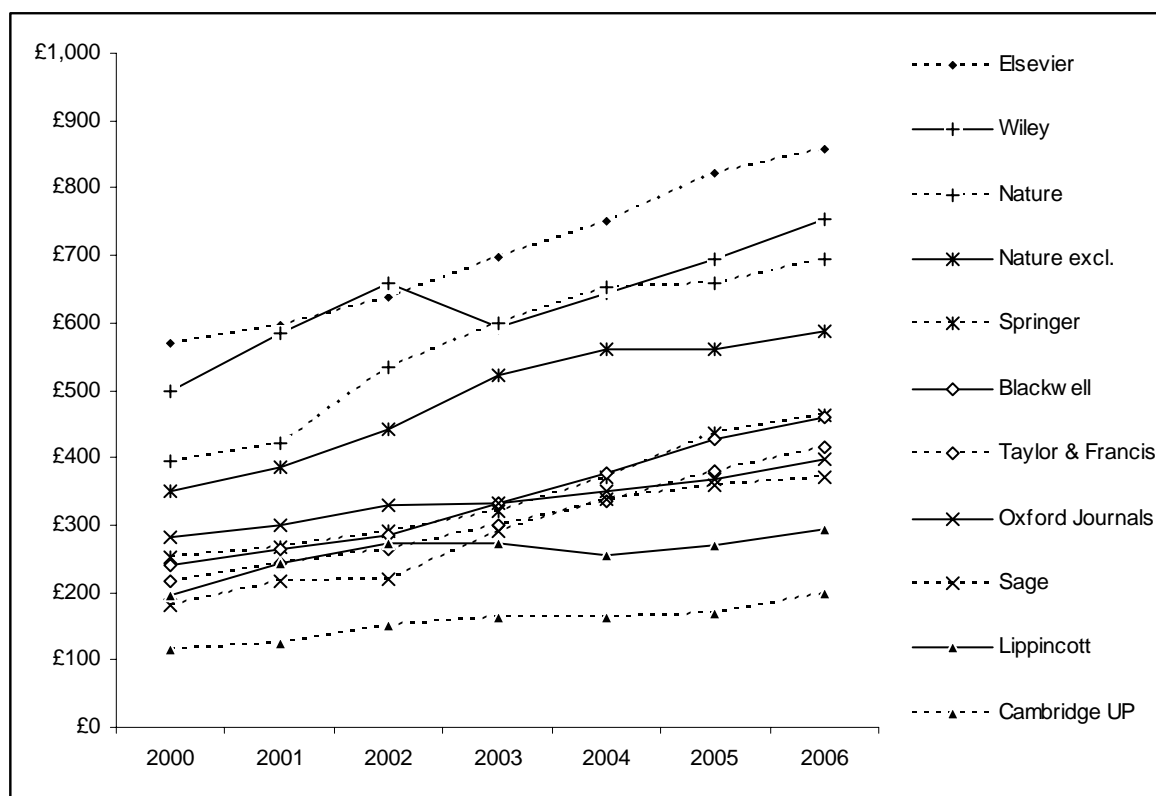
### Biomedical sciences

(Note that, for some of the measures studied, two analyses have been included for Nature publishing – including and excluding the *Nature* group of titles.)

