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WORKING WITHIN  
THE BOUNDARIES  
OF INTELLECTUAL  
PROPERTY

INNOVATION POLICY FOR THE  
KNOWLEDGE SOCIETY

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# ALTERNATIVE ECONOMIC DESIGNS FOR ACADEMIC PUBLISHING

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## I. Introduction

Prices of for-profit academic journals have increased extremely rapidly over the past two decades.<sup>1</sup> This has troubled librarians and researchers who are concerned about the dissemination of knowledge. It has also led to tension between for-profit publishers and the academic community that provides those publishers with free labor.<sup>2</sup>

Economists who study academic journal pricing have considered alternative explanations for the growth in journal prices. McCabe suggests that increased concentration in the journal industry is a contributor to this growth.<sup>3</sup> Nevo, Rubinfeld and McCabe attribute at least part of the rapid price increases to the increasing sophistication of for-profit publishers, who have learned that they can extract large rents from academic libraries, whose demands for journals are remarkably

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<sup>1</sup> For example, the price of library subscriptions for business and economics titles rose by 393% between 1984 and 2001, whereas the CPI grew at only 70%. See Barbara Albee and Brenda Dingley, *U.S. Periodical Prices—2001*, AM. LIBR., May 2001, at 2, available at <<http://www.ala.org/ala/online/resources/selectedarticles/periodicals01.pdf>>.

<sup>2</sup> Theodore C. Bergstrom, *A Free Labor for Costly Journals?*, 15 J. ECON. PERSP. 183 (2001).

<sup>3</sup> Mark J. McCabe, *Journal Pricing and Mergers: A Portfolio Approach*, 92 AM. ECON. REV. 259 (2002).

price inelastic.<sup>4</sup> Edlin and Rubinfeld emphasize the relatively recent effort by major publishers to bundle print and electronic journals.<sup>5</sup>

Whatever the explanation, the high cost of academic journals is a pressing problem for university libraries and university budgets. This paper focuses on the policy issues that flow from the reality of high for-profit journal prices. We begin by looking more deeply into the source of the inelasticity of library demands and the higher for-profit prices that result. We suggest that a key to understanding the pricing of journals under various policy regimes is to understand the two-sided markets that drive journal pricing. We follow with a discussion of alternative models for academic publishing and some remarks about how libraries and universities may cope with this problem.

## II. Two-sided Markets

Good applied economics often moves between the general and the particular, exploring analogies and asking why we see certain differences and similarities. A study of ‘platform competition in two-sided markets’ by Jean-Charles Rochet and Jean Tirole offers just such a perspective for considering academic journal markets.<sup>6</sup> A ‘platform,’ according to Rochet and Tirole, is an intermediary that plays a ‘non-trivial’ role in the interaction between producers and users. Examples of platforms include credit cards, video game consoles, shopping malls, and academic journals. The most interesting examples of platform markets seem to involve network externalities. Participants from either side value the platform more highly the more participants there are from the other side and possibly also from their own side. A credit card, for example, is more useful to consumers if it is widely accepted by merchants, and merchants value the services provided by a credit card more highly if it is held by more consumers. Game developers are more eager to write games for consoles that are owned by large numbers of gamers and gamers value consoles for which more and better games exist. Customers prefer shopping malls with more and better shops and shops prefer to be in malls with more consumers. Authors prefer to write for academic journals with more readers, and readers value journals more highly if they publish more and better authors.

Where network externalities are significant, it is common for there to be a relatively small number of competing platforms, each of which has significant monopoly power on at least one side of the two markets they face. In principle,

<sup>4</sup> Aviv Nevo, Daniel L. Rubinfeld, & Mark McCabe, *Academic Journal Pricing and the Demand for Libraries*, AM. ECON. REV., PAPERS AND PROCEEDINGS 447 (2005).

<sup>5</sup> Aaron S. Edlin & Daniel L. Rubinfeld, *Exclusion or Efficient Pricing: The ‘Big Deal’ Bundling of Academic Journals*, 72 ANTITRUST L. J. 119–57 (2004).

