Exchange rate profiteering and cost-effectiveness of physics journals.

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My original intent, when I talked with Bob about my contribution to this program, was to discuss the appearance of exchange rate profiteering by European commercial publishers. I had presented a paper on this topic, last summer, at the IATUL meeting in Kansas City(1) and thought that this might be a good time to provide an update. However, during the past year, I have been thinking about new ways of looking at the cost-effectiveness of journals, and have some data to present on that subject as well.

In regards possible exchange rate profiteering, I would like to accept Elsevier's assurances that they are not unfairly profiting from a change in their US$ pricing policy, which was first applied to the Year 2000 subscriptions. It appears, however, that if US$ subscription rates were set according the pre-2000 policy, which were based on prevailing foreign currency exchange rates, the prices paid by US libraries from 2000 thru 2003 would have been substantially less.

First, let's look at US$ subscription rates for 1997 thru 1999, which were based on prevailing US$/Guilder exchange rates.

Table 1a. Exchange rate US$ subscription prices 1997-1999

	1997	1998	1999
Nuclear Physics/ Complete	$17,222	$18,102	$18,042
Physica Complete	$14,428	$15,047	$15,048
US$ cost NLG	$0.612	$0.559	$0.495

The reason why the US$ rates were relatively level, even though the Guilder price had increased each year, was a result of the increasing strength of the US$. As you can see .. on the third line .. the US$ cost of a Guilder dropped from 61 cents for 1997 to about 50 cents for 1999.

Now, let's look at the figures for 2000 thru 2003. In Table 1b, you see the US$ prices for these two journal packages, along with the price (in parens) we could have paid, if it had been set according to the pre-2000 exchange rate pricing policy.

Table 1b. Comparison of actual US$ & (exchange rate US$ subscription prices).

Journal/Year	2000	2001	2002	2003
Nuclear Physics/	$19,396	$20,701	$22,047	$23,701

Complete	($19,372)	($18,556)	($17,638)	($19,002)
Physica	$16,177	$17,266	$18,451	$19,898
Complete	($16,158)	($15,476)	($14,757)	($15,593)
US$ cost NLG	$0.507	$0.455	$0.406	$0.407

As you can see, the pre-2K pricing policy would have resulted in substantial savings for US libraries (about 15% per year on average). This, again, because of a decline in the US$ cost of a Guilder, from about 51 cents for 2000 to about 41 cents for 2003.

One might argue that an additional charge, of about 15% a year over four years, is a small price to pay for "moderated and more predictable level of price increases" (i.e., Elsevier's promise of a less than 10% per year increase). However, if you are spending about $1M per year (as Caltech is on Elsevier journals), and assuming half of it is spent on Dutch and Swiss published titles, this would suggest that Caltech may have paid an additional $300K over the past four years as a result of the Y2K policy change.

I have known and respected many people associated with European commercial publishers over the years. In fact, I actually stood up in a public meeting during the serials crisis in the mid-1980s and defended both Elsevier and Springer, pointing out that librarians needed to differentiate between irresponsible and responsible commercial publishers and not castigate commercial publishers as a group, as a result of their experiences with Gordon & Breach.

I am also not making any accusations. I would only suggest that allowing the perception of over-pricing and exchange rate profiteering to continue, will certainly have a negative effect on companies involved. These perceptions, combined with overly restrictive policies for accessing full text articles electronically, already seems to be influencing Caltech authors in their submission choices.

For example, in Table 2, the percentage of nuclear and particle physics papers by Caltech authors in commercially published journals has significantly decreased in the last 6 years.

Table 2. Decreasing percentage of commercially published articles by Caltech Authors (1997-2002)

	1997/98	1999/00	2001/02
	(60%)	(41%)	(36%)
Nucl. Phys. A	14	15	9
Eur. Phys. J. A	1	1	1
Phys. Rev. C	10	23	18
	(34%)	(22%)	(19%)
Nucl. Phys. B	39	23	26
Eur. Phys. J. C	3	6	6
Phys. Rev. D	82	77	110
J. High Energy Phys.	1	27	27

While this is obviously a small sample, it should also be obvious that concerns about excessive subscription costs for commercial journals, coupled with the ease of electronic access and availability of extensive backfiles for non-commercial journals, would begin affecting publication choices for authors.

