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Jorge L. Contreras

American University Washington College of Law, Jorge.contreras@law.utah.edu

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CONFRONTING THE CRISIS IN SCIENTIFIC PUBLISHING: LATENCY, LICENSING AND ACCESS

*Jorge L. Contreras**

ABSTRACT

The serials crisis in scientific publishing can be traced to the long duration of copyright protection and the assignment of copyright by researchers to publishers. Over-protection of scientific literature has enabled commercial publishers to increase subscription rates to a point at which access to scientific information has been curtailed with negative social welfare consequences. The uniformity costs imposed by such over-protection can be addressed by tailoring intellectual property rights, either through legal change or private ordering.

Current open access channels of distribution offer alternative approaches to scientific publishing, but neither the Green OA self-archiving nor the Gold OA author-pays models has yet achieved widespread acceptance. Moreover, recent proposals to abolish copyright protection for academic works, while theoretically attractive, may be difficult to implement in view of current legislative and judicial dispositions. Likewise, funder open access mandates such as the NIH OA Policy, which are already responsible for the public release of millions of scientific articles, are susceptible to various risks and political uncertainty.

In this article, I propose an alternative private ordering solution based on latency values observed in open access stakeholder negotiation settings. Under this proposal, research institutions would collectively develop and adopt publication agreements that do not transfer copyright ownership to publishers, but instead grant publishers a one-year exclusive period in which to publish a work. This limited period of exclusivity should enable the publisher to recoup its costs and a reasonable profit through subscription revenues, while restoring control of the article copyright to the author at the end of the exclusivity period. This balanced approach addresses the needs of both publishers and the scientific community, and would, I believe, avoid many of the challenges faced by existing open access models.

* Associate Professor, American University - Washington College of Law; J.D. Harvard Law School; B.S.E.E., B.A. Rice University. The author would like to thank Jonathan Baker, Harold Burstyn, Michael Carroll, Dan Cole, Brett Frischmann, John Golden, Eric Goldman, Mark Janis, Kimberly Kaphingst, Chuck McManis, Eric Priest, David Snyder, Arlene Zank and the late Elinor Ostrom for their helpful comments, suggestions and discussion, as well as the participants in the 2012 Junior Scholars in Intellectual Property Conference at Michigan State University, the Business Faculty Workshop at American University Washington College of Law and the Colloquium at Indiana University's Workshop on Political Theory and Policy Analysis. An earlier draft of this paper was featured on *Hearsay Culture* hosted by David S. Levine, KZSU-FM - Stanford University (initial broadcast Feb. 17, 2012, available at www.hearsayculture.com).

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INTRODUCTION

In February 2012, more than 5,700 individuals boycotted a leading multinational corporation and successfully derailed a legislative initiative that would have significantly benefitted the industry. Who were the individuals responsible for this remarkable demonstration of grassroots political muscle? Environmental activists? Opponents of corporate globalization? Self-proclaimed representatives of the “99%”? No, the group that successfully stared down this multi-billion dollar global enterprise consisted mostly of mathematicians and other natural scientists. The focus of their boycott: Elsevier, the world’s largest publisher of scientific journals.¹

Led by some of the most prominent names in mathematics, the protesters objected to Elsevier’s spiraling prices and its push to abolish a policy whereby scientific articles funded by the U.S. National Institutes of Health (NIH) are made publicly-available.² The boycott pressured Elsevier to withdraw its support for the bill, called the Research Works Act, and ultimately led to its demise.³ Though the proposed Research Works Act was the immediate cause of the Elsevier boycott, the uprising by scientists is symptomatic of a much deeper and longer conflict within the scientific community. As observed by Ingrid Daubechies, president of the International Mathematical Union, the boycott arose because the “social compact [between scientists and publishers] is broken”.⁴

In the 1940s, sociologist Robert K. Merton famously identified four fundamental norms that characterize both the practice and culture of science. Among these is the willingness of scientists to share their discoveries and findings freely.⁵ While the motivations that lead scientists to share, as well as the practical difficulties inherent in this activity, have been debated since Merton’s day, there is little argument that the accessibility of scientific findings is critical to the advancement of scientific progress.⁶ As Merton observes, there is a strong need for later scientists to

¹ Thomas Lin, *Mathematicians Organize Boycott of a Publisher*, N.Y. TIMES, Feb. 13, 2012.

² Research Works Act (H.R. 3699) introduced in the House by Representatives Issa and Maloney on December 16, 2011.

³ The bill’s co-sponsors withdrew it in February 2012. *See Legislation to Bar Public-Access Requirement on Federal Research is Dead*, CHRON. HIGHER ED., Feb. 27, 2012.

⁴ Lin, *supra* note 1.

⁵ Robert K. Merton, “The Normative Structure of Science (1942)” in *The Sociology of Science* 267-78 (Norman W. Storer, ed., 1973).

⁶ Such acknowledgements abound in the literature. *See, e.g.*, Scott Aaronson, et al., *The Cost of Knowledge* (Feb. 2012) (statement of 34 prominent mathematicians protesting the practices of Elsevier) (available at <http://gowers.files.wordpress.com/2012/02/elsevierstatementfinal.pdf>).

build upon the work and ideas of their predecessors.⁷ Without a cumulative process of this nature, science would not advance, making such sharing necessary to the practice of science itself.⁸ In addition to advancing scientific progress, the sharing of scientific data enables scientists to validate and independently verify the findings, analyses and conclusions of their colleagues.⁹ Recent instances of scientific fraud and misconduct underscore the need for critical and independent review of scientific claims.¹⁰

Consequently, many benefits of scientific research – improvements to health, agriculture, infrastructure and industry – may also be said to flow from the ability of scientists to share and build upon one another’s knowledge. By enabling scientific advancement, the sharing of scientific information may be said to contribute to overall social welfare.¹¹ But

⁷ In this respect, Merton relies upon Sir Isaac Newton’s apocryphal observation, “If I have seen farther it is by standing on the shoulders of giants.” Merton, *Normative Structure*, *supra* note 5, at 274-75. Cf. ROBERT K. MERTON, ON THE SHOULDERS OF GIANTS: A SHANDEAN POSTSCRIPT (1965).

⁸ See DIGITAL ARCHIVING CONSULTANCY ET AL., LARGE-SCALE DATA SHARING IN THE LIFE SCIENCES: DATA STANDARDS, INCENTIVES, BARRIERS AND FUNDING MODELS 11 (Aug. 2005) (hereinafter “JOINT DATA STANDARDS STUDY”) (“data sharing contributes to a virtuous circle, where promoting effective sharing widens research and enhances scientific impact”). See also Karim R. Lakhani et al., *The Value of Openness in Scientific Problem Solving*, Harvard Business School Working Paper 07-050 (<http://www.hbs.edu/research/pdf/07-050.pdf> last accessed July 1, 2009) (offering empirical evidence in support of the proposition that the solution of scientific problems is facilitated by free and open information sharing).

⁹ See NATIONAL ACADEMY OF SCIENCES, ENSURING THE INTEGRITY, ACCESSIBILITY, AND STEWARDSHIP OF RESEARCH DATA IN THE DIGITAL AGE 55 (2009) (HEREINAFTER NAS – RESEARCH DATA) (“only when a researcher shares data and results with other researchers can the accuracy of the data, analyses, and conclusions be verified”) and Paul David, *The Economic Logic of “Open Science” and the Balance between Private Property Rights and the Public Domain in Scientific Data and Information: A Primer* in NATIONAL RESEARCH COUNCIL, THE ROLE OF SCIENTIFIC AND TECHNICAL DATA AND INFORMATION IN THE PUBLIC DOMAIN: PROCEEDINGS OF A SYMPOSIUM (2003) (hereinafter NRC – Public domain) at 21 (“[d]isclosure ... creates an expectation that all claims to have contributed to the stock of reliable knowledge will be subjected to trials of verification, without insult to the claimant”).

¹⁰ See Dov Greenbaum, *Research Fraud: Methods for Dealing with an Issue that Negatively Impacts Society’s View of Science*, 10 COLUMBIA SCI. & TECH. L. REV. 61, 75-77 and Jocelyn Kaiser, *Data Integrity Report Sends Journals Back to the Drawing Board*, 325 SCIENCE 381 (2009) (citing numerous recent examples of scientific misconduct).

¹¹ For the sake of argument, I will assume that scientific discoveries, by and large, are socially beneficial. I recognize but avoid the thorny debate over the desirability and social utility of research in some controversial fields (e.g., human cloning, embryonic stem cells, biological warfare, genetic modification of organisms, nuclear fission/fusion, cryogenics, and the like).

Moreover, I intentionally avoid the question of whether maintaining discoveries as secret, as opposed to sharing them, can lead to greater innovation, particularly in industrial settings. See Jonas Anderson, *Secret Inventions*, 26 BERKELEY TECH. L.J. 917, — (2011). For purposes of this paper, I abide by the generally-held assumption that

despite the acknowledged importance of sharing scientific information, the ability of scientists to access information relevant to their fields has come under increasing pressure.

The most prominent means of disseminating results in the sciences is, and has been for more than three centuries, publication in peer-reviewed scientific journals.¹² Prior to World War II, scientific journals were published primarily by learned societies organized and governed by members of the scientific community.¹³ Today, what was once a cottage industry is dominated by a handful of commercial publishers that control a market valued at between \$7 billion¹⁴ and \$10 billion annually.¹⁵ The ascendancy of commercial publishers in scientific publishing began in the late 1950s and has had several notable effects.

First, the number of journals catering to specialized sub-disciplines expanded rapidly. In 1960, it has been estimated that roughly 2,800 scientific journals were in print.¹⁶ Today, estimates place the number somewhere between 16,000¹⁷ and 24,000¹⁸ journals.

Second, between 1975 and 1995, publishers significantly increased subscription rates for scientific journals and began to “bundle” titles into expensive packages offered to libraries at a single hefty rate.¹⁹ Increases

scientific progress is more typically advanced by disclosure, rather than concealment, of discoveries. And in any case, the discoveries addressed in this paper are ones that scientists have intentionally submitted for publication, evidencing their own preference for disclosure over secrecy. Any subsequent limitations on access to these discoveries by journals are imposed by the policies and financial considerations of journals rather than scientists.

¹² See Robert K. Merton, *Behavior Patterns of Scientists (1968)* in *The Sociology of Science*, *supra* note 5, 325, 337 (“From its very beginning, the journal of science introduced the institutional device of quick publication to motivate men of science to replace the value set upon secrecy with the value placed upon the open disclosure of the knowledge they had created”); and JOHN M. ZIMAN, *PROMETHEUS BOUND: SCIENCE IN A DYNAMIC STEADY STATE* 39 (1994) (arguing that the peer-reviewed publication process is “at the very core of academic science” and “inseparable from its other functions”).

¹³ What is generally regarded as the first scientific journal, the *Philosophical Transactions*, was launched by the British Royal Society in 1665. Today many journals, including the prestigious title *Science* published by the American Association for the Advancement of Science (AAAS), are still published by learned societies.

¹⁴ EPS Market Monitor, Nov. 2003.

¹⁵ Market Research.com, Technology & Media (<http://www.marketresearch.com/Technology-Media-c1599/Media-c92/Scientific-Technical-Medical-c1661/>) (visited Feb. 11, 2012).

¹⁶ Tenopir & King (2000) at para. 7.

¹⁷ “Access all areas”, *The Economist*, Aug. 5, 2004.

¹⁸ Manon A. Ress, *Open-Access Publishing: From Principles to Practice* in *ACCESS TO KNOWLEDGE IN THE AGE OF INTELLECTUAL PROPERTY* 475, 477 (Gaëlle Krikorian & Amy Kapczynski, eds., New York: Zone Books, 2010) (quoting David W. Lewis).

¹⁹ European Commission, *Study on the economic and technical evolution of the scientific publication markets in Europe: Final Report – January 2006*, p.23.

were at levels far in excess of inflation and resulted in subscription rates significantly above those of non-profit journals.²⁰ As a result, the cost of subscribing to many journals, particularly those in specialized technical fields²¹, became prohibitive to all but the largest institutions. What followed was a widespread reduction in subscription volume by academic libraries of all sizes.²² Even Harvard University, arguably the wealthiest academic research institution in the world, recently announced that continuing its subscriptions to the full range of scientific journals at an annual cost of \$3.75 million would be “financially untenable”.²³

This period of sustained price increases, which continues today,²⁴ and the accompanying cancelation of journal subscriptions by academic libraries has been termed the “serials crisis”. The serials crisis prompted a widely-voiced concern among libraries, scientists and public interest advocates that researchers were being deprived of access to the latest developments in their fields, thereby adversely impacting their own research and teaching. An unawareness of the latest research findings makes it more likely that scientists will conduct research that is duplicative or that does not make use of the latest advances. And access to the latest scientific literature is important not only for researchers, but also for professionals who require up-to-date technical knowledge in their fields. For example, one recent study of healthcare professionals (primarily

²⁰ See Carl T. Bergstrom & Theodore C. Bergstrom, *The Costs and Benefits of Library Site Licenses to Academic Journals*, 101 Proc. Natl. Acad. Sci. 897 (2004). Harvard University estimates that online journal subscriptions from two major publishers have escalated by 145% over a six-year period. Harvard University Faculty Advisory Council, Major Periodical Subscriptions Cannot be Sustained (Memorandum to Faculty dated April 17, 2012) (available at <http://isites.harvard.edu/icb/icb.do?keyword=k77982&tabgroupid=icb.tabgroup143448>) (hereinafter Harvard FAC Memo). In response, Elsevier reports that its print list price increases have averaged only five percent per year. Ian Sample, *Harvard University Says it Can't Afford Journal Publishers' Prices*, The Guardian, Apr. 24, 2012.