<sup>6</sup> Jean Charles Rochet & Jean Tirole, *Platform Competition in Two-Sided Markets*, 1 J. EUR. ECON. ASS’N, 990 (2003).

platform owners could extract revenue from either or both sides of the market that they serve. Commonly, however, the middleman's revenue comes mainly from the sellers of goods and services rather than from the consumers. Credit card companies collect most of their revenue from charges assessed to merchants, while setting low or even negative rates for credit card holders. Producers of game consoles charge licensing fees to game developers and sell the consoles at prices close to marginal cost. Shopping mall owners collect revenue by charging rents to merchants while allowing customers to enter the mall at no charge, and indeed while subsidizing shoppers by offering free parking. In contrast, although academic publishers collect some revenue from authors through page charges, most of their revenue comes from subscription charges paid by libraries.

Rochet and Tirole suggest that the allocation of platform charges between the two sides of the market depends on relative price elasticities, with higher prices charged to the side whose demand is less responsive to price. As an example, consider the credit card market. Currently, most retailers accept all major credit cards: Visa, MasterCard, Discover, Diners' Club, and American Express (although some will not accept the last because American Express charges merchants a higher fee). Though some customers may carry more than one brand of credit card, if merchants accept them all and they all offer comparable services, carrying one would be enough. This arrangement promotes price competition in the consumer market. If one company offers comparable credit cards to customers at a lower charge than the others, customers will have a strong incentive to carry only the cheapest card. Price competition between card suppliers is less severe on the merchants' side of the platform and it is on this side that high charges are found. To see why demand on the merchants' side is less responsive to price, suppose that a credit card company undercuts its competitors in its charges to merchants. The only way that a merchant can increase the proportion of customers using the cheaper card is by refusing to accept payments from other cards—a strategy that is likely to result in significant loss of sales.

In the remaining discussion, we apply intuitions that flow from the two-sided market model to evaluate a range of policies the goal of which is to keep down the cost of disseminating knowledge.

### III. For-Profit and Nonprofit Journals

Table 6.1 displays library subscription prices for pairs of economics journals aimed at the same audience, but whose prices per article and per citation to its articles differ dramatically.<sup>7</sup> In each case, the journal with its title in boldface is owned by a for-profit publisher, while the title in italics has similar subject coverage but a

<sup>7</sup> Prices are taken from the website <<http://www.journalprices.com>>.

Table 6.1: Comparison of journal prices

<i>Journal Title</i>	<i>Price/Article</i>	<i>Price/Cite</i>
<b>Applied Economics</b>	\$26	\$95
<i>American Economic Review</i>	\$2	\$1
<b>Intl Rev of Law and Economics</b>	\$29	\$51
<i>Journal of Law and Economics</i>	\$4	\$3
<b>Intl J of Tax and Public Finance</b>	\$18	\$37
<i>National Tax Journal</i>	\$4	\$4
<b>J Development Economics</b>	\$27	\$28
<i>EC Development and Cultural Change</i>	\$7	\$11

nonprofit publisher. The nonprofit journals in this list are published by professional societies and academic presses. These operations are not subsidized, and the subscription prices they charge are approximately their average costs. In this section we explore two questions: First, since for-profit publishers face essentially the same cost structure as nonprofits, why has competition in the academic journal industry not driven the subscription prices of the for-profit journals down close to average cost? Second, why do publishers collect most of their revenue from readers rather than authors?

Scholars, and hence libraries, value access to academic journals. Getting published and getting cited is also valuable to authors. Statistical studies by economists find that citations are a positive and significant determinant of academic salaries.<sup>8</sup> The estimated effect on salary of a single citation to a scholar's work is on the order of \$50 per year. Non-profit journals, particularly in the sciences, frequently charge authors a fixed fee per page for publication. Page charges are rare among for-profit journals.<sup>9</sup>

A recent study shows that the seven most cited ecology journals are all owned by nonprofit organizations, and all have page charges in the range of \$50 to \$150 per page.<sup>10</sup> Less prestigious nonprofit journals have lower page charges: as a result, the median page charge for all nonprofit ecology journals is \$30. In contrast, almost all of the for-profit journals that are jointly owned by publishers and academic associations have no page charges. The study results suggest that about one-third of the revenue of nonprofit journals comes from page charges. Library subscription prices per page for nonprofit journals are about one-fifth those of for-profit journals. If one accounts for page charges, total revenue collected per page by nonprofits is

