

The Promise of Value-based Journal Prices and Negotiation: A UC Report and View Forward

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Abstract

In pursuit of their scholarly communication agenda, the University of California ten-campus libraries have posited and tested the case that a journal's institutional price can and should be related to its value to the academic enterprise. We developed and tested a set of metrics that comprise "value-based pricing" of scholarly journals. The metrics are the measurable impact of the journal, the transparent measures of production costs, the institutionally-based contributions to the journal, such as editorial labor, and the transaction efficiencies from consortial purchases. Initial modeling and use of the approaches are promising, leading the libraries to employ and further develop the approaches and share their work to date with the larger community.

1. Background

Comprehensive access to the expanding volume of scholarly materials necessary for research and teaching is at risk. Trends in scholarly publishing, especially commercial publisher business models that result in the high rates of subscription price increases of the cost of scholarly material, limit the ability to maintain the breadth and depth of library collections and reduce exposure to, and impact of, scholars' work. The University of California Libraries are key actors in the university's response to the economic dysfunctions of scholarly communication systems,² developing a program of strategic actions to produce change.

Collectively, the ten-campus UC libraries materials budget is approximately \$64 million. With the assistance of the California Digital Library, UC cooperatively expends over \$27 million on digital resources made available to the entire UC community. One of the strategic priorities of the UC libraries is to leverage their market buying power in order to advance economically balanced and sustainable scholarly communication systems. An explicit goal of the UC scholarly communication program is to influence the journal pricing market, which has been based on high rates of subscription increases for scholarly materials.³ This goal has broad and crucial support from UC faculty and administrators.⁴

¹ The CDC charge and members list is at <http://libraries.universityofcalifornia.edu/cdc/>.

² <http://libraries.universityofcalifornia.edu/scholarly/>

³ See, for example, the Association of Research Libraries' *Journal Prices and Library Budgets* website, <http://www.arl.org/osc/marketplace/jnlprices.html>

⁴ See, for example, *The University's Role in Fostering Positive Change in Scholarly Communication*, March 10, 2005 (http://www.slp.ucop.edu/consultation/slasiac/SLASIAC_Resolution_1.html) and *Responding to the Challenges Facing Scholarly Communication: The Case of Journal Publishing*, April 2006 (<http://www.universityofcalifornia.edu/senate/committees/scsc/reports.html>).

In carrying out that goal, the 11 university librarians directed the UC systemwide library collection development committee (CDC) to evaluate options to reduce and control prices for online scholarly journal packages. In pursuing its charge, the CDC developed principles and methods that hold promise for aligning the purchase or license (lease) costs of scholarly journals with the value they contribute to the academic enterprise. Collectively labeled “value-based pricing,” these methods have the potential to a) fundamentally alter the price upon which a UC consortial license or purchase of scholarly journals is based, and b) reduce and stabilize annual price increases associated with any contract to levels that are reasonable in terms of value received and institutional purchasing power.

We are sharing the results of this work to date in order to help foster change toward sustainable pricing, to alert stakeholders within and external to the university of our intentions, and to encourage others to contribute to the discussion and the modeling of value-based journal pricing.

2. Rationale

The forces that create an unsustainable system of scholarly communication have been well documented. The subscription-based model for acquiring access to scholarly journals has been characterized by relentlessly rising subscription prices and the continual (i.e. inelastic) demand by library users. The challenges of a dysfunctional marketplace for journals include:⁵

- the entry into, and dominance in some fields, of commercial, profit-making publishers, whose profit motivated and related business models are arguably at odds with the mission of the broadest possible dissemination of research results;
- difficulties in discerning basic production costs for scholarly publications, given donated scholarship, donated labor (e.g. for peer-review and editing), and fixed and development costs for print and online production, all of which vary from journal to journal;⁶
- under-informed and inelastic demand on the part of the readers (i.e. “consumers”) of scholarship, resulting in correspondingly inelastic purchasing behavior by libraries.

Conveying these challenges to users has been complicated by the fact that libraries have acted as the institutional intermediaries between publishers and readers of scholarship. As a consequence of this necessary role, the readers (i.e. “consumers”) have largely been shielded from the cost increases and market dynamics.

⁵ See, for example, McCabe, Mark. *Academic Journal Pricing and Market Power: A Portfolio Approach*. November 2000; available at <http://www.prism.gatech.edu/~mm284/JournPub.PDF> and Ted Bergstrom’s Journal Pricing Page at <http://www.econ.ucsb.edu/~tedb/Journals/jpricing.html>.