²¹ According to one study, the average subscription cost of commercially-published journals in the field of economics in 2001 was over \$1,600. Theodore C. Bergstrom, *Free Labor for Costly Journals?*, J. Econ. Persp., Fall 2001, at 183. Specialist publications, particularly in the medical literature, can cost in the range of \$20,000 per year. Pamela Burdman, *A Quiet Revolt Puts Costly Journals on Web*, N.Y. Times, Jun. 26, 2004 (citing the annual subscription rates of *The Journal of Comparative Neurology* (\$17,995) and *Brain Research* (\$21,269)). Harvard University has reported that some journal subscriptions cost as much as \$40,000 per year. Harvard FAC Memo, *supra* note 20.

²² Though this trend affected institutions and scientists worldwide, its impact was felt most acutely at institutions in developing countries, some of which were unable to sustain subscriptions to *any* relevant scientific publications. See JOHN WILLINSKY, *THE ACCESS PRINCIPLE: THE CASE FOR OPEN ACCESS TO RESEARCH AND SCHOLARSHIP* 14 (2006).

²³ Harvard FAC Memo, *supra* note 20.

²⁴ See Mark McCabe & Christopher M. Snyder, *The Economics of Open-Access Journals* (2010) at 1 (available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=914525), and Aaronson, et al., *supra* note 6.

physicians and nurses) found that a lack of access to current medical literature could have an impact on patient care.²⁵ For all of these reasons, limiting access to scientific research findings is likely to have a negative impact on social welfare.

In this paper, I propose a reallocation of rights between scientific authors and publishers in order to address the serials crisis and reduce the social welfare losses that it has occasioned. In Part I, I review the nature of the scientific publishing market and the causes of the serials crisis. In Parts II and III, I analyze existing proposals to address the crisis, including Steven Shavell's recent proposal to abolish copyright in academic works and a number of "open access" publishing models that have gained some measure of market acceptance. In Part IV, I turn to mandated open access approaches, including the U.S. NIH's open access policy, and discuss the potential pitfalls of relying on governmental programs as long-term solutions. In Part V, I describe the convergence of a number of existing open access efforts defined by particular time periods after which scientific literature is released to the public. Using these "latency" periods as a basis, in Part VI, I propose that the most effective means of addressing the crisis in scientific publishing is to effect a shift in publishing norms using a broadly-adopted license agreement that eliminates the assignment of copyright to the publisher and allows only a one-year exclusivity period before the publication must be released to the public. I argue that such a shift is possible and has precedent in a similar shift that occurred in the academic legal publishing market through the efforts of academics in the 1990s.

I. THE MAKING OF A CRISIS

A. *The Traditional Model of Scientific Publishing*

Merton observes that an individual scientist's rewards consist in large part of recognition and esteem, both of which are achieved through the communication of results to the scientific community.²⁶ What's more, the

²⁵ Jamie O'Keeffe, John Willinsky & Lauren Maggio, *Public Access and Use of Health Research: An Exploratory Study of the National Institutes of Health (NIH) Public Access Policy Using Interviews and Surveys of Health Professionals*, 13 J. Med. Internet Res. at 4 (2011).

²⁶ Merton, *Normative Structure*, *supra* note 5, at 274-75. See also NAS – RESEARCH DATA, *supra* note 9, at 55 ("[r]esearchers receive intellectual credit for their work and recognition from their peers ... when they publish their results and share the data on which those results are based"), Jonathan M. Barnett, *The Illusion of the Commons*, 25 BERKELEY TECH. L.J. 1751, 1800-01 (2010) (norms of scientific practice "mandate uncompensated forfeiture of private knowledge in exchange for the prospect of reputational prestige"), and John M. Golden, *Biotechnology, Technology Policy, and*

quantity and prestige of a researcher's publications and the number of citations they receive from others are critical factors in securing scarce government grant funding.²⁷ Thus, researchers have significant personal incentives, both reputational and financial, to publish their findings as quickly as possible. The result is of personal benefit to researchers, but also confers benefits on society.²⁸

Nothing of value, of course, comes free, and the route to publication in a prestigious scientific journal is often difficult, time-consuming and circuitous. Once a researcher has made a finding deemed worthy of publication,²⁹ he or she must write an article describing that finding together with supporting data, illustrations and the like. The author then submits the article to the most prestigious journal that he or she deems likely to accept it. The most selective and prestigious journals can publish only a small fraction of the thousands of articles submitted to them each year, and a scientist's prominence and career advancement are dependent, in large part, on the number of publications that he or she places in highly-regarded journals.³⁰ Because most journals prohibit or strongly discourage simultaneous submissions, and because most journals' review cycles take weeks or months, scientists have an incentive to target their papers to the highest-ranked journal with a realistic possibility of acceptance.³¹

Patentability: Natural Products and Invention in the American System, 50 Emory L.J. 101, 155-56 (2001) (discussing motivations of scientists).

²⁷ One NIH spokesperson has noted that "applicants with robust publication histories, [and] proven track records of scientific accomplishment . . . may have the edge over their younger, less experienced counterparts." Bob Grant, *New NIH Forms Raise Concerns*, THE SCIENTIST.COM (available at <http://www.the-scientist.com/blog/display/56209/>).

²⁸ See NAT. RESEARCH COUNCIL, SHARING PUBLICATION-RELATED DATA AND MATERIALS: RESPONSIBILITIES OF AUTHORSHIP IN THE LIFE SCIENCES 34 (2003) (hereinafter NRC – SHARING PUBLICATION-RELATED DATA) ("the act of publishing is a *quid pro quo* in which authors receive credit and acknowledgement in exchange for disclosure of their scientific findings").

²⁹ Because researchers are often rewarded for the sheer *number* of publications that they produce, they sometimes strive to squeeze as many papers as possible from a single project. This practice has resulted in an increase in the total number of papers published, each of which consists of what is ironically referred to as a "Least Publishable Unit" (LPU). See William J. Broad, *The Publishing Game: Getting More for Less*, 211 SCIENCE 1137 (1981).

³⁰ The Thomson Reuters Journal Citation Reports (JCR) assign "impact factors" to scientific journals based on a variety of factors including the number of citations received by articles published in those journals. See ZIMAN, *supra* note 12, at 180 (noting that in terms of scientific success, "[o]ne paper with a hundred citations is worth infinitely more than a hundred papers with one citation each") and Research Information Network, *To Share or Not to Share: Publication and Quality Assurance of Research Data Outputs* 25 (2008) (available at www.rin.ac.uk/data-publication) (the assessment of researchers is "perceived to value above all else the publication of papers in high-impact journals").

³¹ This is in contrast to disciplines such as law, in which the cost and effort of simultaneously submitting a paper to multiple journals (often hundreds at once) is

When a journal receives a submission, its editorial staff conduct an initial screening review. Papers that do not meet editorial guidelines, either due to inappropriate subject matter (e.g., a paper on psychology that is submitted to an oceanography journal), the significance of their conclusions (e.g., a minor or incremental finding submitted to a highly-ranked journal), poor writing, or failure to comply with formatting or other editorial requirements, are rejected quickly.

If a paper appears to fall broadly within the journal's guidelines, the staff editors may then submit it for review by an editorial board consisting of respected scientists in the field. If the paper appears to be significant enough to publish, the editorial board will send it to two or more peer reviewers (also known as "referees") for evaluation and comment. Peer reviewers are selected based on their research interests, experience, prominence in the field, and often their own history of publishing with the journal. Peer review can be conducted either "blinded" (the reviewers do not know the identity of the authors) or "unblinded" (the identities of the authors are known to the reviewers). Reviewers, once selected, are asked by the journal to evaluate a submission based on its scientific merit, originality, significance and, if unblinded, the reputation of the authors. Peer reviewers will seldom advise a journal to publish a paper as originally submitted. Many papers, in fact, are rejected at this stage. But if a paper is deemed to be of potentially publishable quality, reviewers will usually suggest a number of changes, both editorial and substantive, and, occasionally, will require additional experimentation or analysis. The reviewers' comments are returned by the journal to the author, who may then revise the paper to address the comments and, if necessary, gather additional data, refine the analysis, and revise the paper. Once revised, the paper is resubmitted and the process is repeated until the paper is either accepted or rejected. If the paper is rejected, either initially or after review, the author must select another journal and revise the paper to comply with that journal's formatting, length and editorial requirements. This process is often repeated multiple times until the paper is finally accepted for publication by a journal.

Once accepted, the journal's editorial staff may edit and format the paper, check references, format figures and images, and otherwise prepare the accepted paper for publication. One recent study reports that the period from completion of scientific work until publication is typically between

extremely low and which results in the highest-ranked journals being swamped with thousands of unsuitable papers for consideration.

twelve and eighteen months.³² Other studies have found comparable or longer delay periods, depending on the field.³³

As time-consuming and frustrating as the journal submission and peer review process may be, journals are generally acknowledged to add value to the publication process. Among their primary contributions are quality-control and selection, which they achieve both through their own editorial review and by coordinating the peer review process. Busy working scientists have limited time to study the literature relevant to their fields and educate themselves regarding new developments and discoveries. As a result, scientists rely on journals and journal reputation to organize and prioritize their intake of information and their limited capacity to read the current literature.³⁴ Journals thus act as value-added intermediaries at several points between authors and readers.³⁵

B. *The (New) Economics of Scientific Publishing*

1. *Cost.* The economic model enjoyed by scientific journals is fairly simple and enviable. On the cost side, journals obtain the majority of their content for free. Unlike publishers of general interest periodicals and newspapers, they employ few, if any, writers, reporters and photographers.³⁶ And unlike most book publishers, journals pay no author royalties. Rather, as described above, scientists submit their work to journals solely in exchange for intangible benefits such as reputational enhancement, career advancement and improved odds of securing grant

³² Carlos B. Amat, *Editorial and Publication Delay of Papers Submitted to 14 Selected Food Research Journals. Influence of Online Posting*, 74 *SCIENTOMETRICS* 379 (2008).

³³ See William D. Garvey & Belver C. Griffith, *Scientific Information Exchange in Psychology*, 146 *SCIENCE* 1655, 1656 (1964) (reporting that in the psychology field, their study indicated that the time between hypothesis and publication is between 30 and 36 months, and the time between reportable results and publication is between 18 and 21 months) and Charles G. Roland & Richard A. Kirkpatrick, *Time Lapse Between Hypothesis and Publication in the Medical Sciences*, 292 *J. AM. MED. ASSN.* 1273, 1274 (1975) (finding delays of 20 and 24 months between the completion of research and publication, respectively, for medical laboratory research and clinical research studies). Anecdotally, the author has been informed that publication delays are typically even longer in the social sciences.

³⁴ One study shows that, on average, a scientist will only read between 100 and 200 scientific articles per year from 18-26 different journals, out of more than one million peer-reviewed scientific articles published annually. Carol Tenopir & Donald W. King, *The Use and Value of Scientific Journals: Past, Present and Future*, 14 *SERIALS* 113, 114, 117 (2001).

³⁵ In economic terms, scientific publishers have been analyzed as intermediaries in a two-sided market, intermediating between authors on one side and readers on the other. See McCabe & Snyder, *supra* note 24.

³⁶ In addition to scientific papers, many journals also publish editorials, correspondence and short news stories of potential interest to their readership. Some of this content is provided by paid correspondents or freelance writers.

funding: benefits that are not funded directly by the journals. What's more, these same scientists perform a significant quality control and editorial function for the journals as peer reviewers. Again, they donate their services without direct compensation to enhance their own relationships with journals and as inherent duties of their academic positions.

Of course, journals do incur operational costs relating to submissions management, article screening, selection and coordination of peer reviewers, copy editing, art production, publication (both in print and online), marketing and distribution. After publication, journals incur ongoing costs associated with maintaining and archiving articles online, making supplementary materials and data available, offering search and indexing functionality, publishing related correspondence, technical comments and occasional retractions,³⁷ and sometimes handling legal claims that may be made with respect to published articles.³⁸

Estimates of the costs incurred by scientific publishers vary. By one estimate, publication costs for a single article in the most prestigious scientific journals can run up to \$10,000.³⁹ Others estimate that "first copy" costs of publishing an article in a scientific journal (i.e., excluding printing, distribution, marketing and overhead expenses) typically run between \$1,000 and \$4,000.⁴⁰

2. *Revenue.* The traditional journal revenue model is based on subscription sales to academic libraries. Libraries acquire journal subscriptions to make their content available to researchers within their institutions. In the past, this meant that paper copies of journals would be routed to relevant researchers or placed in departmental lounges before being archived in the library's general collection. Today, most scientific journals are distributed electronically (sometimes in addition to print copies), and an institutional subscription entitles affiliated researchers to access the journal's articles in electronic form.