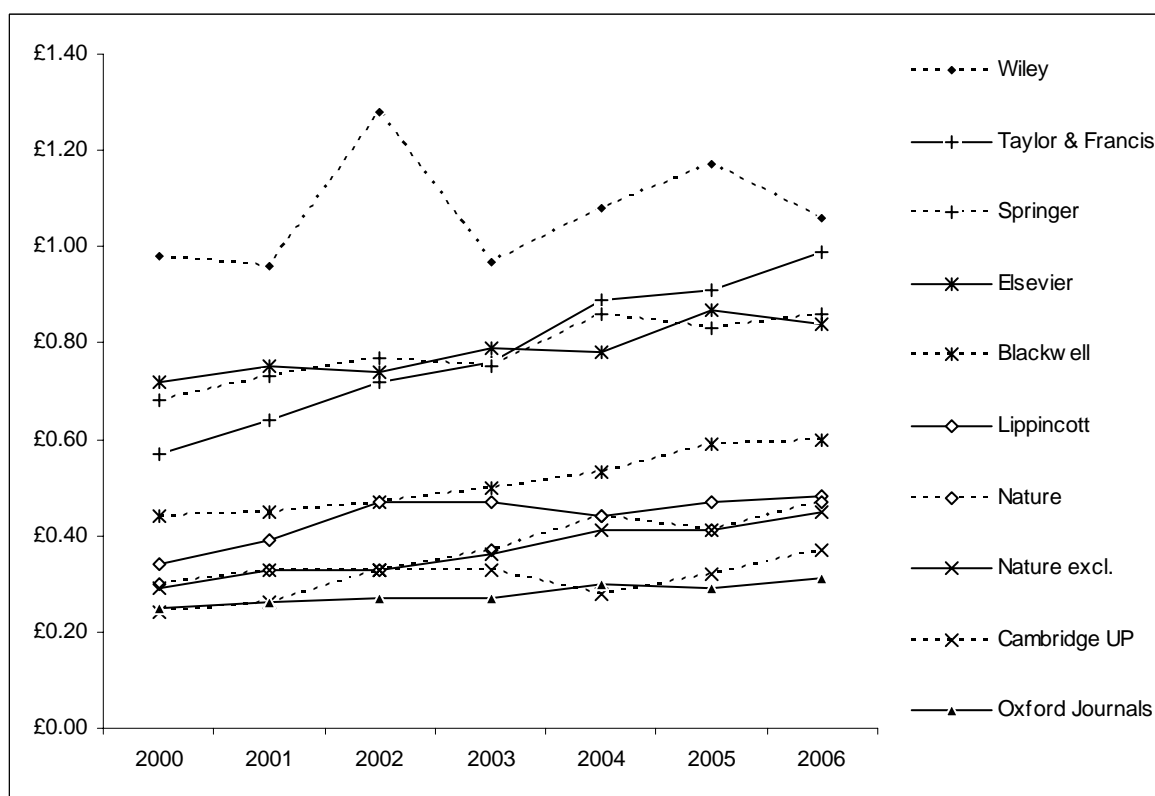
Trends in median prices. Median prices for biomedical titles vary greatly between publishers, from £198 for Cambridge University Press to £859 for Elsevier in the most recent year of the study (Fig 1). In addition, the range of increases over the period considered here varies widely amongst publishers: Oxford Journals made the smallest increase (41.5%) and Sage the greatest (104.4%). In monetary terms, increases ranged from £83 at Cambridge University Press to £298 at Nature (including *Nature* titles). Wiley showed a large increase in median journal price in 2002, followed by a decrease (of just over 11% on average) in 2003. It was beyond the scope of this study to investigate in detail how much this was influenced by the US dollar exchange rate and how much was due to pricing policy at Wiley; Table 3 gives the end of year exchange rates for Sterling against both the Euro and the US Dollar, for information.

Trends in price per page. Fig 2 illustrates the median price per page by publisher. Taylor & Francis shows the largest increase (75%), and Wiley the smallest (just over 8%). This compares with an increase of 16.1% in the Retail Price Index between January 2000 and January 2006. Over the seven-year period considered here, the publisher with the lowest price per page varies between Oxford Journals (2002, 27p; 2003, 27p; 2005, 29p; 2006, 31p) and Cambridge University Press (2000, 24p; 2001, 26p; 2004, 30p). Wiley had the highest price per page in every year of this study (£1.06 in 2006)

**Fig 1 Median overall journal prices, biomedical sciences**

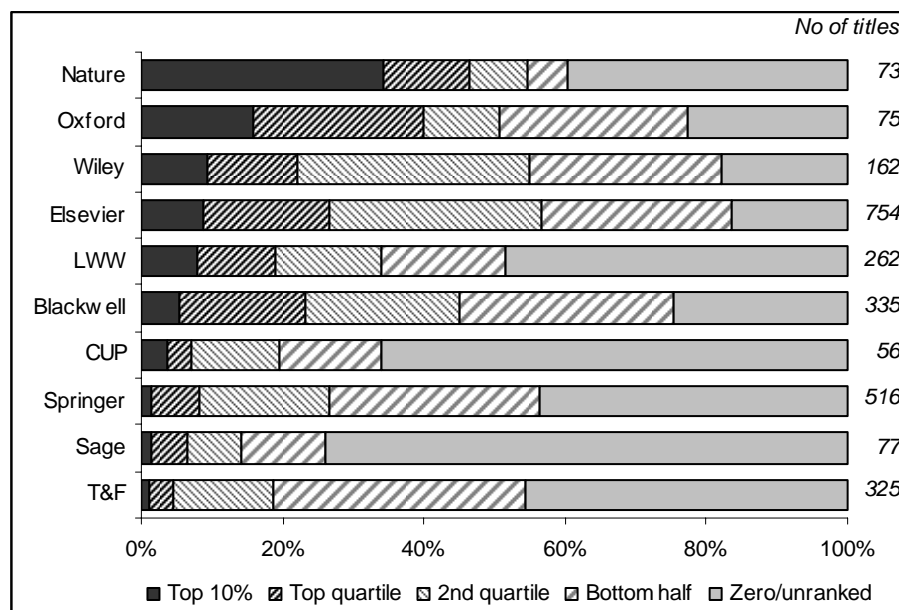


**Fig 2 Median price per page, biomedical sciences**



Analysis by 2005 impact factor. In total 3,219 biomedical titles were listed in the *JCR*, of which 3,190 had non-zero impact factors. The spread of journals by impact factor for the publishers included in this study is illustrated in Fig 3. Nature (including *Nature* titles) has the highest proportion of its titles (34%) in the top 10% of biomedical impact factors overall, and Taylor & Francis the lowest (1.2%).