<sup>8</sup> Daniel Hamermesh, George Johnson, & Burton Weisbrod, *Scholarship, Citations, and Salary: Economic Rewards in Economics*, 49 S. ECON. J. 472 (1982); Arthur Diamond, *What is a Citation Worth?* 21 J. OF HUM. RESOURCES 200 (1986); Onur Baser & Elda Pema, *The Return of Publications for Economics Faculty*, 1 ECON. BULL. 1 (2003).

<sup>9</sup> Another cost of publication for many authors is the obligation (usually implicit) to referee two or three submitted manuscripts for each paper that they publish in a journal.

<sup>10</sup> Carl T. Bergstrom & Theodore C. Bergstrom, *The Economics of Ecology Journals*, 4 FRONTIERS ECOLOGY & ENV'T 488 (2006).

about one-third of that collected by for-profits. In some fields, like economics, however, page charges for accepted articles are rare or nonexistent. Many economics journals, both for-profit and nonprofit, instead charge a submission fee for having one's paper considered for publication, but these fees are typically small relative to the journals' publication costs.

Because journals must compete with each other for good articles, where two journals with equal reputations for quality have significantly different author charges, the journal with higher charges would be likely to have difficulty attracting good papers. Authors do not have a pressing need to spread their publications among many journals. If an author has two papers, both of which are acceptable to two equally prestigious journals, but the author fees at one journal are five times larger than the other's, the author most likely will submit both papers to the cheaper journal.

In contrast, large price differences can be sustained on the subscriber side of the platform. Scholars want access to all of the literature in their research specialty. Libraries at research universities, unlike credit card users, cannot satisfy demand by subscribing only to the cheapest journals. An econometrician who wants to read an article in the *Journal of Econometrics* (the subscription cost of which is \$2,700) will not be satisfied if she is told that the library does not have this journal, but instead has three copies of *Econometrica* (even though the subscription price to it is only \$330 and its articles are much more frequently cited). Reading a better, cheaper journal twice will not substitute for one reading of the articles in the less cost-effective journal.

Much as Rochet and Tirole would predict, commercial publishers, having found that demand on the subscriber side of the platform is less price elastic than that on the side of the ultimate user, have loaded all charges onto the former. The commercial publishers' practice of loading charges onto subscribers has produced two perverse results. One is that, because the demand for subscriptions by research libraries is highly inelastic, large commercial publishers have leverage to extract enormous profits at the expense of university budgets. Elsevier, the largest commercial journal publisher, reported revenue in 2007 of about \$3.2 billion and profits of \$873 million.<sup>11</sup> The six executive directors of Elsevier received combined salaries and benefits in 2007, totaling about \$43 million. The second perverse result is that high prices to subscribers lead to extreme inefficiency in the dissemination of knowledge. The emergence of the Internet has made it technically possible for

<sup>11</sup> These figures are for the Elsevier publishing division of Reed-Elsevier as found in Reed Elsevier, *Annual Reports and Financial Statements 2007* ('Financial Report'). This is available at <[http://www.investis.com/reports/reed\\_ar\\_2007\\_en/report.php?type=1](http://www.investis.com/reports/reed_ar_2007_en/report.php?type=1)>. Revenue and profit figures are available at p. 29. Details of executive remuneration are at pp. 63–74. Salaries of these individuals are reported to total about \$8.2 million. The Financial Report, at 63, estimates that salaries constitute 19% of the total value of bonuses, stock options, and other benefits paid to directors. Our estimate of total payments is found by dividing \$8.2 by .19. Some numbers in the report are stated in euros and some in British pounds. We converted these figures to US dollars at the exchange rate as of January 1, 2008.

researchers anywhere in the world to access all of the world's scientific articles, even without access to a large physical library. But the result of the high subscription prices charged by the for-profit publishers for online journals is that access to much of scientific research is limited to those who happen to work at wealthy universities in rich countries.