³⁷ See Letter from Alan I. Leshner, Chief Executive Officer and Executive Publisher, Science, to Office of Science and Technology Policy (OSTP) dated January 12, 2012 (on file with author).

³⁸ Such claims may involve allegations of defamation, scientific misconduct, fraud, plagiarism, copyright infringement and conflict of interest. While ultimate legal liability for such claims may rest with the authors and/or their institutions, journals are often the first responders when such claims are made.

³⁹ Jocelyn Kaiser, *Free Journals Grow Among Ongoing Debate*, 329 *Science* 896, 897 (2010).

⁴⁰ Donald W. King, *The Cost of Journal Publishing: A Literature Review and Commentary*, 20 *LEARNED PUBLISHING* 85 (2007) and THE WELLCOME TRUST, *ECONOMIC ANALYSIS OF SCIENTIFIC RESEARCH PUBLISHING* (2004) (available at http://www.wellcome.ac.uk/stellent/groups/corporatesite/@policy_communication/documents/web_document/wtd003182.pdf).

As discussed in the Introduction, the subscription model for scientific journals worked without major incident until the large-scale entrance of commercial publishers following World War II. Beginning in the 1960s, the number of scientific journals began to proliferate, so that over the last fifty years the number of individual journal titles has increased by approximately a factor of ten.⁴¹ Together with the expanding number of journals, subscription rates increased dramatically, resulting in widespread cancelation of subscriptions and, as discussed above, the so-called serials crisis.⁴² According to a 1997 study conducted by Page, Campbell and Meadows, subscription revenue still accounts for approximately 85% of total revenue for journals in the sciences.⁴³

In addition to subscription revenue, scientific journals earn income from reprint sales (encompassing printed “reprints”, permissions for reproduction and one-time access to electronic copies). According to one estimate, a single highly-cited article can generate reprint revenue of up to \$700,000.⁴⁴ However, most articles generate little or no reprint revenue. Page, Campbell and Meadows report that combined “reprint” revenue accounts for approximately 8% of total revenue for journals in the sciences.⁴⁵

Another potential revenue source for some journals is advertising. In 2008, for example, the American Medical Association, publisher of the prestigious *Journal of the American Medical Association* (JAMA) reported that advertising generated 49% of its total publishing revenue.⁴⁶ The percentage, however, is significantly lower for commercial publishers that have a larger overall revenue base. Page, Campbell and Meadows report that 5% of journal revenue is attributable to advertising.⁴⁷

Both revenue and operating margin for scientific publishers are sizeable. As noted above, the overall annual market for scientific journals is estimated to be between \$7 and \$10 billion.⁴⁸ The field is dominated, however, by a few large publishers. In 2009, the two largest, Elsevier and Wolters Kluwer, earned annual revenues of approximately \$3 billion and \$1 billion, respectively, and each enjoyed profit margins in excess of 30%.⁴⁹

⁴¹ See notes 16-18, *supra*, and accompanying text.

⁴² See note 24, *supra*, and accompanying text.

⁴³ GILLIAN PAGE, ROBERT CAMPBELL & ARTHUR JACK MEADOWS, JOURNAL PUBLISHING 65 (Table 6.5) (reproduced in WELLCOME TRUST, *supra* note 40).

⁴⁴ E. Ray Dorsey, Benjamin P. George, Elias J. Dayoub, Bernard M. Ravina, *Finances of the Publishers of the Most Highly Cited US Medical Journals*, 99 J. MED. LIBR. ASSN. 255, 257 (2011).

⁴⁵ PAGE, CAMPBELL & MEADOWS, *supra* note 43, at 65 (Table 6.5).

⁴⁶ Dorsey, et al, *supra* note 44. Note, however, that the AMA, as a non-profit publisher, charges far lower subscription rates than commercial publishers.

⁴⁷ PAGE, CAMPBELL & MEADOWS, *supra* note 43, at 65 (Table 6.5).

⁴⁸ See notes 14-15, *supra*, and accompanying text.

⁴⁹ Dorsey, et al., *supra* note 44, at 256. In contrast, the top 10 non-profit publishers of medical journals earned total combined revenues of less than \$200 million in 2008.

3. *The Journal Pricing Debate.* The complaint that elevated subscription pricing shuts out too many potential consumers may at first seem inconsistent with basic economic theory. Absent governmental regulation or violations of antitrust law, producers generally have no obligation to price their goods so that every potential consumer can afford them. Assuming that scientific papers are unique works that are not easily substitutable,⁵⁰ pricing of scientific journals would be expected to approach the publisher's profit-maximizing point. That is, in the market for a product as to which there are few and/or imperfect substitutes, a producer (acting as a monopolist⁵¹) will increase its price up to the point above which further increases would result in diminished demand and lower overall profit. At this point some quantity of consumers will purchase the product, but fewer than the number that would purchase it at a perfectly competitive price. If the producer sets the price of its products too high, it will forego profits. One could argue, therefore, that journal publishers have no incentive to overcharge for subscriptions, as this tactic would inure to their own detriment.

Critics contend, however, that just because a small number of wealthy institutions can afford journals' high subscription rates, the market is not working efficiently. Instead they see a market failure that reduces overall social welfare,⁵² namely the advancement of scientific progress. Scientific literature, they argue, is not a luxury good, the overall distribution and production of which society is indifferent to. Rather, the broad distribution of scientific knowledge is itself a social good that should be encouraged, or at least not stymied through the pricing action of non-producing intermediaries such as publishers. The loss of utility experienced by consumers who do not purchase a product at the monopolistic publisher's profit-maximizing price is termed deadweight loss.

Id. The Economist reports Elsevier's 2010 profit margin at 36%. *Of Goats and Headaches*, THE ECONOMIST, May 26, 2011.

⁵⁰ Felix S. Chew, Kevin T. Llewellyn & Kathryn M. Olsen, *Electronic Publishing in Radiology: Economics and the Future*, 1 J. AM. COLL. RADIOLOGY 815 (2004) (supporting the notion of non-substitutability of journals in radiology).

⁵¹ The scientific publishing market may more accurately be described as one of monopolistic competition, in which products (journals) do not serve as substitutes for one another, but in which producers (publishers) do exhibit some characteristics of market competitors. The publishing industry is generally viewed as exhibiting the characteristics of monopolistic competition. *See, generally*, N. GREGORY MANKIW, PRINCIPLES OF MICROECONOMICS 329-31 (6th ed. 2012).

⁵² Landes and Posner argue that total welfare should not be affected by losses to consumers from higher prices in markets dominated by copyright. WILLIAM M. LANDES & RICHARD A. POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 81-82 (2003). This view, however, assumes a regime in which the creation of copyrighted works is affected by the level of copyright protection. In the case of scientific publishing, incentives for authors are typically independent of copyright protection. *See* Section x, *infra*.

This critique echoes the criticism of pharmaceutical manufacturers in the “access to medicines” debate. These manufacturers are alleged to have charged monopolistic profit-maximizing prices for patented drugs in developing countries, where only a tiny fraction of the population can afford them. In this market, deadweight loss can be equated to a reduction in access to life-saving medications, and a corresponding social benefit can be derived from minimizing this deadweight loss.⁵³

In the case of scientific publishing, deadweight loss is created when institutions are unable or unwilling to pay a journal’s subscription rates and are thus unable to give their faculty access to the journal’s content. In other words, the deadweight loss represented by the inability of scientists to access scientific information results in less overall scientific advancement - fewer medical and technological breakthroughs - and is thus socially undesirable.⁵⁴ The reported effects of the serials crisis on actual institutions, both within the industrialized world and, more tellingly, in the developing world, support the argument that overall scientific progress may be less than it otherwise could be absent the publishing industry’s current pricing structure.⁵⁵

Journals, of course, incur costs, and many critics acknowledge that scientific publishers contribute value to the publishing enterprise. Landes and Posner remind us of this often-neglected element of the equation:

We must not ignore the publishers ... Given substantial fixed costs of publication and easy copiability, publishers may need copyright protection in order to be able to

⁵³ See, e.g., Jerome H. Reichman, *Comment: Compulsory Licensing of Patented Pharmaceutical Inventions: Evaluating the Options*, 37 J. L. Med. & Ethics 247, 250 (2009), and Sean Flynn, Aidan Hollis, & Mike Palmedo, *An Economic Justification for Open Access to Essential Medicine Patents in Developing Countries*, 37 J.L. Med. & Ethics 184, 185 (2009).

⁵⁴ Suboptimal social welfare may result not only from loss of access by institutions unable to afford publishers’ profit-maximizing rates, but also from those that *can* afford these rates, as the excess rent paid by research institutions to publishers (whether funded internally or by government grants) is diverted to publishers and away from the funding of further scientific research. And unlike other monopolists, such as patent-holding pharmaceutical manufacturers, who arguably utilize excess profits to fund further research and development, scientific publishers do not themselves fund any scientific research.

⁵⁵ See, e.g., JOHN WILLINSKY, *THE ACCESS PRINCIPLE: THE CASE FOR OPEN ACCESS TO RESEARCH AND SCHOLARSHIP* at ix, 93-94 (2006) (describing the devastating loss of subscriptions by research institutions in the developing world), and Barbara Aronson, *Improving online access to medical information for low-income countries*, 350 NEW ENGLAND J. MED., 9668 (2004) (reporting the results of a 2001 WHO study finding that 56% of all research institutions in the lowest-income tier countries had *no* subscriptions to international scientific journals and 21% averaged only two such subscriptions; and even in the next income tier, 34% had no subscriptions, and 34% had between two and five such subscriptions).

recover their fixed costs even if they don't have to pay a cent for the expressive content of what they publish⁵⁶

Critics counter, however, that the escalating subscription rates charged by journals have far outstripped mere cost recovery and cannot be justified on this basis alone. The reported 30%+ profit margins of major commercial publishers, substantially in excess of margins elsewhere in the publishing industry,⁵⁷ would seem to support this assertion. Moreover, unlike pharmaceutical manufacturers, scientific journals do not require even a portion the financial incentives permitted by monopolistic pricing in order to fund the creation of new scientific works, as these works are created by scientists who are not financially compensated by the journals.

C. Leveraging Copyright

Given that both the bulk of the content that they publish and a significant editorial and quality-control function are provided to journals for free by their own customers, how have commercial publishers managed to escalate the prices of scientific journals to monopolistic levels that, by most accounts, are far in excess of their costs? Reputational factors and the dependence of scientists on publication in prestigious journals give journals significant leverage to attract high-quality articles notwithstanding their pricing policies.⁵⁸ But once a journal attracts an article, it retains its absolute control over the article through copyright law.

1. *Why Copyright Matters.* The U.S. Constitution grants Congress the power to secure to authors the exclusive right to their writings for limited times in order to “promote the progress of science and the useful arts”.⁵⁹ Thus, according to the well-known incentive-based copyright argument, authors must be granted some exclusivity in their works if they are to be persuaded to create them in the first place.⁶⁰ As Thomas Macaulay explained in 1841, copyright imposes “a tax on readers for the purpose of giving a bounty to writers”.⁶¹

⁵⁶ Landes & Posner, *supra* note 52, at 53.

⁵⁷ See Ernst & Young, *New Study Shows Profitability and Growth in Media and Entertainment* (Mar. 14, 2011) (available at <http://www.ey.com/US/en/Newsroom/News-releases/New-study-shows-profitability-and-growth-in-media-and-entertainment>) (finding average 20% profitability in publishing industry).

⁵⁸ Journals' relative impunity in this area is bolstered by the separation of research and library functions at most institutions.

⁵⁹ U.S. Const., Art. 1, Sec. 8.

⁶⁰ Landes & Posner, *supra* note 52, at x. *But see*, Stan J. Leibowitz, *Is Efficient Copyright a Reasonable Goal?*, 79 GEO. WASH. L. REV. 1692 (2011) (arguing that economic efficiency is not a reasonable goal of copyright law).