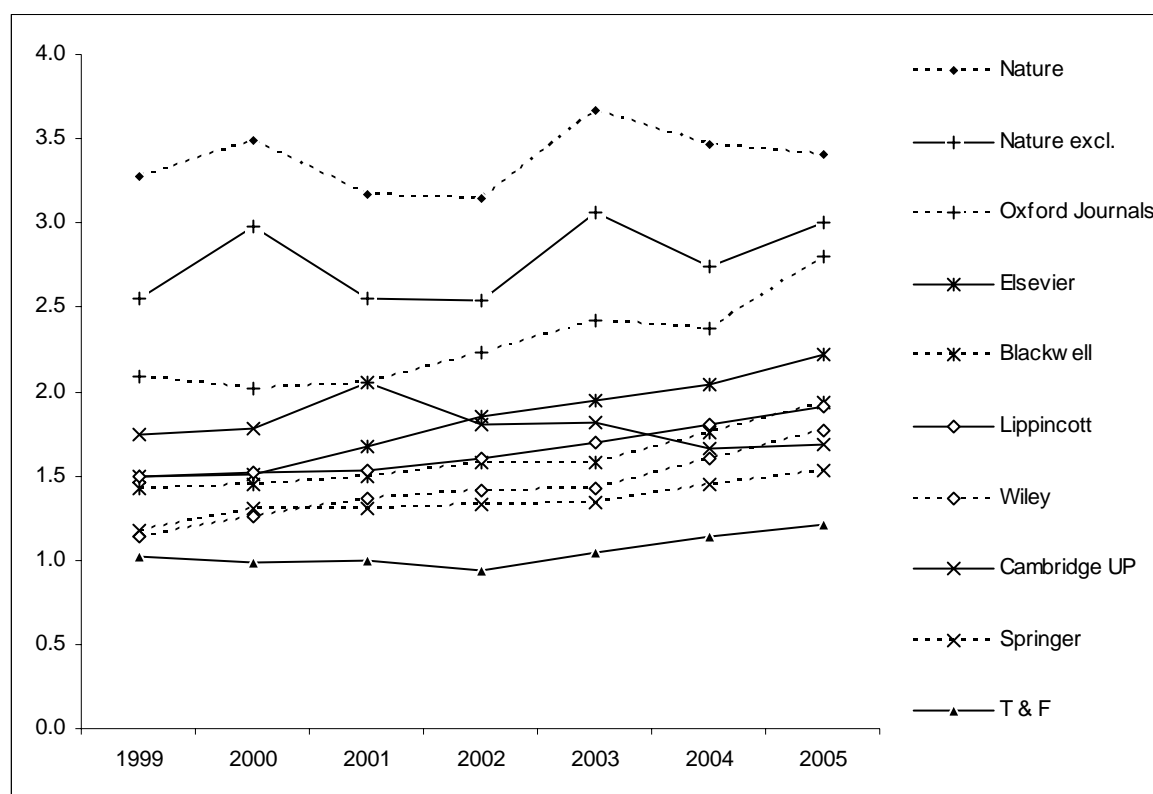
Fig 3 Journal ranking 2005 – biomedical sciences