The best journals in most academic disciplines are published by professional societies and university presses. These, too, get most of their revenue from subscription charges, but they are nonetheless able to manage with much lower rates than those charged by the for-profits. Preston McAfee and Ted Bergstrom have recorded subscription prices per article for more than 7,000 academic journals.<sup>12</sup> Their figures show that in most disciplines the median subscription price per article of nonprofit journals is between one-fifth and one-third of that of for-profit journals. In the physical and life sciences, some of this difference results from the fact that nonprofit journals gain significant revenue from page charges to authors, while for-profits rarely use page charges. The study of ecology journals by Bergstrom and Bergstrom shows that author page charges account for only a small part of the difference in subscription prices.<sup>13</sup>

While it is understandable that large price differences can be sustained from the demand side, we must also ask why it is that the authors and readers of overpriced journals are not competed away from the supply side by new and more reasonably priced journals. One reason is that, with the advent of electronic journals, the major academic publishers have developed an effective new tactic for deterring entry of competitors. This is the so-called 'Big Deal' in which a large publishers offer site licenses for online access to their entire list of journals for a lump sum price that is substantially lower than the sum of the prices of individual journals. Annual costs of these site licenses, however, typically rise more rapidly than library budgets, and this puts intense pressure on library budgets. This device protects the commercial publishers from competition, since libraries are inclined not to replace the commercial publishers' weaker offerings with better cheaper competitors.

If a new journal is to be successful, overcoming library resistance to new acquisitions is only one of the hurdles that it faces. Coordination is another. It is in general difficult for a new journal to solve the coordination problem of attracting good authors, editors, and referees along with subscribers and readers. However the academic and professional societies are in a relatively good position to accomplish this. Within the field of economics, the European Economics Association has started a new nonprofit journal, the *Journal of European Economics Association*, intended to compete directly with its for-profit counterpart, the *European Economic Review*. In 2007, the American Economic Association announced that it will begin

<sup>12</sup> See <<http://www.journalprices.com>>.

<sup>13</sup> Bergstrom and Bergstrom, see n. 10 above.



publication of four new journals, targeted to compete with leading specialized journals sponsored by Kluwer and Elsevier.

There have also been some interesting new entrants in the form of relatively low-priced for-profit electronic journals, such as those from Berkeley Electronic Press. At least in the short run, these new commercial entrants increase competition in the industry. Some economists have expressed concern, however, that once those entrants solve the coordination problem of breaking into the industry, they may then be purchased by a major publisher who will increase their prices to match the publishers' usual prices.

#### IV. Open-access Journals and the Author-pays Model

The current system of journal pricing evolved in the era of paper-based journals, but the Internet has drastically changed how they are now distributed. In the year 2000, few journals were available online; today almost all journals are, and online access has become the mode of choice for most scholars. This new technology can potentially eliminate one portion of the coordination problem that has prevented new entrants from competing away the profits of large publishers. With paper-based journals, it was necessary to coordinate authors, libraries, and readers around a single brand name. Libraries would be reluctant to subscribe to a new journal unless the journal was likely to be widely read. To attract readers, a new journal needs good papers by prestigious authors. But authors are reluctant to publish their papers in a journal with few library subscriptions because few readers would have access to their work.

The problem of accessibility can now be sidestepped by means of open-access journals that are freely available on the web to all readers. Authors need not worry that readers will be unable to find their articles if they appear in a newly introduced open-access journal. It remains to be seen whether the competitive forces unleashed by this change will be sufficient to undermine the old system of high-priced, subscription-based for-profit publishing, and/or even the system of moderately priced subscription-based pricing.

There has been a vigorous flowering of new open access journals across many disciplines and following many business models. The Directory of Open Access Journals maintains a list that currently contains more than 3,700 open access journals, 1,300 of which are searchable at the article level.<sup>14</sup> Though they are not able to collect revenue from subscribers, open-access journals fund themselves in a variety of ways. Dewatripont *et al.* report that 55% of open access journals were supported through direct or indirect public funding, 28% from revenue generated

<sup>14</sup> See <<http://www.doaj.com/>>.

from sales of the hardcopy volume, and 17% by publication fees levied on authors.<sup>15</sup> Private grants, membership dues in scholarly societies, or advertising may provide financing. Many foundations, including the Ellison Medical Foundation, the David and Lucile Packard Foundation, the Gordon and Betty Moore Foundation, and the Open Society Institute, support open access publication. Other financing models include the provision of open access to only select articles.