⁶¹ Thomas B. Macaulay, *The First Speech on Copyright, February 5, 1841*, in MACAULAY'S SPEECHES ON COPYRIGHT AND LINCOLN'S ADDRESS AT COOPER UNION 18, 25 (Charles Robert

As an initial matter, however, it is not immediately apparent why copyright law matters at all in scientific publishing. The law is well-settled that scientific facts, data and discoveries are not themselves copyrightable.⁶² And, unlike most other works of authorship (e.g., novels, musical compositions, paintings and screenplays), there is little creative expression in the text of scientific journal articles, and only marginally more in their illustrations and figures. The primary, if not the only, goal of such articles is to communicate new scientific data, findings and conclusions to an interested audience of fellow scientists. The manner of expression, the language in which the article is written, provided that it is generally comprehensible to the intended audience, is irrelevant.⁶³

For example, below are two short descriptions of the same scientific finding. One is an excerpt from the abstract of an actual scientific article, the other is a rewording of that excerpt in a form that conveys the same information (to the best of this author's limited ability), but via a different form of expression:

Although eye color is usually modeled as a simple, Mendelian trait, further research and observation has indicated that eye color does not follow the classical paths of inheritance ... Although there are about 16 different genes responsible for eye color, it is mostly attributed to two adjacent genes on chromosome 15.⁶⁴

Despite the typical modeling of eye color heritability in classical Mendelian terms, our research shows that eye color is not determined through traditional inheritance pathways... We identify a pair of neighboring genes along chromosome 15 that are found to have primary responsibility for determining eye color, among the sixteen or so genes that are generally credited with affecting this trait.

Gaston ed., 1914) (quoted in Stephen G. Breyer, *The Uneasy Case for Copyright: A Look Back Across Four Decades*, 79 GEO. WASH. L. REV. 1635, 1641 (2011).

⁶² See *INS v AP*, *Feist v. Rural Telephone*. See generally J.H. Reichman & Paul F. Uhlir, *A Contractually Reconstructed Research Commons for Scientific Data in a Highly Protectionist Intellectual Property Environment*, 66 Law & Contemp. Probs. 315, 337-38 (2003) (describing the 'thin' copyright in scientific works and data).

⁶³ In fact, the prose in which scientific articles are written has frequently been criticized for its density, turgidity and generally poor quality. See, e.g., Rachel Toor, *Bad Writing and Bad Thinking*, CHRON. HIGHER ED., Apr. 15, 2010 (criticizing scholarly writing that uses "multisyllabic words, complex phrasing, and sentences that go on for days" and noting that "[i]f you're too clear, if your sentences are too simple, your peers won't take you seriously").

⁶⁴ Désirée White & Montserrat Rabago-Smith, *Genotype-phenotype associations and human eye color*, 56 J. HUMAN GENETICS 5 (Jan. 2011).

Though these two statements arguably convey the same scientific information (two genes out of sixteen strongly influence inherited eye color), the two modes in which this idea is expressed are sufficiently distinct that the second version should not infringe the copyright in the first.⁶⁵ Thus, even if dissemination of the first statement were barred by the owner of the copyright (a journal), that copyright owner could not restrict dissemination of the second statement.

If this is the case, then what would prevent scientific authors from recreating each of their copyrighted articles in a different guise and allowing the “second” versions to be distributed free of the control of publishers? Legally speaking, this approach might be viable. Practically speaking, however, such rephrasing would require a significant amount of work by the author – work that would not result in any material benefit. There is a low likelihood that busy scientists, racing to obtain grant funding and publish their latest findings, would take the time to rewrite each of their articles simply to help others who could not afford to subscribe to certain journals. And what about rewriting by graduate students, laboratory technicians or even undergraduate work-study students? While no formal study has been conducted, scientists whom I have informally queried claim that they would be unlikely to read or give much credence to such rewritten articles. They would be concerned about reliability and the introduction of errors, about losing the nuances of an experienced researcher’s reasoning, and about the interpretive exigencies of any translation exercise. Thus, even for scientific works, it appears that copyright cannot easily be circumvented, and that any solution to the serials crisis must address copyright head-on.

2. *Author’s Assignment of Rights.* Under modern copyright law, the author of a “literary” work has a number of exclusive rights, including the rights to reproduce, distribute and display the work.⁶⁶ The authors of scientific journal articles, which generally qualify as literary works, are also entitled to these exclusive rights.⁶⁷ But when a scientific article is accepted

⁶⁵ The test for determining copyright infringement in the U.S. is whether one work is “substantially similar” to another. Feist, 499 U.S. at 340.

⁶⁶ 17 U.S.C. §106.

⁶⁷ Under the Copyright Act, ownership of a copyrightable work vests in the author upon fixation of the work in a tangible medium. 17 U.S.C. §102(a). But in the case of employees who create copyrighted works within the scope of their employment (works made for hire), their employers are treated as the authors and thereby obtain ownership of the copyright. 17 U.S.C. §101. An exception to this rule has been recognized in the case of academic authors, most of whom are employed by a university or other institution, but who typically retain copyright in works either through contractual arrangement with their institution or via the so-called “teacher exception” to the work made for hire doctrine. See Eric Priest, *Copyright, Scholarship, Authorial Autonomy, and the “Harvard” Open Access Mandate*, __ Nw. J. L. Sci. Tech. __ (forthcoming 2012).

for publication in a journal, the publisher typically requires that the author *assign* to it the full copyright in the article. This assignment of copyright gives the publisher complete and exclusive control over the reproduction, dissemination and publication of the work, even as to the original author and his or her institution.⁶⁸ And while some limited rights to use the work for educational and research purposes may be available under the “fair use” doctrine⁶⁹, these rights cannot be exercised unless the user has *access* to a copy of the work. Thus, one of a publisher’s key assets is the ability to prevent those who have not paid for a work from accessing it.⁷⁰

3. *Copyright Duration.* As observed by Patricia Aufderheide and Peter Jaszi, copyright is both “long and strong”.⁷¹ Despite the Constitutional restriction of the term of an author’s copyright exclusivity to “limited times”, the term of copyright protection in the U.S. has grown steadily over the years. Under the original Copyright Act of 1790, Congress set the maximum period of exclusivity at twenty-eight years (an initial term of fourteen years plus a fourteen-year renewal term). Since then, the term of copyright in the United States has steadily increased.⁷² Today, under the 1998 Sonny Bono Copyright Term Extension Act, the copyright term for most works is the life of the author plus seventy years.⁷³ The term of protection can thus easily exceed a century. Because of this extraordinary protective period, the exclusive rights controlled by publishers enable them to control the market for scientific works for the entire useful life of those works.

Interestingly, had the current copyright regime then been in effect, the works of Nicola Tesla (1856-1943) and George Washington Carver (1864-1943), each of whom made significant scientific discoveries during the nineteenth century, and most scientists who followed them, would still be protected by copyright in 2012. What if only a handful of scientists at

⁶⁸ In economic terms, copyright enables the journal publisher to act as a monopolist in the market for readers. See Frank Mueller-Langer & Richard Watt, *Optimal Pricing and Quality of Academic Journals and the Ambiguous Welfare Effects of Forced Open Access: A Two-Sided Model* at 17 (TILEC Discussion Paper, DP 2012-19, Apr. 25, 2012).

⁶⁹ 17 U.S.C. §107.

⁷⁰ Section 1201 of the Digital Millennium Copyright Act of 1998, Pub. L. 105-304, prohibits any attempt to circumvent electronic protection measures to access a digitally protected work, even if the purpose is to exercise fair use rights. For a critique of this level of legal protection in the context of scientific data, see generally Reichman & Uhler, *supra*, note 62, at 376-79.

⁷¹ PATRICIA AUFDERHEIDE & PETER JASZI, RECLAIMING FAIR USE – HOW TO PUT BALANCE BACK IN COPYRIGHT 16 (2011).

⁷² The extension of copyright term is not unique to the U.S. See Council Directive 93/98/EEC of 29 October 2003 (implementing the same copyright term length later reflected in the Sonny Bono Act in the U.S.).

⁷³ 17 U.S.C. 302(c). For anonymous works, pseudonymous works and works made for hire, the copyright term expires 95 years from publication or 120 years from creation, whichever occurs first. *Id.*

wealthy institutions had access to the corpus of scientific literature of the last century? One can only speculate (with some dismay) about the effect that such a lengthy restrictive regime might have had on the “progress of science”.

Notwithstanding these considerations, the Supreme Court has repeatedly affirmed the ability of Congress to extend the term of copyright protection at these levels. Most notably, when the constitutionality of the Sonny Bono Act was challenged in *Eldred v. Ashcroft*,⁷⁴ Justice Ginsburg, writing for the majority, relied on “[t]ext, history, and precedent” to confirm that the Copyright Clause grants Congress broad power to establish the term of copyright protection,⁷⁵ and declined to “alter the delicate balance Congress has labored to achieve”.⁷⁶ Even more recently, in *Golan v. Holder*,⁷⁷ Justice Ginsburg again affirmed the power of Congress to expand the scope of copyright protection without significant restraint.

Thus, the long horizon of copyright protection, coupled with the assignment of copyright by authors to publishers, has resulted in a situation in which publishers who neither create nor fund the creation of scientific works exert near-absolute control over their distribution, and charge the market accordingly. The result has been a curtailment of the literature available to many members of the scientific community, an undesirable result from a social welfare standpoint.

It is my goal in this paper to propose a modified scientific publishing model that both compensates publishers fairly for the value that they add as intermediaries, while at the same time ensuring that the published scientific literature is made broadly available to the scientific community to enable the continuing advancement of science.

II. ADDRESSING THE CRISIS THROUGH COPYRIGHT REFORM

A. *Abolishing Academic Copyright?*

If copyright law caused the serials crisis, then it stands to reason that substantive changes to copyright law can alleviate it. Steven Shavell, perhaps the most prominent scholar to advocate this approach, argues that

⁷⁴ 537 U.S. 186 (2003).

⁷⁵ *Id.* at ___. *But see id.* at ___ (J. Breyer, dissenting) (arguing that Congress’s expansion of copyright term should be subject to a “rationality” test).

⁷⁶ *Id.* at [n. 10 and slip op. 22] (citing *Stewart v. Abend*, 495 U.S. at 230).

⁷⁷ 556 U.S. ___, 132 S.Ct. 873 (2012).

copyright in academic works should be abolished altogether.⁷⁸ While this conclusion may, at first blush, sound extravagant, Shavell's careful reasoning bears consideration.⁷⁹

First, Shavell suggests that “the conventional rationale for copyright of written works – that it stimulates their creation and publication by allowing authors to profit from their sale – is seemingly of limited applicability to academic authors.”⁸⁰ To this end, he observes that academics possess strong incentives to publish scholarly work that are wholly independent of copyright. As discussed above, these incentives include recognition, career advancement and support of grant applications. By the same token, academics receive little if any direct pecuniary gain from the publication of scholarly articles.⁸¹ Thus, the financial incentives that copyright protection may offer to the authors of works of fiction, musical compositions and other copyrighted works do not necessarily apply to works of academic scholarship, and the abolition of copyright on academic works would likely have little impact on the overall production of these works or the financial returns to their authors.

Next, Shavell considers the potential impact of abolishing academic copyright on publishers. He acknowledges that publishers incur costs associated with their services as intermediaries. He also postulates that absent copyright, there would be no effective means for them to prevent others from copying and distributing published works soon after their initial appearance. In the face of rapid, inexpensive and legal copying, it would

⁷⁸ Steven Shavell, *Should Copyright of Academic Works be Abolished?* __ J. Leg. Anal. __ (2010). Shavell is not, of course, the first scholar to argue for the abolition or severe curtailment of copyright term. See, e.g., Stephen Breyer, *The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs*, 84 Harv. L. Rev. 281 (1970), MICHELE BOLDRIN & DAVID K. LEVINE, AGAINST INTELLECTUAL MONOPOLY 15 (2008) (“[t]he basic conclusion of this book is that intellectual monopoly – patents, copyrights, and restrictive licensing agreements – are unnecessary”), LAWRENCE LESSIG, THE FUTURE OF IDEAS 250-52 (arguing for a renewable 5-year copyright term, with a particular focus on online content). For a contrary view, see LANDES & POSNER, *supra* note 52, at 215 (presenting the economic argument for copyrights of indefinite duration, subject to ongoing renewal requirements).

⁷⁹ In this brief summary I cannot do justice to the economic model developed by Shavell, and will primarily address his qualitative reasoning and conclusions. An alternative to the Shavell model is presented in Mueller-Lander & Watt, *supra* note 68 (concluding that removal of copyright could have different effects depending on market configuration).

⁸⁰ Shavell, *supra* note 78, at __. For a statement of the traditional incentive-based argument for copyright, see LANDES & POSNER, *supra* note 52, AT 13 (“the dynamic benefit of a property right is the incentive that possession of such a right imparts to invest in the creation or improvement of a resource ... It enables people to reap where they have sown.”)