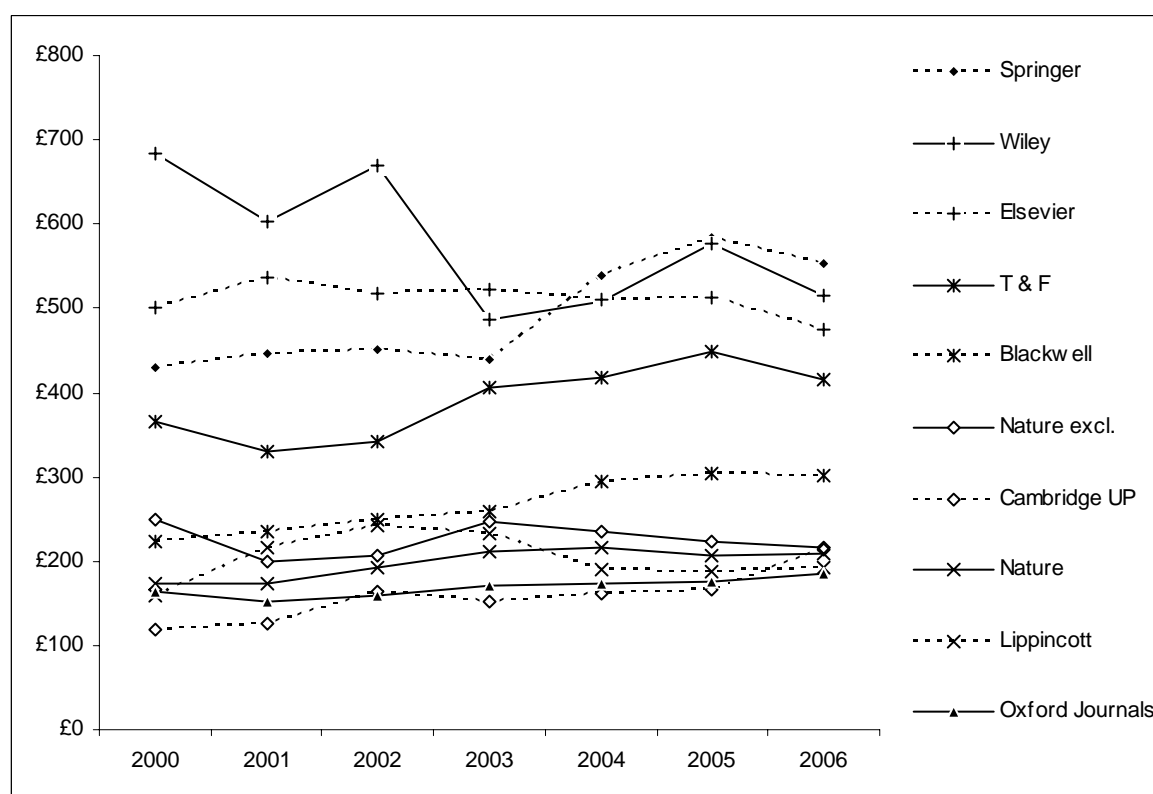
The range of impact factor values is very wide between publishers (Fig 4). In each year of the study, Nature has the highest median impact factor – whether or not the *Nature* branded titles are included. Taylor & Francis records the lowest median impact factor in every year of the seven-year period; Cambridge University Press is the only publisher to have a lower median impact factor in 2006 than in 2000 – although there are many fluctuations amongst the publishers over the seven years.

Trends in price per point of impact factor. Fig 5 illustrates the median price per point of impact factor and gives an alternative measure of value to the price per page analysis considered above. Again the figures illustrate that there is much variation both between as well as within publishers – most noticeably for Wiley. As has been discussed earlier, the variations in the exchange rate of the US dollar may have had some effect on the fluctuations in journal prices for Wiley. Cambridge University Press had the lowest median price per impact factor between 2000-01 and 2003-05, and Oxford Journals had the lowest in the remaining years.

**Fig 4 Median impact factor, biomedical sciences**



**Fig 5 Median price per point of impact factor, biomedical sciences**



## Social sciences

Trends in median prices. As with the biomedical journals discussed above, the median price of social sciences journals varies greatly between publishers, from just under £119 for the University of Chicago Press to £513 for Wiley in 2006 (Fig 6). The range of increases in median prices is wide: Elsevier shows the smallest increase (just over 47%), and the University of Chicago Press the largest (almost 120%). In monetary terms, the increases range from £43 at Cambridge University Press to £195 at Wiley.