Both for-profit and nonprofit publishers offer open-access journals. BioMed Central is the best-known commercial open-access publisher. It began in 2000 and currently publishes 158 open access peer-reviewed journals. Its business model is based upon author fees which range from \$600 to about \$2,000 depending on the particular journal title. According to Chang, the company needs to publish approximated 2,000–2,500 articles per month to cover its expenditures.<sup>16</sup> Table 6.2, adapted from Chang, lists several of the major open-access publishers.<sup>17</sup>

The nonprofit Public Library of Science (PLOS) publishes seven peer-reviewed journals in biology, pathology, and medicine. Since its founding, these journals have achieved very high impact ratings and are among the most prestigious outlets for research. PLOS is based on the author-pay funding model, with substantial author fees. In addition, PLOS has received substantial financial backing from foundation donors. As of July 2006, *PLOS Biology* and *PLOS Medicine* charged authors \$2,500 per article while the other titles charged approximately \$2,000 per article. Authors from supporting institutions received a discount when publishing in PLOS journals. The prestige and impact of *PLOS Biology* and *PLOS Medicine*, together

Table 6.2: Open-access journal publishers

<i>Publisher</i>	<i>Type</i>	<i>Fee (\$)</i>	<i>Titles</i>
BioMed Central	Commercial	0–1,750	160
Calicut Medical College	Non-profit	0	3
Copernicus Open Access Publishing	Non-profit	Varies	14
First Monday	Non-profit	0	1
Hindawi Publishing Corporation	Commercial	495	35+
Ivyspring International Publisher	Commercial	595–750	2
<i>Journal of Medical Internet Research</i>	Non-profit	0	1
<i>Journal of Postgraduate Medicine</i>	Commercial	0	1
Medknow Publications	Commercial	0	30+
Molecular Diversity Preservation International	Non-profit	600	9
<i>Proceedings of the National Academy of Science</i>	Non-profit	1,000	1
Public Library of Science	Non-profit	2,000–2,500	7

<sup>15</sup> Mathias Dewatripont et al., *Study on the Economic and Technical Evolution of the Scientific Publication Markets in Europe*, 64 (2006), European Commission Community Research (available at <<http://ec.europa.eu/research/index.cfm?pg=search>>; search for scientific publication study).

<sup>16</sup> Chen Chi Chang, *Business Models for Open Access Journals Publishing*, 30 ONLINE INFO. REV. 699 (2006) available at <<http://www.emeraldinsight.com/1468-4527.htm>>.

<sup>17</sup> Ibid.

with the fact that most of their authors can rely on grants that cover their submission fees, makes these rather high fees acceptable to a very large number of authors.

The PLoS business model is probably of limited applicability. The PLoS journals (perhaps as befits biomedical research) are high overhead operations. They were set up with donated funds and have both a professional editorial staff and publicists who work to see that their articles receive attention in the national press. Open access journals, however, do not need to be this expensive and can be operated with much lower budgets than the PLoS journals. Free software is now available to greatly ease the overhead cost of journal management. *Economics Bulletin*, a successful open access alternative to Elsevier's *Economics Letters*, has sustained itself with volunteer labor and a small amount of university overhead support since 2000, charging no page or author fees at all. *Theoretical Economics*, begun in 2006, aspires to replace Elsevier's *Journal of Economic Theory* as the top journal in the field. This journal has a \$100 fee for submissions and no additional charge for accepted papers if these papers are submitted in LaTeX.