⁸¹ Shavell's proposal deals both with academic journal articles and books. Given the focus of my analysis on the serials crisis and means that have been proposed to alleviate its effects, I do not address his analysis of scholarly books in detail.

become impossible for journals to charge readers for their content (i.e., driving subscription and reprint rates to marginal cost, effectively zero). Publishers would thus need to look elsewhere to recoup their costs.⁸² Absent subscription revenues, publishers would most likely turn to authors. In such an “author-pays” model, the author’s institution (either itself or through grant funding) might or might not cover publication costs. If an author’s institution did not cover publication costs, then the abolition of copyright might have a negative impact on the production of scholarly work (as authors would probably be reluctant to pay journal fees out of their personal funds). However, Shavell argues that institutions and funders would have numerous reasons to cover these costs (e.g., to ensure that the work conducted by researchers they support continues to be published), and would likely have the means to do so.⁸³ In such a world, authors would not be financially disadvantaged by the abolition of copyright, resulting in no net increase or decrease in the number of scholarly works produced; publishers would recover their costs and thus continue to perform as value-added intermediaries; and the free availability of such works to the public would yield a significant social benefit. Thus, Shavell concludes that the abolition of copyright in academic works should be seriously considered as a possible solution to the serials crisis.

B. The Challenge of Tailoring Copyright Term

Shavell’s proposal to abolish copyright on academic works would adjust the intellectual property rights awarded by Congress to authors based on the peculiar incentive structures of the scientific publishing industry. Michael Carroll refers to this type of industry-specific calibration as *tailoring*,⁸⁴ and observes that tailoring can reduce inefficiencies created by “one-size-fits-all” intellectual property regimes. That is, under the current copyright system, once a work is determined to be copyrightable subject matter, the term of protection is uniform, no matter what the nature of the work or its author. This blunt approach over-compensates creators in industries in which the incentives to produce new works do not require the level of protection afforded by the law. This over-compensation comes at the expense of the public, which has limited rights to exploit the work during the term of protection, resulting in a net social cost without an offsetting gain in the production of new works. This cost, which results from the application of a uniform exclusive term to all forms of copyrighted works,

⁸² In a world without copyright, Shavell envisions most publication occurring electronically, without printing and distribution costs. He thus focuses exclusively on publisher “first copy” costs.

⁸³ In this vein, he argues that universities would be more than capable of funding such author fees from the savings they realize by no longer having to pay subscription fees for academic journals.

⁸⁴ See Michael W. Carroll, *One Size Does Not Fit All: A Framework For Tailoring Intellectual Property Rights*, 70 Ohio St. L.J. 1361 (2009).

has been termed “uniformity cost”.⁸⁵ According to Carroll, “uniformity cost is the central problem that intellectual property law must manage.”⁸⁶ Robert Merges has framed the problem of uniformity cost in terms of proportionality, reasoning

that a property right ought to be reasonably related to something socially useful and valuable. Where the unregulated market price of a property right moves radically out of alignment with underlying social utility, an institutional response is called for.⁸⁷

Proposals to tailor the scope and term of intellectual property rights based on the characteristics and requirements of particular industries have long been attractive to scholars and advocates. As long ago as 1884, Congressional backers of the newspaper industry sought (unsuccessfully) to enact an *eight-hour* copyright on the news.⁸⁸ More recently, Dan Burk and Mark Lemley have pointed to significant differences in the cost and incentive structures of the pharmaceutical industry, on one hand, and the information technology industry, on the other hand.⁸⁹ These differences, they argue, cannot be accounted for under the uniform 20-year patent term afforded under U.S. law, giving rise to significant market inefficiencies and net social cost.⁹⁰

In general, applying a uniform set of intellectual property rules to different industries and technologies is inefficient, and tailoring of these rights presents a way to reduce this inefficiency.⁹¹ However, as Carroll points out, “tailoring intellectual property rights well is not easily done”.⁹² In order to aid policy makers in assessing the feasibility of increasing social welfare through tailoring of intellectual property rights, Carroll offers a

⁸⁵ See Michael W. Carroll, *One for All: The Problem of Uniformity Cost in Intellectual Property Law*, 15 Am. U. L.Rev. 845 (2006).

⁸⁶ *Id.* at 849.

⁸⁷ ROBERT P. MERGES, JUSTIFYING INTELLECTUAL PROPERTY 181 (2011).

⁸⁸ News Copyright Bill of 1884. This legislative attempt was defeated. Thirty-two years later, in *INS v. AP*, the Supreme Court held that news facts are not subject to copyright protection, though the expression of the news in written stories might be, concurrently creating the so-called “hot news” doctrine based on state law tort of misappropriation.

⁸⁹ DAN L. BURK & MARK A. LEMLEY, THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT (2009).

⁹⁰ Specifically, Burk and Lemley argue that while a 20-year patent term might be appropriate to incentivize innovation in the pharmaceutical industry, with its lengthy, capital-intensive product development cycles and multi-year regulatory approval process, it is almost certainly not appropriate in the software industry, in which development cycles are a few months and involve few capital expenditures. *Id.* at x.

⁹¹ See Carroll, *Uniformity Cost*, *supra* note 85, at 848 (“perfectly tailored rights that promise innovators only the expected value required to induce socially desirable innovation would be theoretically optimal”).

⁹² Carroll, *One Size*, *supra* note 84, at 1366.

useful analytical framework.⁹³ In this framework, he posits three conditions that must be satisfied if efficiency gains are to be achieved by tailoring: (1) there must be reliable evidence that uniformity costs exist and that they can be reduced by tailoring (I term this the likely “*effectiveness*” of the tailoring proposal), (2) the measures proposed to eliminate these uniformity costs must be *administratively* feasible, and (3) the tailoring proposal must be *politically* feasible.

Shavell’s tailoring proposal would abolish copyright in academic works through an amendment to the Copyright Act. It is worth assessing this proposal in terms of Carroll’s three-part framework.⁹⁴

1. *Effectiveness*. Shavell’s arguments regarding the mismatch between copyright protection and incentives to create works of academic scholarship are consistent with a large body of previous criticism of the academic publishing market. Thus, I will assume *arguendo* that uniformity costs exist in this market and that the tailoring of intellectual property rights can lead to greater efficiencies and social welfare.

It is less clear, however, that Shavell’s specific proposal to abolish copyright on academic works would achieve optimal results. If copyright in academic works were abolished then, as discussed above, commercial publishers would likely turn to authors to cover their costs. The economics of an author-pays world are not well understood. Today, a number of open access scientific journals have adopted author-pays models,⁹⁵ but these are still a small fraction of the overall market. If the entire scientific publishing industry moved from a subscriber-pays to an author-pays model, there is a risk that the current reader-side serials crisis would simply be transformed into an author-side serials crisis. That is, once all publishers are operating under an author-pays model, what would prevent the subsequent escalation of author fees on a scale mirroring the escalation of subscriber fees today? In other words, if competition has not mediated price escalation on the subscriber side (due to the general inelasticity of journal prices) and publishers have been able to extract super-competitive rents from subscribers, it is possible that the same market forces would allow a similar escalation of author fees, particularly among the most prestigious and desirable (from an author’s standpoint) publications.

⁹³ *Id.* at 1406-07.

⁹⁴ Shavell’s economic model and assumptions have also been critiqued. See, e.g. Mueller-Langer & Watt, *supra* note 68, and Hossein Nabilou, *A Response to Prof. Shavell’s ‘Should Copyright of Academic Works Be Abolished?’*, 7 REV. ECON. RES. ON COPYRIGHT ISSUES 31 (2010). An analysis of the Shavell formal model and its critiques is beyond the scope of this article.

⁹⁵ See Section III.B.2, *infra*.

Moreover, it is not clear that authors or their institutions would be willing or able to pay author-side fees once they are required by all journals (as opposed to the small percentage of journals levying such fees today). If not, then authors (as opposed to readers) could become priced out of the academic scholarship market or some number of journals could fail.⁹⁶ In either scenario, the dissemination of scholarly work could decrease, leading to a decrease in available scientific knowledge that could rival the decrease caused by the serials crisis on the reader side. Thus, until further empirical and modeling work is done to assess the potential market effects of such a radical economic shift, it would be difficult to conclude that the abolition of copyright in academic works would be effective in increasing social welfare.

2. *Administrability.* Carroll's second test queries whether "the distinctions drawn [by a tailoring solution] are jurisprudentially stable and administratively cost-effective."⁹⁷ An example of a rule that is relatively easy to administer is Section 105 of the Copyright Act, which denies copyright protection to works created by U.S. government employees.⁹⁸ To apply this exclusion one must simply determine whether or not the author of a particular work is an "officer or employee of the U.S. Government" and whether the work was prepared within the scope of that person's governmental duties.⁹⁹ To the extent that questions have been raised around its edges (e.g., whether government contractors should be considered government employees), they can be answered definitively by the courts.

The distinction proposed by Shavell between academic and non-academic works, however, is less clearly delineated. His proposal would exclude from copyright "academic works", encompassing both books and articles in all academic disciplines.¹⁰⁰ Yet many authors of articles in scientific journals are not full-time faculty at academic institutions, but

⁹⁶ Cf. Mary Waltham, *The Future of Scholarly Journals Publishing Among Social Science and Humanities Associations* 19 (2009) (available at <http://www.nhalliance.org/bm~doc/hssreport.pdf>) (noting that of ten social sciences and humanities journals studied, most could not move to an author-pays model with their current cost structures).

⁹⁷ Carroll, *One Size*, *supra* note 84, at 1424. See also John Golden, *Principles for Patent Remedies*, 86 Tex. L. Rev. 505, 563 (2010) (defining "administrability" as establishing a regime "that government actors can readily apply and that interested private actors can readily heed, use, and understand").

⁹⁸ 17 U.S.C. §§101 and 105.

⁹⁹ 17 U.S.C. §§101

¹⁰⁰ Though it is a less critical point, it is also worth noting that all "academic" literature, including presumably, literature in the humanities, arts, natural sciences, social sciences, and professional training, has not been substantially affected by the serials crisis. In this sense, the scope of Shavell's approach is somewhat over-broad. For example, literary magazines and many specialized journals in the humanities in which academic authors publish are priced quite modestly and are not generally thought to suffer from the inflationary tendencies of scientific journals.

employees of corporations, government agencies,¹⁰¹ and not-for-profit institutions such as hospitals, think tanks, advocacy groups and the like. This is especially true in fields such as pharmaceutical development, engineering, computer science and economics. It is not clear how Shavell would deal with scientific articles published by non-academic authors, not to mention part-time academic authors such as adjunct professors, instructors, lecturers and postdoctoral fellows, or full-time members of the academic community who are not normally considered to be academic faculty: graduate students, project managers and technicians. Is Shavell's proposal to abolish copyright dependent on the employer of the author, the nature of the author's engagement with an academic institution, or the type of work being published? If the former, then significant inconsistencies would arise in the many scientific journals that carry articles by both academics and non-academics (i.e., some articles would be copyrighted, others not). If the latter, it is not clear that the arguments regarding the rationale for abolishing copyright for academics apply equally persuasively to non-academic authors. Moreover, it is difficult to conceptualize a justifiable subject matter-based exclusion from copyright that would accomplish the goal of alleviating the serials crisis without being stated so broadly that it would also eliminate copyright on textbooks, technical manuals, industry standards and other technical works that may be more deserving of copyright protection. Thus, it is not clear that Shavell's proposal offers a solid basis for differentiating between protected and unprotected content that "the law can adequately delineate",¹⁰² and thus suffers from likely difficulties in administrability.

3. *Political Economy.* The third prong of Carroll's tailoring framework requires an assessment of the political economy of a tailoring proposal. As any alteration to the scope of copyright protection is likely to require an amendment to the Copyright Act, Shavell proposes Congressional action to address the uniformity cost of academic publishing. The Copyright Act has, of course, been amended many times, and many of these amendments have been made with the purpose of "tailoring" protection for one specific industry or another.¹⁰³ Such legislative initiatives include protections for the cable and satellite television industries (Sections 111 and 119), the digital music industry (Section 114) and visual artists (Section 106A).

However, unlike most previous amendments to the Copyright Act, Shavell's proposal would act to *reduce* the term of copyright protection

¹⁰¹ No copyright attaches to the work product of U.S. federal employees, but the same is not true for state and local government employees or employees of foreign governments.

¹⁰² Carroll, *One Size*, *supra* note 84, at 1425.

¹⁰³ The Patent Act has been subject to similar industry-specific tailoring initiatives. See BURK & LEMLEY, *supra* note 89, at 95-96.

rather than increase it. He reasons that “[e]liminating academic copyright seems feasible from a political perspective because of its likely endorsement by universities, academics and students.”¹⁰⁴ While it is indeed conceivable that a coalition of universities, academics and students might support the abolition of academic copyright (except, possibly, in the case of university press publications), the effectiveness of such coalitions has been limited in cases involving copyright term length. For example, in *Eldred v. Ashcroft*, the petitioners (Eldred, et al.) were joined by *amici curiae* including fifteen library associations, five arts-based academic associations, seventeen economists, five constitutional law professors, fifty-three intellectual property law professors, and numerous other groups. This broad-based coalition was unsuccessful in persuading the Court and, evidently, in influencing Congress with respect to the enactment of the Sonny Bono Copyright Term Extension Act the year before (which passed in the House by a comfortable margin of 297-112).¹⁰⁵

While Shavell acknowledges that political opposition to his proposal would likely be raised by commercial publishers, he only mentions in passing potential opposition from other parties that “would view the abolition of academic copyright as undesirable because it might lead to erosion of intellectual property rights in a wider domain.” Based on the enactment within the last decade and a half of the strongly pro-copyright Sonny Bono Act, Digital Millennium Copyright Act (DMCA), and Anti-Counterfeiting Trade Agreement (ACTA), it would appear that the pro-copyright lobby in the United States is both formidable and effective.¹⁰⁶ Thus, there is some doubt regarding the likelihood that Congress could be persuaded to abolish copyright in academic works in the current political environment.¹⁰⁷

There are additional political impediments to the legislative amendment that Shavell proposes. He only mentions in passing that the abolition of academic copyright could conflict with U.S. treaty obligations.¹⁰⁸ The so-called TRIPS Agreement¹⁰⁹ establishes minimum requirements for intellectual property protection among WTO member

¹⁰⁴ Shavell, *supra* note 78, at 54.