Fig 6 Median journal prices, 2000-06 Social sciences

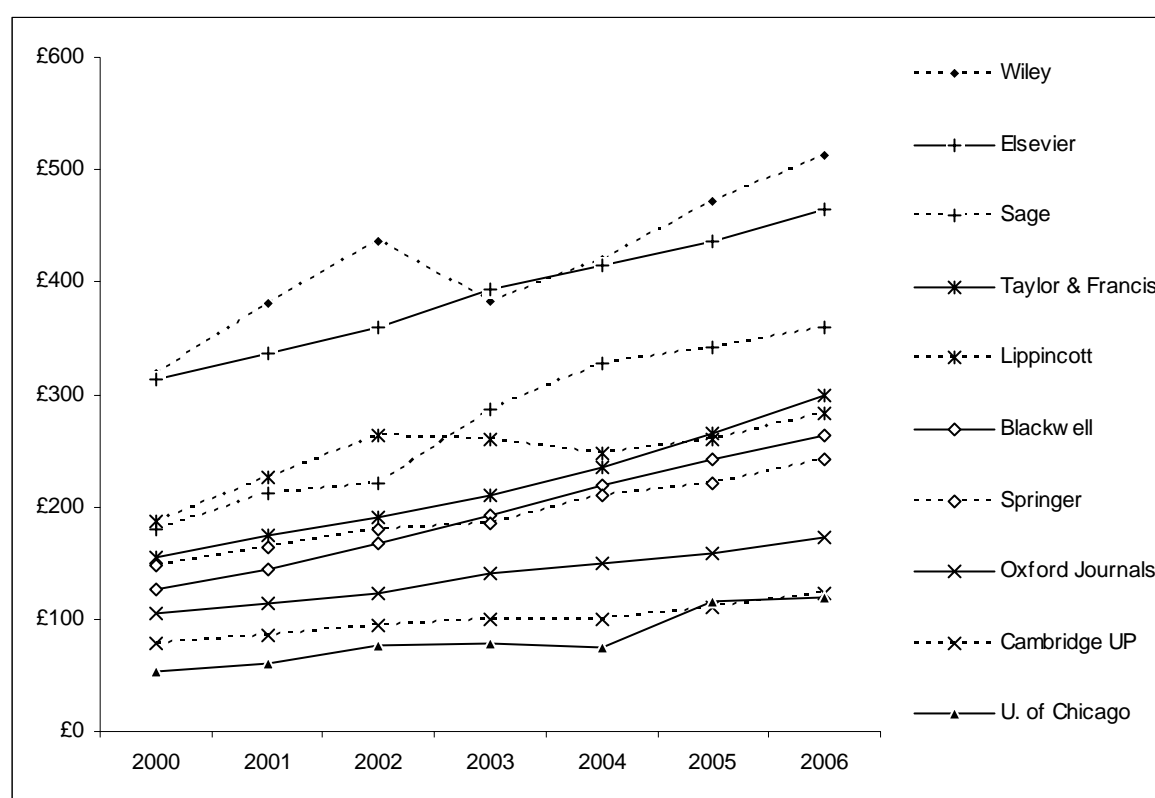


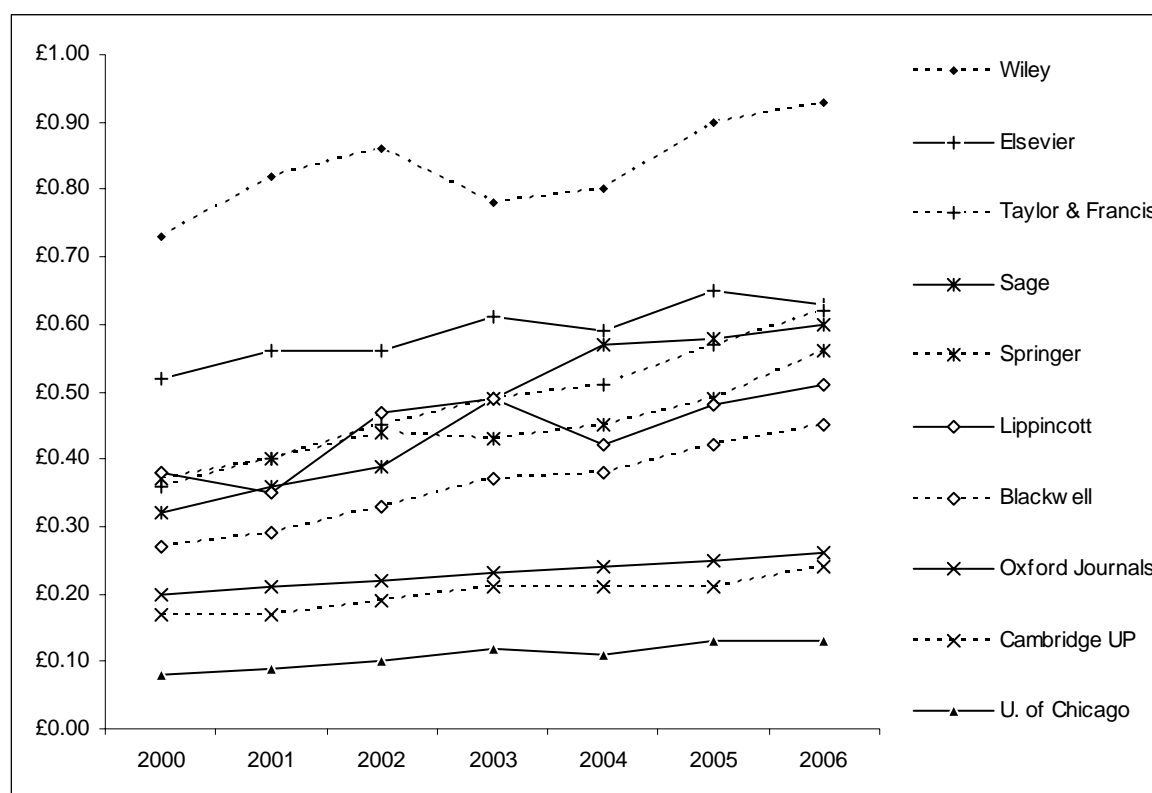
Fig 6 illustrates that all publishers have made year-on-year increases throughout the period 2000-06, except for Wiley and Lippincott, the median price of whose social sciences journals declined in 2003 and 2004 respectively. However, in the case of Wiley this decrease followed an increase of just over 14% in 2002, and, as has been noted in the section on biomedical sciences above, it was not possible to evaluate within the scope of the project how much of this was due to the fluctuation in the US dollar exchange rate and how much to Wiley's pricing policies.