McCabe and Snyder propose conditions under which open-access journals (especially under the author-pays model) may be sustainable: the market power of journal publishers is low, author benefits relative to reader benefits are high, and the marginal cost of publication is very low.<sup>18</sup> The degree, in reality, that these conditions all hold is likely to vary by discipline. McCabe and Snyder suggest that some journals—even profit-maximizing ones—may opt for an open-access business model in a free-entry equilibrium that works as follows: a few journals exist in which all good authors want to publish; because good authors publish in those journals, many scholars read them, thus increasing author demand to publish in them. Under these conditions, they claim, commercial publishers would maximize their profits by utilizing open access, while gaining their revenue from user charges.

A number of publishers, both commercial and nonprofit, have instituted a policy of 'hybrid open access' for their journals. These publishers give authors of accepted papers the option of having their papers made freely available on the web in return for payment of a publication fee. One publisher, Springer, explicitly states that it will reduce its subscription prices in proportion to the fraction of articles that are made open access. Other publishers are less direct about this. It is difficult, however, for any publisher to make this claim fully credible. How can we tell that they actually cut their price without knowing what they would have charged if no articles were made open access? An economist's take on the situation is that the for-profits will continue to charge what the market will bear, but the more of its papers that are available for free, the less the market will bear.

<sup>18</sup> Mark J. McCabe & Christopher M. Snyder, *The Economics of Open-Access Journals, Working Paper* (2004); Mark J. McCabe & Christopher M. Snyder, *Academic Journal Pricing in a Digital Age: A Two Sided Market Model*, 7 B.E. J. ECON. ANALYSIS & POL'Y, Art. 2 (2007) available at <<http://www.bepress.com/bejeap/vol7/iss1/art2>>.

Two large for-profit companies, Springer and Elsevier, each charge authors \$3,000 per article to make their articles open access. Among nonprofits, the American Chemical Society charges \$1,000 for ACS members who are at institutions that subscribe to ACS publications (and \$3,000 to non-affiliated authors); the American Physical Society charges from \$900 to \$1,300; the National Academy of Sciences charges \$1,000; Oxford University Press charges \$1,500 to scholars at institutions that subscribe to their journals but sharply discounts this price for scientists living in less wealthy countries; and Cambridge University Press charges \$2,700. While this presents an interesting dispersion of prices, price competition among hybrid open access publications is not likely to be intense so long as the relevant option for most authors is to publish in the same journals without open access and without paying the open-access fee.

Available information suggests that the 'uptake rate' for hybrid open access is not particularly impressive. The Oxford University Press (OUP) News Pages website<sup>19</sup> reported in August, 2006, that the fraction of OUP authors who opted to have their papers made open access was about 10% in life sciences, 5% in medicine and public health, and 3% in humanities and social science. The uptake rate for the Proceedings of the National Academy of Sciences is reportedly about 15%. We have not been able to find corresponding statistics for the commercial publishers.

Some commentators have emphasized that from a social point of view the author-pays open-access publication model also has some undesirable effects. The supply of articles will be responsive to price. If publishers collect their revenue by charging authors, some scholars may choose to forego publishing in academic journals. Nevertheless, those authors can still post their work on web pages and public archives. Though they would forego the credential that comes from peer review and endorsement by a journal, their work would remain available to interested readers.

## V. Open Archives

It may be that the expansion of open access and hybrid journals will eventually erode the old subscriber-based equilibrium. But in many disciplines, nearly complete open access has already arrived from another quarter—self-archiving by authors, who place pre-print and post-print copies of their own published papers on their websites and/or on university-sponsored archives. Most publishers currently allow authors to post final versions of their own papers on their own universities' websites. Physicists and computer scientists have a long-standing tradition of posting their work on ArXiv, an open-access repository for both pre-publication and post-publication copies. According to Brown and Swan, about 30% of the work in

<sup>19</sup> See <<http://www.oxfordjournals.org/news/>>.

physics and virtually all papers in the specialized areas of high energy physics, condensed matter, and astrophysics are posted there.<sup>20</sup> Bergstrom and Lavaty searched the web for copies of a large sample of journal articles published in 2006.<sup>21</sup> Using a simple Google search, they found freely available versions of about 90% of the articles originally published in high impact economics journals and about 50% of those originally published in less prestigious journals. Practices differ greatly across disciplines, however. Bergstrom and Lavaty found that only about 30% of published political science articles could be found on the web.