¹⁰⁵ Congressional Record, Vol. 144, 1998, H1482-H1483.

¹⁰⁶ The recent popular opposition to the pending copyright bills SOPA and PIPA was fueled primarily by the technology sector, an increasingly powerful foil to the pro-copyright content industries. Unfortunately, it is hard to envision technology vendors expending significant political capital supporting the abolition of academic copyright.

¹⁰⁷ This is not to say, however, that no legislative action in the area of scientific publishing is possible. See discussion, *infra*, of the NIH OA Policy and related legislation.

¹⁰⁸ Shavell, *supra* note 78, at __, n. 88.

¹⁰⁹ Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 108 Stat. 4809, 1869 U.N.T.S. 299 (hereinafter “TRIPS Agreement”).

states. With respect to copyright, the TRIPS Agreement requires members to abide by Articles 1-21 of the Berne Convention for the Protection of Literary and Artistic Works (1971), another treaty to which the United States is a party. Article 1(1) of the Berne Convention expressly includes within the scope of copyright “every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as books, pamphlets and other writings, lectures, addresses, sermons and other works of the same nature.” While certain exceptions from the scope of protection are permitted under the TRIPS Agreement, these may only be imposed in “special cases”.¹¹⁰ And Article 12 of the TRIPS Agreement requires that the minimum copyright term for protected works be the life of the author plus fifty years. Thus, it is likely that one could raise a serious challenge to the abolition of copyright for academic works on the basis of the United States’ obligations under both the TRIPS Agreement and the Berne Convention.¹¹¹

Finally, and perhaps most tellingly, in June 2003 Representative Martin Sabo (D-Minn) introduced a bill to the House that would have had an effect similar to Shavell’s proposal, though only with respect to federally-funded research. Representative Sabo’s Public Access to Science Act (H.R. 2613) would have amended Section 105 of the Copyright Act to provide that “Copyright protection ... is not available for any work produced pursuant to scientific research substantially funded by the Federal Government.”¹¹² The bill, which had three co-sponsors, was referred to the House Judiciary Committee but failed to exit committee.¹¹³

Lemley and Burk, recognizing the difficulty of enacting effective legislative changes, suggest that tailoring of intellectual property rights (specifically patents) may best be achieved through judicial action.¹¹⁴ While Carroll is “less pessimistic” about the potential for legislative tailoring solutions, he too acknowledges that achieving lasting efficiency gains through legislative enactments is challenging.¹¹⁵ In the case of abolishing copyright for academic works, the legislative hurdles seem particularly high.

¹¹⁰ TRIPS Agreement, Art. 13.

¹¹¹ Burk and Lemley acknowledge this potential barrier to legislative tailoring in the context of patents. BURK & LEMLEY, *supra* note 89, at 97.

¹¹² Public Access to Science Act, H.R.2613, §3(b)(1) (Jun. 26, 2003)

¹¹³ While the Public Access to Science Bill was ultimately unsuccessful, it was succeeded in 2004 by the Congressional directive responsible for the NIH OA Policy discussed in Section IV below. That legislation, unlike the Public Access to Science Bill, did not abolish copyright in federally-funded scientific works, but encouraged (and later required) their release on an open access basis following the expiration of an exclusivity period negotiated by publishers. See discussion at Section IV.A, *infra*.

¹¹⁴ BURK & LEMLEY, *supra* note 89, at 104-06.

¹¹⁵ Carroll, *One Size*, *supra* note 84, at 1432.

Based on the foregoing, under all three prongs of Carroll's framework for analyzing the tailoring of intellectual property rights, Shavell's proposal to abolish copyright in academic works appears to face significant practical, administrative and political challenges.

III. RESPONSES IN THE SHADOW OF COPYRIGHT: THE OPEN ACCESS MOVEMENT

Whatever the theoretical merits of abolishing academic copyright may be, no such proposals have yet gained serious traction among lawmakers or other major stakeholder groups. In contrast, the "open access" (OA) movement among academic scholars and librarians has had a significant and growing impact on the public availability of scientific literature.

A. *The Rise of Open Access*

The emergence of the open access movement in scientific publishing is often linked to the rise of the Internet in the early- to mid-1990s, when it became increasingly clear that research publications could be shared online with minimal cost and great speed. In 2000, Harold Varmus, the Nobel Prize-winning Director of the U.S. National Cancer Institute, and other prominent scientists formed the Public Library of Science (PLOS), a coalition dedicated to improving public access to biomedical literature. They circulated an open letter, which was eventually signed by 34,000 scientists in 180 countries, urging publishers to make "the full contents of the published record of research and scholarly discourse in medicine and the life sciences" available to the public within six months after initial publication.¹¹⁶ The OA movement continued to gain momentum in 2001, when a group sponsored by George Soros's Open Society Institute met in Budapest to develop a set of recommendations for expanding open access to peer-reviewed scientific literature. The resulting Budapest Initiative (released in February 2002) calls both for self-archiving of journal articles by academic scholars and a "new generation" of open access journals that would be disseminated as widely as possible.¹¹⁷ Similar statements followed from Bethesda, Maryland (June 2003)¹¹⁸ and Berlin (Oct. 2003)¹¹⁹. These

¹¹⁶ The text of the PLoS 2001 letter can be found at: <http://www.plos.org/about/what-is-plos/early-history/>

¹¹⁷ The statement of the Budapest Initiative can be found at: <http://www.soros.org/openaccess/read>.

¹¹⁸ The Bethesda Statement on Open Access Publishing offers "concrete steps" that scientists, publishers, libraries and funding agencies can take to "promote the rapid and efficient transition to open access publishing". <http://www.earlham.edu/~peters/fos/bethesda.htm>

¹¹⁹ The Berlin Declaration on Open access to Knowledge in the Sciences and Humanities offers several conditions and definitions further elaborating the path toward establishment of an open access regime in scientific publishing. <http://oa.mpg.de/berlin-prozess/berliner-erklarung/>

three declarations (Budapest, Bethesda and Berlin, now commonly referred to as the “Three Bs”), received widespread support from the international scientific and academic communities. Though they differ in various respects, all three call for the free, online accessibility of scientific literature and the elimination of restrictions on its reproduction.

These calls for open access have given rise to a number of distinct OA approaches over the past decade. Below is a brief summary of the principal modes of open access publication for scientific literature.

B. Modes of Open Access Publication

1. Self-Archiving – The Green Route. Many academic researchers post copies of their work on departmental or institutional web pages, making them available to all without charge. This practice has been termed self-archiving or the “Green” route to open access. One recent study found that in 2008, approximately 12% of the published scientific literature was available through Green open access archives.¹²⁰ While this figure demonstrates that impressive gains have been made over the past decade, self-archived literature is still a relatively small percentage of the overall body of scientific literature.

Though self-archiving enjoys the twin virtues of convenience and speed, it is not without its limitations. Most notably, it depends heavily on the technical capabilities and idiosyncrasies of the author’s home institution, lacks indexing across different institutional repositories, and becomes unstable when authors move from one institution to another. To address these issues, some disciplines have moved toward centralized archiving services such as arXiv.org (physics and mathematics) and SSRN (social sciences, economics and law). These services generally allow free submission of articles, some limited indexing, and free access to all users. They are typically supported by volunteer efforts, institutional grants and/or charitable contributions. In addition, numerous software tools now exist to enable self-archiving and meta-tagging of documents so that they can be easily searched and indexed.¹²¹

From a copyright standpoint, before an author enters into a publishing contract with a journal, he or she is free to self-archive drafts and working papers as he or she wishes. But once an article is accepted by a journal and the author assigns the copyright to the publisher, the publisher obtains the exclusive right to control distribution of that work. Thus, the author who wishes to post a copy of a published article on his or her institutional web site cannot do so without the permission of the publisher.

¹²⁰ Bo-Christer Björk, et al., “Open Access to the Scientific Journal Literature: Situation 2009”, *PLoS ONE* 5(6) (June 2010).

¹²¹ Willinsky, *The Access Principle*, supra note 55, at App. F.

In response to this situation, a number of prominent research universities, in conjunction with groups such as the Association of College and Research Libraries (ACRL) and the Scholarly Publishing and Academic Resources Coalition (SPARC), began in 2005 to encourage researchers to utilize so-called “author addenda” in their publishing contracts.¹²² Among other things, author addenda reserve the author’s right to self-archive pre-publication versions of articles following journal publication.¹²³ Large institutions that subscribe to numerous research publications have proven to possess sufficient bargaining leverage to persuade publishers to permit such archiving by their faculty, often after the expiration of an “embargo” period of 6-12 months, and self-archiving of pre-print versions of articles after the expiration of an agreed embargo period is now permitted by a growing number of commercial publishers.¹²⁴ But, as several commentators have pointed out, a pre-print version of an article cannot substitute for the final published article, as it cannot be cited or quoted authoritatively, nor would it always reflect the refinements and corrections introduced by a journal’s peer reviewers.¹²⁵

Green OA offers a convenient and inexpensive way to disseminate research literature to a large audience. However, it is unlikely that self-archiving can ever replace the selection, editing and reputational functions provided by third party journals.

2. *Open Access Journals – The Gold Route.* Self-archiving is, among other things, designed to mitigate the copyright-based access limitations imposed by proprietary journals. An alternative OA approach seeks to bypass limited-access journals altogether and make published literature open from the outset.¹²⁶ This approach is enabled by a relatively

¹²² See SPARC, *Author Rights: Using the SPARC Author Addendum to Secure Your Rights as the Author of a Journal Article* (available at <http://www.arl.org/sparc/author/addendum.shtml>).

¹²³ Archived pre-publication versions of articles are typically either “pre-print” (articles that have not yet been accepted by a journal) or “post-print” (the final manuscript after peer review and acceptance for publication, but prior to the publisher’s copy editing, design, formatting and other services).

¹²⁴ The RoMEO database hosted by University of Nottingham currently lists 217 publishers that automatically allow institutional self-archiving of articles and 58 more that allow self-archiving after the expiration of an embargo period. <http://www.sherpa.ac.uk/romeo/PDFandIR.php?la=en> (accessed December 4, 2011).

¹²⁵ See, e.g., Shavell, *supra* note 78, at 43, and Michael Jubb, *Correspondence - Open Access: Let’s Go for Gold*, 487 *Nature* 302 (2012). The same observation applies to conference presentations, posters and abstracts. While valuable scientific information is undoubtedly disseminated through these channels, often long before results appear in a published article, only the definitive, published article is typically cited in another scientific article or grant application.

¹²⁶ In the strictest sense of “open access”, journals should permit free online access to content without any restrictions on reuse (provided that users cite the original author

new category of OA journals that support themselves not by charging subscription or access fees to readers, but by charging the authors who publish in them. This model has become known as the author-pays or “Gold” route to open access.¹²⁷ The first significant Gold OA publishing venue was launched by for-profit publisher BioMed Central in 2000. Today, BioMed Central is part of the Springer publishing group and publishes more than 220 OA journals in all fields of biomedical science. In 2003, the Public Library of Science (PLOS) launched its first open access journal, PLOS Biology, with financial backing from the Gordon and Betty Moore Foundation. Since then, PLOS has achieved significant recognition and its flagship journal, PLOS ONE, published 6,749 papers in 2010, more than any other scientific journal.¹²⁸

Author publication fees for Gold OA journals generally range from \$1,000 to \$5,000 per article, but can reach \$10,000 or more in some cases.¹²⁹ While the researcher’s institution is generally responsible for the payment of these fees, an increasing number of funding agencies and foundations have indicated a willingness to pay author publication fees for

and publisher on copies and derivatives of the content). Michael Carroll has recently noted that “some publications have begun offering an open-access option that charges for Internet publication without granting readers full reuse rights”. Michael W. Carroll, *Why Full Open Access Matters*, 9 PLoS Biology, Nov. 29, 2011, at 1. Carroll argues that this “pseudo open access” approach violates both the spirit and the purpose of open access publication and fails to produce the benefits that “full” open access can provide.