Trends in price per page. There is much variation in median price per page between publishers (Fig 7): Wiley shows the highest price per page (93p in 2006) in each year considered here, and the University of Chicago Press the lowest – just 13p in 2006. The

range of increases in the median price per page varies between publishers over the seven-year period; Elsevier shows the smallest increase (just over 20%) and Sage the greatest (almost 91%). Elsevier is the only publisher which showed a drop in price per page in 2006 (3% less than in 2005).

It is important to note that the price per page calculations for Lippincott are based on only 14 journal titles and so changes affecting a small number of titles could therefore lead to large fluctuations in the median – as illustrated by Fig 7.

Fig 7 Median price per page, social sciences



Analysis by 2005 impact factor. For the social sciences, 1,900 titles were included in *JCR*, of which 1,888 had non-zero impact factors. Elsevier has the highest proportion (9.7%) of titles in the top 10% of impact factors overall, and Sage the lowest (0.6%) (Fig 8).

The range of values, both for the median impact factor and for its increase between 2000 and 2005, varies greatly amongst publishers (Fig 9). For each year considered here Lippincott has the highest median impact factor (between 43% and 96% higher than the next highest publisher). This may appear contradictory, given the relative positions of the publishers in the 2005 impact factor rankings (Fig 8), but is influenced by the high proportion of Lippincott journals without impact factors. The lowest median impact factor fluctuates between four different publishers; however, Taylor & Francis has the lowest in 2000, 2002

and 2005. The University of Chicago Press actually experienced a slight decrease (0.1%), while Elsevier had the highest increase (75.6%).