⁶ For a recent description of these production cost challenges, and their particular effect on scholarly society publishing, see Crow, Raym. *Publishing cooperatives: An alternative for non-profit publishers*. *First Monday*, Volume 11, Number 9 — 4 September 2006. http://www.firstmonday.org/issues/issue11_9/crow/index.html.

The UC libraries' pursuit of value-based pricing is part of an ongoing effort to overcome these marketplace challenges and obtain reasonable prices in line with institutional capacity. In developing this model, we hope to shed more light than heat and further the community-wide discussion. We have tried to focus that discussion by answering the question: "How can we establish, validate, and communicate an explicit method for aligning the purchase or license (lease) costs of scholarly journals with the value they contribute to the academy and the costs to create and deliver them?" In pursuing the answer, the libraries fully expect to develop new expectations and terms for contract negotiations with publishers, and to respond to specific calls made by the UC faculty for deeper understanding of the economics of scholarly publications.⁷

It is important to point out that value-based pricing is assumed to be only one tool or strategy used – hopefully through partnerships among all of the major stakeholders in scholarly publishing – to address difficult economics. We believe it is likely that value-based pricing can address market inelasticity by creating an explicit metric with which to characterize value. Of course a value metric would ideally include quantitative measures of local value and would complement and aid, not replace, the expert combined judgments of library selectors and faculty consultants. With value metrics, libraries can more confidently select high-value materials and cancel (or pay appropriate prices for) low-value materials and can more directly demonstrate the rationale for these choices to the faculty. Value-based pricing can be a vehicle through which student and faculty consumers become more directly aware of the difficult decisions made on their behalf by their libraries. The UC libraries also support the development, real-world testing, and proliferation of successful alternative business models that maximize access and minimize costs. These include, but are not limited to, "producer pays" and other open access approaches, such as those pursued by SPARC

3. The Elements and Methodology of Value-Based Pricing

Our model of value-based pricing assumes that prices could and should be set, or negotiated, not solely through an arbitrary producer-set price point (in which little is known to the library about publisher assumptions and expectations for generating revenue above operational costs), but rather, in relation to four key elements:

- a. measures of scholarly value and impact;
- b. transparent and explicit indexes for changes in production costs;
- c. value-adding contributions from the purchasing/leasing institution (e.g. for original content, editorial labor, editorial overhead such as office space);
- d. transaction efficiencies (e.g. through business negotiations with a library consortium; through near-zero marginal costs for an additional user).

⁷ See *Responding to the Challenges Facing Scholarly Communication: The Case of Journal Publishing*, April 2006 (<http://www.universityofcalifornia.edu/senate/committees/scsc/reports.html>).

a. Alternative base prices that account for scholarly value

To develop a value-based pricing model, we used the recent journal cost effectiveness research and data produced by Ted Bergstrom and Preston McAfee.⁸ The Bergstrom-McAfee approach, which calculates and mathematically combines price-per-citation and price-per-article, draws upon and extends similar work whose lineage starts with the 1986 study of physics journals by Henry Barschall.⁹ The key Bergstrom-McAfee extensions involve scope, the combination of two easily calculable metrics, and disciplinary relevance. Bergstrom-McAfee used source data from ISI-Thomson to cover 6,900 journals in all fields. They mathematically combined a journal’s price-per-citation and price-per-article to create a “Composite Price Index.” They then compared that index with the median composite price index for non-profit journals in the same discipline to create a *Relative Cost Index (RCI)*, i.e. the price-per-citation and price-per-article *relative to* the same measures for non-profit journals in the same discipline.

In the Bergstrom-McAfee approach, a journal whose combined price per article and price per citation is exactly the same as the median value for non-profit journals in the same discipline would have a *Relative Cost Index* of 1.0. Journals with RCI values near or below 1.0 would provide “good value.” Journals with RCI values much above 1.5 would provide “low value.”¹⁰

The example below shows source information for two hypothetical chemistry journals and their RCI based on Bergstrom-McAfee’s 2006 analysis of non-profit chemistry journals. The *Journal of B* has a price double that of the *Journal of A* and produces half as many articles and half as many citations. It compares unfavorably with non-profit chemistry journals, which have a median Composite Price Index of 1.97, and therefore has a high RCI score.