I am now going to say a few words about the cost-effectiveness of journal articles, but would first like to suggest a moment of silence in memory of Henry Barschall, whose pioneering efforts on this subject, in the face of completely unwarranted criticism and lawsuits, is very gratefully appreciated … I'm sure by all of us.

I would also like to pay tribute to Ken Frazier and Ken Rouse's work at the University of Wisconsin-Madison. Their efforts, in continuing Barschall's analysis, inspired me to think about cost-effectiveness in a new way. I also want to thank Bernd-Christoph Kaemper at the Universitätsbibliothek in Stuttgart, for his encouragement, and Bob Michaelson whose counsel and help with data collection is very greatly appreciated.

Author subsidization of journal publication, through page charges, has steadily eroded over the past forty years, largely because of the no page-charge policies of commercial publishers. Both the American Chemical Society and American Physical Society, however, have recently dropped page charges, completely transitioning to the 'reader pays' model. This has had the unintended effect of allowing journal subscription rates for society publications to now be directly compared with those of commercially published journals, and encourages a comparison of their relative cost-effectiveness.

TABLE 3a. Cost and impact data for solid state, nuclear and particle physics articles (2001).

2001	articles	Cost	C/A	IP
Phys. Rev. B	4725	$5130	$1.09	3.070
Physica B	787	$4951	$6.29	0.663
J. Phys. 'C'	1061	$7480	$7.05	1.611
Eur. Phys. J. B	373	$4139	$11.10	1.811
Phys. Rev. C	797	$1385	$1.74	2.695
Nuclear Physics A	1151*	$8300	$7.21	2.074
J. Phys. G	236	$2527	$10.71	1.182
European Phys. J. A	132	$2583	$19.57	1.725
Phys. Rev. D	1955	$2770	$1.42	4.363
J. High Energy Phys.	447	$900**	$2.01	8.664
Nuclear Physics B	692	$12598	$18.21	6.593
European Phys. J. C	280	$6113	$21.83	5.194

* (please note that 33 of 68 issues were conference proceedings papers)
**(please note that JHEP was free in 2001. The 2003 price was $900)

Table 3a gives cost/article and ISI Impact Factor data for groups of comparable physics journals in 2001. For solid state physics journals, the cost/article varies from about $1 for Phys. Rev. B to about $11 for the European Physical Journal B, with even greater variations for nuclear and particle physics journals.

In an attempt to formulate a clearer, more illustrative metric for determining cost-effectiveness, normalized values for the ratio of 'cost/article' to 'impact factor' were calculated for equivalent physics journals and are shown in Table 3b.

TABLE 3b. 2001 Cost-Effectiveness data for solid state, nuclear and particle physics journals.

2001	(C/A)/IP	N(C/A)/IP
Phys. Rev. B	0.36	1.00
J. Phys. 'C'	4.38	12.12
Eur. Phys. J. B	6.13	17.03
Physica B	9.49	26.36
Phys. Rev. C	0.65	1.00
Nuclear Physics A	3.48	5.35
J. Phys. G	9.06	13.94
European Phys. J. A	11.35	17.46
J. High Energy Phys.	0.23	1.00
Phys. Rev. D	0.33	1.44
Nuclear Physics B	2.76	12.00
European Phys. J. C	4.20	18.26

IP = 2001 ISI Impact Factor
(CA)/IP = (Cost per article) per Impact Factor
N(C/A)/IP = Normalized (Cost/Article) per Impact Factor = Cost-Effectiveness

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These values are analogous to previous work by Barschall and Rouse, but differ in that the value of each journal's cost-per-article per Impact Factor is normalized to a baseline journal. Normalization is simply the rescaling of a set of values, e.g., dividing each journal's (C/A)/IP Factor by the value for a baseline journal. This results in the baseline journal having an relative value of 1 and quickly provides a rescaled and more easily understandable comparison, with the other journals.