Fig 8 Journal ranking 2005 – social sciences

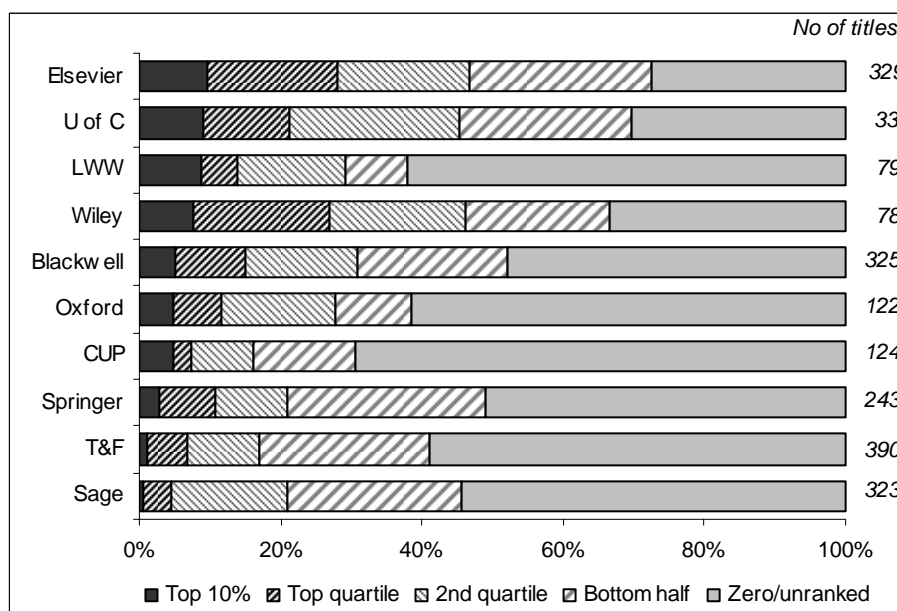
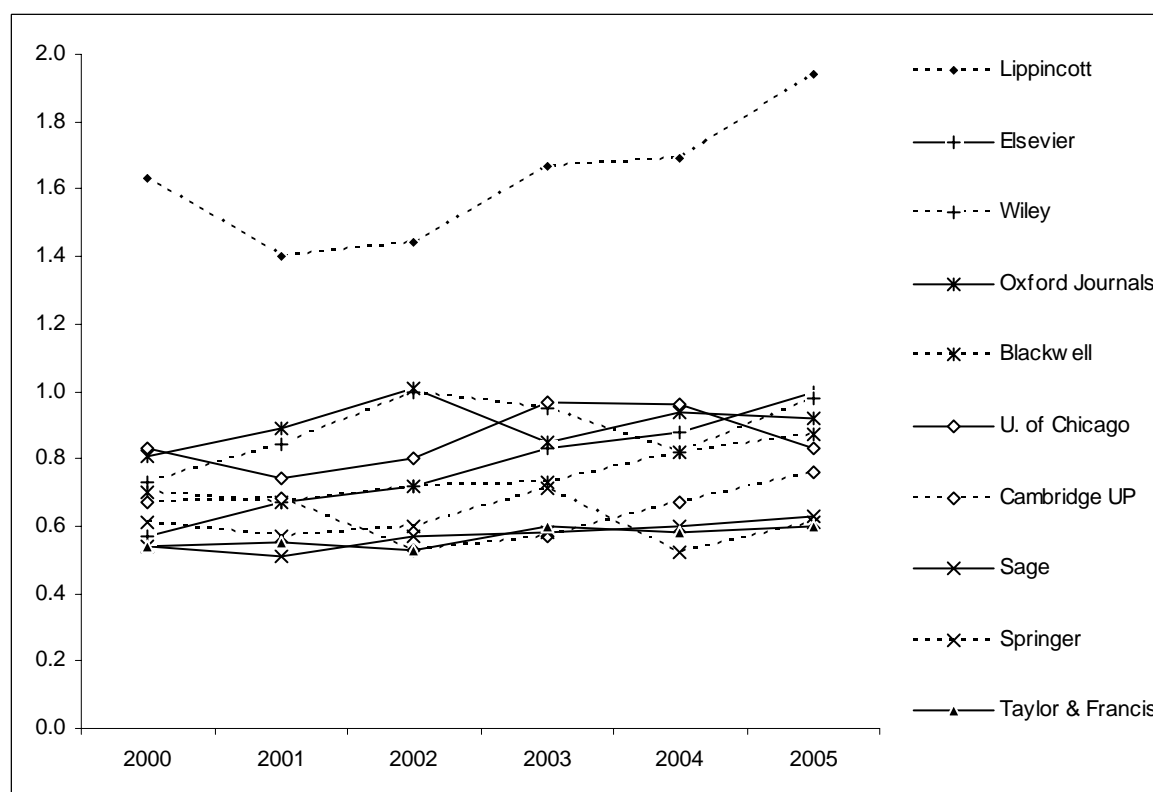
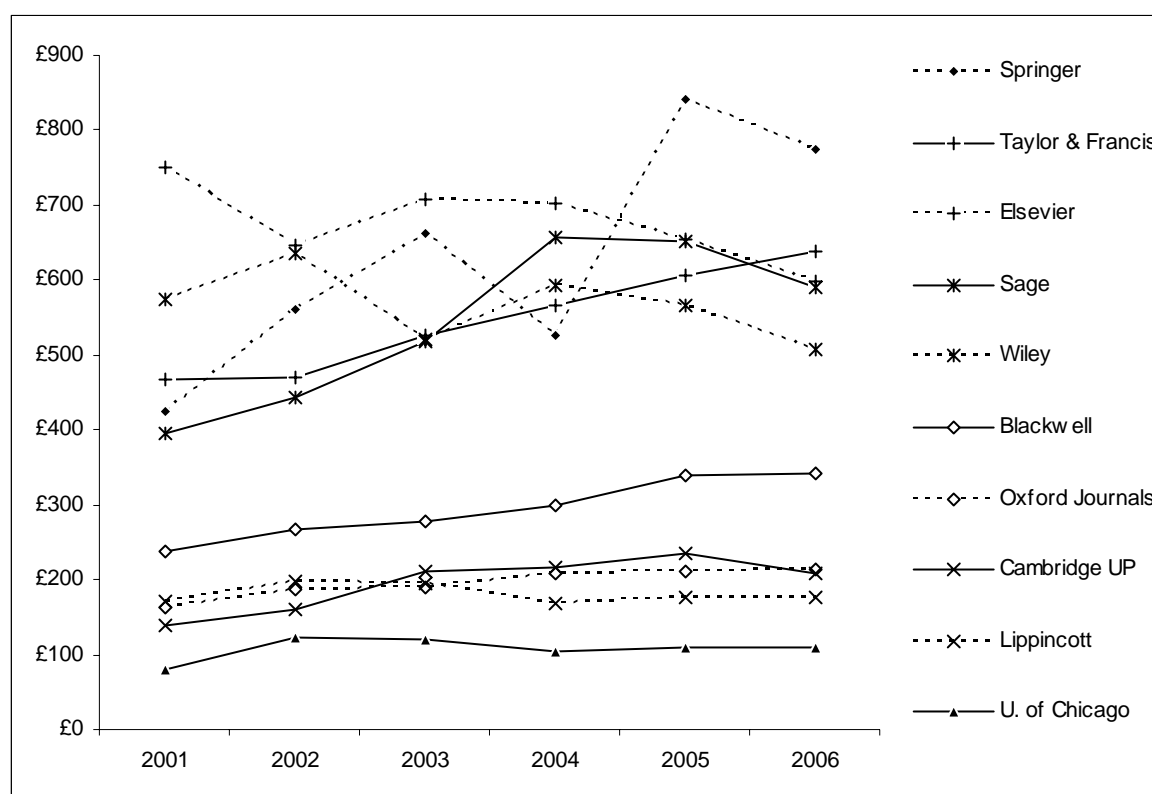