<i>Journal</i>	<i>Institutional Price*</i>	<i>avg # of articles**</i>	<i>avg # of citations**</i>	<i>Price/article</i>	<i>Price/citation</i>	<i>Composite Price Index‡</i>	<i>Relative Cost Index†</i>
Jrnl of A	\$225	72	200	3.12	1.12	1.87	.95
Jrnl of B	\$450	36	100	12.50	4.50	7.50	3.81

Table 1: Relative Cost Index (RCI) calculation for two hypothetical chemistry journals

* e.g. derived from Ulrich’s 2006 price data (as Bergstrom-McAfee did for their Journal Cost-Effectiveness 2006 data)

** over 5 years from 2000-2004 (as Bergstrom-McAfee did for their Journal Cost-Effectiveness 2006 data)

‡ the geometric mean of price/article and price/citation

† based on 69 non-profit chemistry journals with median price/article of 2.95, median price per citation of 1.12, and median Composite Price Index of 1.97. Bergstrom-McAfee’s calculations for 174 for-profit chemistry journals show a median price/article of 14.60, a median price/citation of 6.917, and a median Composite Price Index of 9.78.

⁸ <http://www.journalprices.com>

⁹ Barschall, Henry. “The Cost of Physics Journals,” *Physics Today* 39, no. 12 (1986): 34–36. See also The University of Wisconsin’s follow-up work, reported in *Measuring the Cost Effectiveness of Journals: The Wisconsin Experience ARL Bi-monthly Report 205*, August 2000. <http://www.arl.org/newsltr/205/>

¹⁰ The value of a journal (either “good” or “bad”) does not necessarily refer to the caliber and quality of the research and content of the journal but rather refers to a journal’s Composite Price Index relative to the median Composite Price Index for non-profit journals in the same discipline.

Our modeling of value-based prices used Bergstrom-McAfee’s work to progressively “discount” list prices for journals with high RCI scores, i.e. to calculate a discount from the institutional list price when their combined costs per-citation and per-article were significantly higher than the median non-profit journal in the same discipline. Higher Relative Cost Index scores, indicating a journal further from the median price/article and price/citation of non-profit journals in the same discipline, were more heavily discounted. (Table 2 shows the results for our hypothetical chemistry journals.) In two test cases of commercial publishers with large title lists, this yielded list price discounts in the range of 40% and 50% for the entire list of journals for which RCI data was available. If successfully employed in a purchase or license negotiation, these base prices would very likely yield larger and more defensible discounts than ad hoc “better than list price” negotiations.

<i>Journal</i>	<i>Institutional Price</i>	<i>Relative Cost Index</i>	<i>Discount*</i>	<i>Value-based price</i>
Jrnl of A	\$225	.95	0%	\$225
Jrnl of B	\$450	3.81	30%	\$315

Table 2: Value-based prices derived from Relative Cost Index (RCI) discounts for two hypothetical chemistry journals

* e.g. if, hypothetically, discounts were assigned at 0% for RCI 0-2.0; 20% for RCI 2.0-2.9; 30% for RCI 3.0-4.0; 40% for RCI 4.0-4.9; 50% for RCI of 5.0-9.9; 60% for RCI 10.0-14.9; 60% for RCI ≥ 15.0

We also used the Bergstrom-McAfee data, along with ISI citation data, to calculate a value-based price for a journal that is the product of the median price per citation for non-profit journals in the field times the average number of citations that journal generated over five years. (Table 3 shows the results for our hypothetical chemistry journals.)

<i>Journal</i>	<i>Institutional Price</i>	<i>Avg # of citations</i>	<i>Median price per citation non-profit chemistry journals</i>	<i>Effective discount</i>	<i>Value-based price</i>
Jrnl of A	\$225	200	1.12	0%	\$224
Jrnl of B	\$450	100	1.12	75%	\$112

Table 3: Value-based prices derived from number of citations for two hypothetical chemistry journals

In the first commercial publisher test case, this yielded a discount of almost 80% from list price for the entire list of journals for which RCI data was available. In the second case, a commercial publisher whose journals consistently generated more citations, the discount was more modest at around 30%.

b. Transparency for annual price increases.