When discussing journal costs and article quality with faculty members or administrators, it is very important to compare journals publishing equivalent information. Previous studies on journal costs and effectiveness focused on fairly general subject areas and, for that reason I feel, did not receive the attention they richly deserve.

Assuming that the normalized ratio of the Cost/Article to the ISI Impact Factor [N(C/A)/IP] is an effective cost-effectiveness metric, one could conclude that (in 2001) solid state physics information in the *Physical Review B* was over 26 times as cost-effective as presumably similar information packaged in *Physica-B*. Similarly, “nuclear physics” information packaged in the *Physical Review C* was nearly 14 times as cost

effective as that in *Journal of Physics-G,* and “particle physics" information packaged in the *Journal of High Energy Physics* was over 18 times as cost effective as that in the *European Physical Journal-C.*

Additional comparisons can be made by renormalizing to a different baseline journal. For example, “solid state physics” information packaged in *Journal of Physics-Condensed Matter* was just over twice as cost-effective as that in *Physica-B*. Similarly, “particle physics” information in *Physical Review D* was just over 8 times as cost-effective as that in *Nuclear Physics-B*.

Assuming *Physical Review-D* is over 8 times as cost effective as *Nuclear Physics-B,* suggests that to be as cost-effective as *Physical Review-D*, *Nuclear Physics-B*'s 2001 subscription cost should have been $1575 (instead of over $12K). This comparison is even more surprising since the subscription price, paid by large academic libraries for *Physical Review* includes multiyear electronic access, where as subscriptions to *Nuclear Physics* only include only one-year, rolling-window, electronic access.

These dramatic differences--in article costs, impact factors, cost-effectiveness and electronic access--should serve as a warning for the 2004 subscriptions. The US$ cost of a EURO has increased over 25% since May of last year(2). It will be interesting to see how European commercial publishers deal with this very dramatic increase. While Elsevier has made a commitment to keep their annual US$ price increases under 10%, other commercial publishers have been silent.

There should also be concern about decreasing content. I raise this question because of the example of Wiley's Biopolymers, which has more than doubled in price from 1996 to 2001 ($2723 to $6,003) and, believe it or not, decreased the total number of published pages. This is obviously an extreme example, with the cost per page rising 125% in the same period ($1.16 to $2.61).

If all this were not enough, we now hear from the group that proposes to purchase BertelsmannSpringer, that (and I quote) …"Cinven and Candover have stated their intention to increase … the profit margin to 38 percent, in line with Elsevier Science. While operating efficiencies will likely contribute part of the rise, experience following other mergers in the industry shows that returns are likely to be driven by price increases, as well."(3)

In conclusion, society publishers (such as the APS and ACS) have clearly shown that recruiting editors and reviewers, managing the editorial process, maintaining an electronic infrastructure, and processing subscriptions and advertisements can be accomplished at a very reasonable cost. However, the significant role that share-holders, stock prices and management bonuses now play, in the economics of commercially published journals, has resulted in subscriptions costs that are no longer either justified or sustainable.

In this regard, I would like to pass along a thought from Scott Bedbury (the advertising executive behind the mystique of Nike and Starbucks), who was quoted in March 2002 issue of Southwest Airlines' Spirit magazine. Bedbury has a 'Brand Man's Mantra' that is hopefully worthy of consideration. "Show genuine compassion. No one wants to work for or patronize an Evil Empire, and bad karma is one enormous boomerang that knows where you live"…

1. Roth, Dana L. "Differential Pricing and Exchange Rate Profits". IATUL Meeting, 2002. http://caltechlib.library.caltech.edu/archive/00000044/00/IATUL.2002.sentrev.pdf

2. Oanda.com - FXHistory: historical currency exchange rates http://www.oanda.com/convert/fxhistory

3. Press Release - **Libraries Urge Justice Department to Block Cinven and Candover Purchase of BertelsmannSpringer**
http://biz.yahoo.com/bw/030530/305485_1.html