¹²⁷ Some advocates of Gold OA argue that only a minority of open access journals charge author fees. See, e.g., Peter Suber, Open Access Overview (available at <http://www.earlham.edu/~peters/fos/overview.htm>) (visited August 18, 2012) (reporting that 70% of Gold OA journals charge no author-side fees). Presumably, many of the non-charging Gold OA journals either receive funding from institutional or governmental sources or rely exclusively on volunteer efforts. Such approaches are not likely both to produce high-quality work and remain viable over the long term. Thus, for purposes of this article, I follow the custom of equating Gold OA approaches with the author-pays model. See McCabe & Snyder, *supra* note 24.

By the same token, many professional societies (such as the American Physiological Society) charge authors publication fees in order to defray member subscription costs. See Dale J. Benos, L. Gabriel Navar & Margaret Reich, *Publishing in the Journals of the APS: Why are authors charged fees?*, 278 AM. J. PHYSIOLOGY GASTROINTESTINAL LIVER PHYSIOLOGY 663, 663 (2000) (“Like many other association publishers, APS is able to keep subscription prices low by sharing some of the cost of publishing the journals with the authors who submit manuscripts... Many commercial publishers do not charge authors for publication (i.e., page charges) but have much higher subscription prices”), see also, Proceedings Natl. Acad. of Sci., Information for Authors, available at <http://www.pnas.org/site/misc/iforc.shtml> (detailing fees per page and per color figure), and J. Virology, Instructions to Authors, available at http://jvi.asm.org/misc/journal-ita_pub.dtl (detailing fees per page and per color figure).

¹²⁸ John Whitfield, *Open access comes of age*, 474 Nature 428 (2011).

¹²⁹ Maria Leptin, *Open Access – Pass the Buck*, 335 Science 1279 (2012).

research that they fund.¹³⁰ In addition, such fees are often waived or heavily discounted for researchers in developing countries.¹³¹

The growth of Gold OA journals over the past decade has been steady and is showing signs of achieving financial sustainability. One study found that in 2009 nearly 200,000 peer-reviewed articles were published in 4,769 Gold OA journals, representing between 6% and 8% of the total peer-reviewed scientific literature published that year.¹³² Thus, while Gold OA journals have seen impressive gains in just a decade, the large majority of peer-reviewed scientific output continues to be published in commercial, limited-access journals; and some critics question whether Gold OA journals will ever achieve a significant market share.¹³³ Among the challenges such journals face are their current lack of prestige as compared to many traditional journals, which dissuades scientists from submitting their best work to them.¹³⁴ Moreover, until such time as a large segment of the market consists of author-pays journals,¹³⁵ Gold OA journals will compete for authors and content with traditional journals that charge authors nothing. Thus, in the marketplace for new articles, Gold OA journals will continue to suffer a competitive disadvantage to traditional reader-pays journals. This situation will continue to be the case even if funders permit grant funding to be used to defray author-side publication fees, as some level of effort will always be required on the author's part to secure this funding, and in an era of declining grant funding, a few thousand dollars per article in publication fees can always find other productive

¹³⁰ Declan Butler, *US Seeks to Make Science Free for All*, 464 *Nature* 822, 823 (2010). A group of major research universities including Harvard, M.I.T., Dartmouth, Cornell, Berkeley, Columbia, Memorial Sloan-Kettering and the University of Ottawa have formed a group called the Compact for Open-Access Publishing Equity to advocate for greater payment of open access publication fees by research funders. Compact for Open-Access Publishing Equity (available at <http://www.oacompact.org/compact/>).

¹³¹ See, generally, Jorge L. Contreras, *Open Access Scientific Publishing and the Developing World*, 8 *ST ANTONY'S INTL. REV.* 43, 53-55 (2012) (discussing "information philanthropy" in the developing world).

¹³² Mikael Laaski, et al., *The Development of Open Access Journal Publishing from 1993 to 2009*, 6 *PLoS ONE* (June 2011). Significantly higher figures for OA journals are reflected in the online Directory of Open Access Journals (www.doaj.org), which, as of this writing, lists more than 7,300 OA journals in 117 countries. However, these figures rely on self-reporting, do not account for discontinued or merged journals, and do not require that journals be peer reviewed in order to be included. Shavell places the percentage of Gold OA journals in 2009 at 4%. Shavell, *supra* note 78, at 44-45.

¹³³ Shavell, *supra* note 78, at 46-47.

¹³⁴ Shavell views this lack of prestige as the most serious challenge faced by OA journals, though he also expects that the quality gap between traditional and OA journals may diminish over time. Shavell, *supra* note 78 at 46-47.

¹³⁵ This is the situation that Shavell would bring about with the abolition of academic copyright.

uses.¹³⁶ Finally, it is still unclear whether an author-pays Gold OA model is financially viable across a large field of competitors. Many of the major Gold OA initiatives operating today have received substantial supplemental funding from charitable sources¹³⁷ or are part of larger profit-making organizations (e.g., BioMed Central, the OA arm of Springer). Such non-recurring revenue and support, while helpful to the initial entrants to the Gold OA marketplace, may not be available to subsequent entrants, raising questions regarding the “scalability” of the model.¹³⁸

3. *Voluntary Time-Delayed Open Access.* Scientific publishers have not uniformly opposed open access initiatives, and a few have even embraced them. Learned societies still publish a number of important scientific journals, and these have been among the most receptive to OA publishing models due, in large part, to advocacy by their members. Examples include the *New England Journal of Medicine (NEJM)* (published by the Massachusetts Medical Society) and *Molecular Biology of the Cell (MBC)* (published by the American Society for Cell Biology). Each of these journals now voluntarily makes its contents publicly-available after a waiting period (six months in the case of *NEJM*, two months in the case of *MBC*).¹³⁹ All seventeen journals published by the American Physiological Society make their contents openly available after twelve months.¹⁴⁰ The theory behind such delayed-release programs is that dues-paying members of the society benefit from immediate access to journal content, and are not harmed by the eventual public availability of such content.

Though promising, such delayed-release programs are limited primarily to journals published by learned societies rather than commercial publishers. Societies, in contrast to commercial publishers, serve their members through multiple channels, of which journal publication is only one. As of 2006, however, the three largest commercial publishers of scientific journals collectively controlled sixty percent of scientific research

¹³⁶ Moreover, it is often the case that only a project’s principal investigator has access to grant funding for publication fees, and not post-doctoral fellows or graduate students and publication often occurs months or years after the expiration of the grant funding. (I am grateful to Monte Buschbaum for these insights).

¹³⁷ For example, in 2004 PLoS reported that 90% of its revenue derived from contributions and grants. By 2009, 89% of its revenue were earned from author fees. Dorsey, et al., *supra* note 44, at 257.

¹³⁸ One recent analysis conducted by the UK government found that depending on starting assumptions about author fee levels and international uptake of Gold OA journals, a transition of UK research publications to a fully Gold-OA model could cost the UK higher education sector anything from zero to £70 million per year. *Editorial - Openness Costs*, 486 *Nature* 439 (2012) (citing Report of the Working Group on Expanding Access to Published Research Findings, Accessibility, Sustainability, Excellence: How to Expand Access to Research Publications (June 2012) (the Fitch Report)).

¹³⁹ Willinsky, *The Access Principle*, *supra* note 55, at 68.

¹⁴⁰ John Willinsky, *The Publisher’s Pushback against NIH’s Public Access and Scholarly Publishing Sustainability*, 7 *PLoS Biology* 20, 21 (2009).

content, and have significant subscription and reprint revenues at stake.¹⁴¹ These organizations have not, by and large, engaged in large-scale adoption of open access models, and some commentators do not see such a shift as likely¹⁴² (the notable exception being Springer's acquisition in 2008 of BioMed Central, the largest Gold OA publisher).

4. *Institutional Open Access Mandates.* Both Green and Gold routes to open access are largely voluntary. That is, authors choose to make their work openly accessible, either by self-archiving or submitting it to an OA journal. As demonstrated by the relatively modest proportion of articles available through self-archiving sites, scientists have little incentive to incur the cost and effort to self-archive.¹⁴³ Beginning in 2008, however, several prominent research universities including Harvard, the Massachusetts Institute of Technology and University College London, began to implement policies arising from their frustration with commercial publishers' unwillingness to allow self-archiving of their faculty authors' published articles.¹⁴⁴ These policies typically *mandate* that faculty deposit all research publications into open access databases after the passage of some defined time period following publication.¹⁴⁵ Such mandates give researchers a strong incentive to submit their work to journals that permit self-archiving or other open access release, and by the same token encourage commercial journals to permit this form of open access. By the end of 2011, more than 150 institutions worldwide had implemented such mandatory open access policies for scholarly publications.¹⁴⁶ In many cases, the use of time delays before published content is granted open access status has served to facilitate negotiation and agreement regarding this difficult issue.¹⁴⁷

¹⁴¹ *Id.* at 18.

¹⁴² See, McCabe & Snyder, *supra* note 24, at 3-4.

¹⁴³ This effort would include, in addition to whatever work were required to post the article online, an often-frustrating exchange with the publisher securing permission to self-archive.

¹⁴⁴ For an extensive analysis of Harvard's open access mandate, and a discussion of the distinction between "deposit mandates" (in which university faculty are simply required to deposit their published work into OA repositories) and "permission mandates" (in which the university purports to reserve to itself the right to publish all works produced by its faculty) see Eric Priest, *supra* note 67 (questioning the legal enforceability of university permission mandates under copyright law). See also, John Timmer, *MIT to Make All Faculty Publications Open Access*, ARS TECHNICA, Mar. 24, 2009, and *Open-access publishing gains another convert*, 459 Nature 627 (2009).

¹⁴⁵ Many of these mandates, however, also permit authors to "opt out" of the open access requirement on a case-by-case basis. See Priest, *supra* note 144, at x.

¹⁴⁶ ROARMAP Registry of Open Access Repositories Mandatory Archiving Policies (available at <http://roarmap.eprints.org/>)

¹⁴⁷ See Jorge L. Contreras, *Data Sharing, Latency Variables and Science Commons*, 25 BERKELEY TECH. L. J. 1601 (2010) (discussing negotiation of timing periods in this and other multi-stakeholder contexts).

However, such initiatives have generally been limited to large and influential research institutions whose faculty may be less vulnerable to retaliation (or the fear of retaliation) by journals. Smaller institutions might be reluctant to jeopardize the publication options of their faculty by imposing such mandates. Moreover, the results of such bilateral negotiations are usually protected by confidentiality clauses, making the benchmarking of such agreements difficult for those wishing to negotiate with publishers.

IV. FROM MOVEMENT TO MANDATE

A. *Funder and Agency Open Access Mandates*

The preceding section describes a number of privately-ordered open access initiatives developed by research institutions, scientists and publishers to counteract the effects of the serials crisis in scientific publishing. During the period that these initiatives were being implemented, many of the leaders of the open access movement were also urging major research funders, both governmental and charitable, to take similar steps toward encouraging the broad public availability of scientific literature.¹⁴⁸

This call was soon answered by major private research foundations including the Wellcome Trust in the UK, and the Howard Hughes Medical Institute and the MacArthur Foundation in the U.S. Each of these organizations now requires that all researchers to whom it provides financial support must deposit any resulting journal articles into an open access repository. Like the institutional mandates described in Section III.B.4 above, these policies encourage researchers to submit their papers to journals that permit some form of open access release, and also encourage commercial publishers to permit self-archiving of these articles within some time period following initial publication.

Beginning in 2003, scientists, archivists and policy makers also began to approach U.S. and European governmental funding agencies regarding the need for open access to scientific publications. In the case of government agencies, open access advocates had available to them an additional argument not germane to the private sector: that it is inappropriate for research funded by the *taxpayers* to inure solely to the financial benefit of publishers. Their strong contention was that taxpayer-

¹⁴⁸ In fact, many of these leaders themselves held government office. The primary example of this close connection between the OA movement and government is Harold Varmus, co-founder of PLoS, who has served as Director of both the National Institutes of Health and the National Cancer Institute (the position in which he currently serves).

funded research should be made freely-available, both to scientists and to the general public.¹⁴⁹ The implications of this argument are significant, as government-funded scientific research represents a large portion of all academic research conducted globally. According to one estimate, research funded by the U.S. National Institutes of Health (NIH) alone, which has an annual research funding budget of more than \$30 billion, results in approximately 60,000 new scientific papers every year.¹⁵⁰

Both NIH and Congress were highly receptive to this argument. Accordingly, in June 2004, the House Appropriations Committee directed NIH to adopt a policy making all scientific publications generated by NIH-funded research available online. Shortly thereafter NIH engaged in an informal rulemaking procedure and public comment solicitation. During the 60-day comment period, the agency received more than 1,000 responses, including significant opposition from publishers and representatives of other content-based industries. After considering this public response, NIH adopted a policy¹⁵¹ that encouraged, but did not require, researchers to place the full text of their published articles into the National Library of Medicine's publicly-accessible PubMed Central archive¹⁵² within six months following publication in a journal.