In UC’s experience, while annual price caps that are negotiated over the life of a multi-year contract add predictability, they are often arbitrarily proposed and negotiated with anecdotal evidence to find a compromise between what the publisher wants and what is reasonable or affordable to the library. To remove this arbitrary aspect, we wanted to tie annual price increases to actual increases in publisher production costs. UC has limited experience in negotiating price increases tied to the Consumer Price Index (CPI), under the rationale that CPI is an actual measure of inflation. However, we speculated that the Producer Price Index (PPI), specifically the PPI’s “Commodity Finished Goods Less Food and Energy” (which removes the two most volatile components), is a more appropriate metric for changes in production costs.¹¹ We calculated a 3-year (2003-2005) average for PPI of 1.36% which compared quite favorably to extant price caps.

Year	Annual PPI*
2003	0.19%
2004	1.48%
2005	2.42%
3-year average	1.36%

Table 4: PPI Calculations

We hypothesize that a contract could stipulate a moving average of recent PPI to adjust prices each year. Basing price increases on PPI, which changes yearly, would create less predictability for each year’s increase compared to fixed price caps, but a moving average would smooth the effect of any rapid PPI changes.

We anticipate that this approach to annual price increases will require extensive discussion with publishers. We expect that an appropriate improvement would be to include adjusting factors based on increases in content volume and usage. However, we were unable at this early stage to model such extensions in ways that would account, for

¹¹ “The CPI measures inflation as experienced by consumers in their day-to-day living expenses; the Producer Price Index (PPI) measures inflation at earlier stages of the production and marketing process.” U.S. Department of Labor, Bureau of Labor Statistics. [CPI] Frequently Asked Questions [<http://www.bls.gov/cpi/cpifaq.htm>]

“The Producer Price Index is a family of indexes that measures the average change over time in the selling prices received by domestic producers of goods and services. PPIs measure price change from the perspective of the seller. This contrasts with other measures, such as the Consumer Price Index (CPI), that measure price change from the purchaser's perspective. Sellers' and purchasers' prices may differ due to government subsidies, sales and excise taxes, and distribution costs.” U.S. Department of Labor, Bureau of Labor Statistics. [PPI] Frequently Asked Questions [<http://www.bls.gov/ppi/ppifaq.htm>]

“Because they measure price changes objectively, both in general and for particular products, free from possible manipulation by either of the contracting parties, the producer price indexes calculated by the Bureau of Labor Statistics are widely recognized among business people, economists, statisticians, and accountants as useful in price adjustment clauses.” [Escalation and Producer Price Indexes: A Guide for Contracting Parties. U.S. Department of Labor. Bureau of Labor Statistic. September 1991. Report 807]

The PPI for Finished Goods and Services also has the appealing characteristic of a trend of relatively low increases as compared, e.g., to CPI.

example, for inconsistencies in usage reporting or deliberate increases in content to create higher revenues (although the latter would eventually be reflected in the value measures above if quality were sacrificed).

c. Contributions from the purchasing/licensing institution

In their “open letter” to academic leaders, Bergstrom and McAfee make a case for acknowledging the contributions of labor and overhead often provided to journals and their publishers from the universities at which the editors or editorial offices are located.¹²

Following their rationale that common contributions of space and staff-level editorial support are on the order of \$12,000 per year, and drawing from previous surveys of the number of UC-based principal or managing editors, we calculated “contribution credits” of \$211,000 and \$372,000 for publisher journal bundles of 353 and 629 titles, respectively.

At best, this measure is crude and suffers from assumptions about the levels of and typical labor and space costs for such contributions. We note that it does *not* account for the primary intellectual contributions of content (articles), peer-review, and editorial judgment that are often cited as “give-aways” from the academy to publishers. Attempting such an accounting would add serious complexities to the modeling and the community discussion, but nevertheless may be an important component of future work.

d. Transaction efficiencies

Through the California Digital Library, the University of California libraries often co-invest in “systemwide” purchases or licenses. In this manner UC operates similarly to many other library consortia, whose membership work to achieve negotiating and transaction efficiencies for both themselves and for publishers and other content vendors. These quantity discounts currently result in significant cost savings on contracts, but the mechanism and rationale for the adjustment, when explicit, has been based on the historic average number of print subscriptions across the ten campuses. We want to move away from basing costs on historic print subscriptions for several reasons. For example, many journals are now available for which there has never been and never will be a print subscription. Also, the historic number of print subscriptions to journals can be widely variable within a publisher’s title list and is demonstrably correlated with perceived value, which our modeling addresses elsewhere.