Once a large fraction of published work can be found at no cost on the web, libraries have far less incentive to subscribe to high-priced journals that offer little value per dollar spent. If major research libraries begin to cancel subscriptions to overpriced journals, authors of papers in these journals will find it all the more necessary to self-archive if they hope to reach an audience. If more disciplines follow the path of astrophysics, high energy physics, and economics, the scholarly community could reach a tipping point where the great majority of influential research is available for free. If this happens, librarians need no longer worry that refusing to subscribe to overpriced journals will greatly diminish the resources available to university researchers. We would then expect library demand for journal subscriptions to become much more price-elastic and high-priced publishers to be forced to reduce subscription prices.

Can subscription-based journals survive if self-archiving becomes much more widespread? Even if versions of all published articles could be found on decentralized open archives, value and convenience remains in being able to download an official final version of an article directly from the publisher's website. The evidence from physics suggests that reasonably priced subscription-based journals will remain economically viable. Swan and Brown asked the two main nonprofit physics publishers, the American Physical Society and the Institute of Physics Publishing, about their experiences over the 14 years of ArXiv's existence.<sup>22</sup> The societies responded that they could not identify any loss of subscriptions due to ArXiv. They found that subscription trends for the areas that are most thoroughly represented in ArXiv were no different from those in other areas of physics. The experience from physics suggests that research libraries are not likely to abandon their subscriptions to reasonably priced journals of high quality, even if self-archiving becomes almost universal. There will, however, be intense pressure on less commonly cited journals and on high-priced journals currently published on a for-profit basis. Increased price elasticity on the subscriber side is likely to force

<sup>20</sup> Alma Swan & Sheridan Brown, *Open Access Self-archiving: an Author Study* (2005), available at <<http://eprints.ecs.soton.ac.uk/10999/>>.

<sup>21</sup> Theodore C. Bergstrom & Rosemarie Lavaty, *How Often Do Economists Self-archive?*, UCSB working paper (2007), available at <<http://repositories.cdlib.org/ucsbecon/bergstrom/2007a/>>.

<sup>22</sup> Swan & Brown, see n. 20 above.

them to reduce subscription prices and perhaps to increase charges on the author side of the platform.

## VI. Concluding Remarks

The two-sided model of the journal industry suggests that journal prices will remain high unless and until library demand becomes more elastic and/or the system moves to one in which individual user demand rather than library demand drives pricing. We have no magic solutions to offer, but for what it's worth, here are a few thoughts.

First, it is essential that individual scholars maintain some control over their copyrights. Universities should encourage individual faculty to sign publishing contracts that, while giving journal publishers certain rights, maintain (at a minimum) the author's right to post published articles on open archives. While open archiving offers a promising long-term solution to the problem at hand, its future is also less than clear. Open archives need financial backing to deal with issues related to copyrights and article quality control, especially if pre-publication versions of articles are what is deposited in an archive. The archives also have to deal with the moving wall problem; the wall represents the cutoff that separates articles that have been available for a sufficient period of time for journal publishers to agree to have them archived from those more recently published articles that are not permitted to be archived. The moving wall creates accessibility issues for students or researchers not privileged to be part of a frontier or elite network.<sup>23</sup>

Second, while only a stopgap solution, learned societies should continue to support new nonprofit journals if and when their members' journal publication options are primarily high-priced journals.

We are uncertain, however, about the future of open access publishing. The few commercial attempts at it have been largely limited to fields where major granting agencies have explicitly demanded some form of open access to research content, or to foreign journals which probably have a very small readership at major universities and also rely on government grants to fund publication. Most non-profit attempts at open-access publishing continue to rely on grant support to establish their physical infrastructure or to cover part of their expenses. While we are enthusiastic about the open-access publishing movement, we are as yet uncertain that open access will be the best economic model in terms of long-term viability.

<sup>23</sup> For a discussion of the moving wall concept, see Diane Leenheer Zimmerman, *Cultural Preservation: Fear of Drowning in a Licensing Swamp*, Chapter 2 in this volume.