Fig 9 Median impact factor, social sciences



Trends in price per point of impact factor. No one publisher stands out as having a consistently higher or lower price per point of impact factor (Fig 10). Again, however, there is much fluctuation within as well as between publishers. Springer in particular shows wide fluctuations in median price per point of impact factor between 2000 and 2005; however, it is important to emphasise that the calculations are based on a small number of journals and so large increases or decreases in a handful of journals could skew the overall picture somewhat.

Fig 10 Median price per point of impact factor, social sciences



## Summary

For this analysis two subject areas have been examined in depth – biomedical sciences and social sciences. Analyses have been carried out on overall institutional subscription price, price per page, and price per point of impact factor. The size of a journal is one factor used in determining price, and analysis of price per page allows a fairer comparison of price between journals whose extent may differ by a factor of 100.

The Research Assessment Exercise in the UK, and similar regimes elsewhere, have become a key determinant of departmental funding; academic authors and readers are therefore focussed on the 'most important' journals in their subject area, and the impact factor of a



journal has become a key measure of its importance, particularly in scientific disciplines. Librarians have therefore had to take the impact factor into account in calculating the relative value of journals. Using price per point of impact factor as a measure of relative value, rather than price per citation, has the advantage that journal size is not a confounding factor in the analysis.

It is important to note that journal subscription prices are determined by a number of factors, of which size (number of articles or number of pages) is only one. Other factors, beyond the scope of this study, include circulation and alternative sources of revenue, such as individual subscriptions or advertising. A journal in a particularly narrow specialist area, with low institutional circulation and little or no other revenue, is likely to be much more expensive than one with a wider appeal which may have both greater institutional circulation and considerable individual subscriptions and other revenue. These are areas where further investigation and analysis would be valuable.

In interpreting these analyses it is important to note that price per impact factor is a measure which has a particularly wide range. Impact factor can be very low – in 2005 the lowest (non-zero) values were 0.018 in biomedical sciences and 0.008 for social sciences. In such cases, whatever the actual subscription price, the price per point of impact factor will be very high.

Impact factor levels also vary between subjects; those in the social sciences tend to be considerably lower than those in biomedical sciences, owing to the ways in which scholars in the two areas disseminate information. Andersen<sup>7</sup> reports that only a quarter of social sciences dissemination is via journal articles, compared to two-thirds in natural science and medicine. In 2005, the highest journal impact factor in social sciences was 12.685, compared to 49.794 in biomedical sciences.

There is clearly also wide variation between publishers in the relative prices of their journals, and a wide variation was also found within each publisher's titles. There is some evidence to suggest that not-for-profit publishers may offer better value for money in terms of price per page and price per point of impact factor than the commercial houses, but this is not conclusive. For biomedical titles, Fig 2 and Fig 5 show a clear distinction between the four publishers with the highest price levels - all of them commercial - and the rest, which include the two not-for-profit publishers. For social sciences, the picture is a little more clear-cut; not-for-profit publishers have the lowest median prices per page throughout (Fig 7), and three of the four publishers with the lowest median price per point of impact factor are also not-for-profit (Fig 10). This is in line with results from previous studies<sup>8, 9</sup>.

It would be interesting to continue these series of analyses, and to extend the range of subjects covered. There is scope for adding future data to yield some potentially very interesting long-term studies, although the changing nature of scholarly publishing may necessitate a revision of the methodology as most journals are published electronically, and print only options are becoming rarer. The development of open access models, transferring the costs of publishing from the consumer to the producer of scholarly material, is likely to introduce a further complication. Libraries base their purchasing decisions on more than price alone, and introducing data on actual levels of use would further illuminate this complex area.

### Acknowledgements

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