A related quantity discount takes the form of a “cross-access” benefit, where all members of a consortium are awarded access to content that is crucial to only some of the members. A volume purchase discount (off of the theoretical price calculated as the sum of all title list prices times the number of members) can also be considered a “cross-access” assessment. Here again, the calculation has been based on historic print subscriptions, where, for example, an average of 3.2 print subscriptions within the

¹² *An Open Letter to All University Presidents and Provosts Concerning Increasingly Expensive Journals.* <http://www.hss.caltech.edu/~mcafee/Journal/OpenLetter.pdf>. Accessed January 12, 2007.

consortium for Publisher Y's titles might result in a cross-access (i.e. all-member access) subscription fee of 3.2 times the agreed base price for the list of titles. Presumably these cross-access contract terms are acceptable to publishers because they recognize that they can only achieve so much penetration in any given market and because vendors tacitly admit to low marginal costs for an additional user.

In our work we modeled several explicit formulas for discounts due to consortial transaction efficiencies. We modeled a discount of 5% off for each consortial participant in a contract, which produced 50% off the 10x price for a 10-member license. This was based on the assumption that a transaction discount is appropriate for a "consortium" the size of UC (ten campuses). Future work and community discussion could uncover clear economic rationale and more sophisticated modeling for these discounts.

4. Caveats and Promises

While the Bergstrom-McAfee approach is promising and defensible, their data has some limitations which complicate its application in real-world situations. It is, for example, subject to some errors in determining profit or non-profit status and assignment to broad subject categories, both of which are done by hand. Based as it is on the limited set of titles covered by ISI, there are many missing titles for which value-based calculations would be difficult if not impossible to calculate. However, Professors Bergstrom and McAfee have been correcting errors and refining their work. An important example, in the 2006 version of their database, is a revised calculation of price per citation which better accommodates new journals. The academic library community might benefit by challenging itself to continue these refinements.

Our work included several scenarios in which we applied the value-based method to specific publisher packages. In these case studies we calculated the sum of the model's elements for a publisher's title list, (i.e. value-based pricing plus price increases based on changes to the Producer Price Index plus discounts for UC editorial contributions plus discounts for consortial efficiencies). Not all of these calculations produced significant cost savings. In fact, some titles would become more expensive under such modeling. However, we believe the elements have the potential to improve marketplace dynamics because they are transparent, i.e. explicit, and based on defensible connections to value, production costs, and economies of scale.

UC believes prices that reflect value make sense. It intends to employ the concepts and appropriate data in discussions with journal publishers. Of course, there is no silver bullet in such a complex marketplace and scholarly communication system. For example, we know that the volume of quality scholarship is increasing, and the overall system will have to pay for its validation, certification, and dissemination. In a subscription-based environment, library budgets could benefit from one-time gains and better overall alignment through value-based pricing, but they eventually will be overtaken by the expansion of relevant, high-quality materials. Therefore the community will find it necessary to continue to pursue alternative business models, production

efficiencies, and, most likely, some increases in the budgets available to produce and purchase the products of research. There is also the trend of citation inflation and salami-chopping of research publications into the smallest publishable unit. It may also be necessary to take into account the trend toward tiered and other forms of differential publisher pricing in order to develop reliable measures of comparative value. Such problems show that we must combine value-based pricing strategies with other reforms in the evolution of scholarly communication, especially those which encourage faculty to behave in ways that maximize research impact rather than personal reward.

Our report also brings several “big questions” to the foreground and further emphasizes the importance of community engagement in the debate. For example, is it possible for for-profit publishing to maintain an acceptable margin of profit in a “value-based” pricing system? How can we meaningfully assess value as publishers begin to move away from (historically print-based) institutional list price pricing models, a model we can all agree is untenable? Can we effectively shape those new pricing models? How do we factor in usage data? What other potential measures of value are there? How do we quantify the academy’s contribution to the publishing/scholarly communication process? Can and should value-based pricing be developed for the article as opposed to the journal?

We are certain that all engaged stakeholders – authors, publishers, scholarly societies, and libraries – know that the marketplace for scholarly materials is inexorably changing. We believe that a value-based and value-driven marketplace, with transparent metrics and business models, serves the interests of those who embrace and even want to accelerate that change toward the widest dissemination of knowledge. Although the work at UC will continue, through the publication of this report we invite all stakeholders to help extend and refine the concepts and modeling, and to engage in the dialogue on solutions.

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