But with little direct incentive to do so, and the prospect of having to negotiate nettlesome publication addenda with publishers who were unfamiliar with (or hostile to) the NIH policy, scientists did not submit their articles to PubMed Central in large quantities.¹⁵³ Advocates again approached Congress regarding the need for access to taxpayer-funded research. Accordingly, in 2007 Congress directed NIH to revise its policy to *require* open access publication of NIH-funded publications.

The revised NIH policy¹⁵⁴ (the "NIH OA Policy") went into effect in 2008. It provides that all publications resulting from NIH-funded research

¹⁴⁹ The patient advocacy community has forcefully argued that access to the latest research contained in medical journals is of critical importance to patients and their families and caregivers.

¹⁵⁰ Willinsky, *The Access Principle*, *supra* note 55, at 2.

¹⁵¹ Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research, NOTOD-05-022, Feb. 3, 2005 (available at <http://grants.nih.gov/grants/guide/notice-files/NOT-OD-05-022.html>).

¹⁵² <http://www.ncbi.nlm.nih.gov/pmc/>

¹⁵³ According to a 2006 NIH progress report, the compliance rate with NIH's voluntary policy was 3.8%. Peter Suber, "NIH report to Congress", *Open Access News*, Feb. 16, 2006 (available at <http://www.earlham.edu/~peters/fos/2006/02/nih-report-to-congress.html>).

¹⁵⁴ National Institutes of Health, Revised Policy on Enhancing Public Access to Archived Publications Resulting from NIH-Funded Research, NOT-OD-08-033 (Apr. 7, 2008), implementing Division G, Title II, Section 218 of PL 110-161 (Consolidated Appropriations Act, 2008).

must be uploaded to PubMed Central within one year of publication.¹⁵⁵ The NIH OA Policy has already had a significant impact on the availability of biomedical literature: as of the end of 2011 the PubMed Central repository held approximately 2.3 million published articles relating to the biomedical sciences.

The NIH OA Policy has likely been successful because it balances the interests of publishers, scientists and the public. Thus, even though published articles are made publicly-available one year after initial publication, enough institutions are willing to pay for immediate access that journals can continue to charge subscription fees and recoup their costs plus some profit during the one-year exclusivity period. The continued high profit margins of the leading scientific publishers suggests that NIH's policy has not significantly reduced subscriptions to commercial journals,¹⁵⁶ nor have any discernible number of commercial journals gone out of business as a result of their inability to charge for access to articles after they have been placed in PubMed Central.

Similar open access mandates have been enacted by the European Research Council, the UK Medical Research Council and numerous other non-U.S. funding agencies. The NIH OA Policy has also been viewed with approval by other agencies within the U.S. federal government, and in 2010 and 2012 bills were introduced in the House of Representatives that would have required all other federal research funding agencies to adopt a similar policy.¹⁵⁷ Thus far, these initiatives have not gained significant political momentum.¹⁵⁸

B. *Vulnerabilities of Agency Mandates*

Despite the apparent success and promise of agency mandates, there are at least three significant issues that may limit their effectiveness as long-term solutions to the scientific publishing crisis.

¹⁵⁵ Note the lengthening of the "latency" period from six months under the 2005 policy to twelve months under the 2008 mandatory policy, largely due to the agency's attempt to respond to public comments received from the publishing industry.

¹⁵⁶ See Dorsey et al., *supra* note 44, at Fig. 2.

¹⁵⁷ Federal Research Public Access Act (FRPAA), H.R. 5037, 111th Cong. (2010) and Federal Research Public Access Act (FRPAA), H.R. 4004, 112th Cong. (2012). Companion legislation was introduced in the Senate by Senators Cornyn, Wyden and Hutchison. Federal Research Public Access Act of 2012, S.2096, 1125th Cong. (2012).

¹⁵⁸ The political will to act in this area may be supplied by another grassroots effort – a petition launched on the White House's open government web site in May 2012 which had received nearly 30,000 signatures by August. See Petition: Require Free Access Over the Internet to Scientific Journal Articles Arising from Taxpayer-Funded Research (available at <https://petitions.whitehouse.gov/petition/require-free-access-over-internet-scientific-journal-articles-arising-taxpayer-funded-research/wDX82FLQ>) (visited August 18, 2012).

1. *National Open Access?* The principal argument made in support of agency open access mandates is that taxpayer-funded research should not redound solely to the financial benefit of private commercial publishers, but rather should be made available to the taxpayers who funded it. Doing otherwise requires the taxpayer to pay twice for the same goods: the first time through his taxes, and the second time through the subscription fees charged by publishers. As described by Rep. Mike Doyle when introducing legislation this year to expand the scope of the NIH OA Policy, “Americans have the right to see the results of research funded with taxpayer dollars.”¹⁵⁹

This argument is attractive for its rhetorical simplicity and its appeal to a populist sentiment that is currently in vogue.¹⁶⁰ It has also been relatively successful in marshaling support for the NIH OA Policy. However, the taxpayer argument introduces into the open access debate a national character that has not previously been present.

The national character of research funding is one of the seldom-discussed puzzles of the open access model. Proponents of open access to

¹⁵⁹ Mike Doyle, *Rep. Doyle Introduces Bill to Ensure Public Access to Federally-Funded Research* (Feb. 9, 2012) (available at <http://doyle.house.gov/press-releases-1/2012/02/doyle-introduces-bill-to-ensure-public-access-to-federally-funded-research.shtml>) (visited 4 Mar 2012).

¹⁶⁰ The argument suffers from some obvious logical flaws that have largely been ignored. For example, U.S. taxpayers also “pay for” nuclear weapons, Air Force One, federal courthouses, penitentiaries and containers of grain shipped to developing countries, yet there is no serious argument that the average taxpayer should be permitted to access or use these assets simply on the basis of tax funding. In essence, the payment of taxes does not (and cannot, practically speaking) give rise to any direct entitlement to the things that the government spends those tax dollars to purchase.

In terms of intellectual property, the situation is more complex. Works of authorship created by federal employees are excluded from federal copyright protection. 17 U.S.C. §105. This exclusion tends to support the argument that federal taxpayer dollars (i.e., those paying the salaries of federal employees) should result in work that is broadly accessible to the public. Yet the federal copyright exclusion only applies to federal employees, and not to federal contractors. Copyright in works produced by authors under federal contract are generally owned by the contractor, with a limited right to governmental use. And a contrary approach has been taken in federal policy relating to patents. Under the Bayh-Dole Act of 1980, the federal government expressly authorizes government-funded researchers (principally university laboratories) to secure patent protection for inventions made using federal funding. And even more puzzling is the fact that the federal government itself obtains patent protection on inventions made by federal agency employees. Clearly, in the case of patents, federal policy does not mandate the divestment of rights based on the receipt of federal funding. Thus, it is by no means clear that the presence of federal funding should compel the release of scientific publications contrary to the protections afforded by copyright law.

federally-funded scientific literature generally advocate *global* open access. That is, literature that is considered “open access” should be available to any reader throughout the world without charge. This model reflects the global, open nature of the Internet (national censorship notwithstanding), and has generally been adopted by open access publications and resources across the board, including PubMed Central. There are many valid arguments, both ideological and instrumentalist, for adopting such a global approach. But the argument that U.S. taxpayer-funded research should be accessible to the taxpayers does *not* support a global open access approach. Rather, this argument would tend to favor a system whereby research publications were made accessible only to *U.S.* taxpayers (institutional or individual), but not to foreign ones. Such a nationally-based open access system (which I have termed “National OA”) would, in economic terms, better allocate the benefit of U.S. tax dollars to U.S. taxpayers, and would eliminate economic free riding by non-U.S. consumers of research.¹⁶¹ Thus, supporters of broad open access initiatives should be wary of the taxpayer argument and its potential to limit the scope of information availability in the future.

2. *Limited Copyright Permissions.* From a legal standpoint, it is important to note that agency mandates such as the NIH OA Policy do not purport to divest publishers of any exclusive rights under copyright law.¹⁶² Rather, these policies require agency-funded researchers to upload their published articles to a centralized open access repository, but in *compliance* with copyright law. For example, under the NIH OA Policy, authors are required to deposit their published articles into the federally-managed PubMed Central repository within one year following publication. Because the publisher acquires the copyright in the article, the author cannot make this deposit without the publisher’s permission. Publishers, of course, would be short-sighted in prohibiting PubMed Central deposits, because much high-quality research in the U.S. is funded by NIH. It is thus in their interest to enable authors to comply with the NIH OA Policy.

Publishers *could* enable this compliance by granting authors a copyright license to upload their articles to PubMed Central upon expiration of the one-year holding period. However, most publishers have elected to take a more circuitous route and grant the author no copyright license.

¹⁶¹ I address the potential for a National OA model in greater detail in Jorge L. Contreras, Letter to Ted Wackler, Deputy Chief of Staff, Office of Science and Technology Policy, Re: OSTP Request for Information: Public Access to Peer-Reviewed Scholarly Publications Resulting from Federally Funded Research (76 Fed. Reg. No. 214 at 68,518), January 12, 2012.

¹⁶² Some have argued that a mandate in this form could constitute the “taking” of a property right under the Fifth Amendment of the U.S. Constitution and thereby impose on NIH an obligation to compensate the publisher for the fair value of the appropriated property. A full analysis of this argument is beyond the scope of this paper.

Rather, the publishers commit that *they* will submit the post-print version of the article to PubMed Central twelve months after publication.¹⁶³ This approach has several advantages for the publisher: it ensures that only the post-print version, and not the published version, of the article will be released to the public, and it keeps the publisher's copyright intact, without licenses flowing to individual authors. Thus, if the NIH OA Policy were suddenly to change or be rescinded, publishers could rescind any rights granted to NIH and no residual rights would remain with the authors. For the same reason, the commitments made by publishers to authors in this regard are highly tailored to the specific open access policies being addressed, and some publishers maintain a separate policy for each different funding agency that requires open access release.¹⁶⁴ Thus, if a particular funding agency changed or rescinded its open access policy, any new action required by the publisher would not affect its commitments made with respect to other agencies.

This level of specificity, while enabling compliance with current agency policies, is not very adaptable to changed circumstances, requirements or technologies. Thus, a publisher's commitment to upload an article to PubMed Central is useful while PubMed Central is in operation in its current form. However, what would happen if PubMed Central began to charge non-U.S. institutions for access (as it might if a National OA program were implemented)? What if the federal government, in a politically-motivated flurry of governmental "shrinkage", transferred PubMed Central to a private sector entity (much as it has done with the U.S. Postal Service)? What if Google became the primary vehicle for scientific publishing? In very few of these cases would publishers' current OA commitments compel the re-posting of articles to such new, altered or improved repositories, and the 2.3 million articles currently residing in PubMed Central would be stuck there unless some actor could persuade or pay the publishing industry to authorize this new open access release. There are thus serious issues with the long-term viability of governmental and other funder OA mandates.

3. *Political Uncertainty.* While OA mandates imposed by a non-profit funder may remain in place so long as the funder does not radically change its mission, mandates implemented by governmental

¹⁶³ See, e.g., Elsevier, Elsevier NIH Policy Statement (available at <http://www.elsevier.com/wps/find/authorsview.authors/nihauthorrequest>) (accessed 24 January 2012) and Genetics in Medicine, Authorship Responsibility, Financial Disclosure and Copyright Transfer at 3 (available at <http://edmgr.ovid.com/gim/accounts/copyrightTransfer.pdf>)

¹⁶⁴ See, e.g., Elsevier, Elsevier Funding Body Agreements & Policies (available at <http://www.elsevier.com/wps/find/authorsview.authors/fundingbodyagreements>) (visited 24 Jan. 2012) (providing links to Elsevier's separate policies for NIH, the Wellcome Trust, Howard Hughes Medical Institute, the UK Medical Research Council and 10 other funding bodies).

agencies are subject to the whim of political change. The most successful agency mandate to-date, the NIH OA Policy, which can already be credited with the public release of more than 2.3 million scientific journal articles, is under continual legal attack by the commercial publishing industry. Legislation seeking to overturn the NIH OA Policy has been introduced in the House of Representatives twice: in 2008¹⁶⁵ and 2011.¹⁶⁶ Though neither of these legislative initiatives gained much ground, it is not difficult to envision a political climate that would favor the elimination of costly federal document repositories that essentially duplicate and supersede the work of private sector enterprises.¹⁶⁷ And even if legislative efforts are unsuccessful in revoking such policies, changes in agency leadership could have equally damaging effects on the viability of governmental repositories and the continuation of agency open access mandates.

V. COMMONS AND LATENCY IN SCIENTIFIC PUBLISHING

A. Science Commons

The term “commons” has long been used to denote a resource shared by a group of individuals, typically without significant restriction on its use or consumption.¹⁶⁸ In recent years, much has been written about so-called “information commons”, a term used to encompass resources as varied as computer software, network capacity, artistic content and scientific data.¹⁶⁹ And Peter Suber has aptly applied commons terminology

¹⁶⁵ Fair Copyright in Research Works Act, H.R. 801, 111th Cong. (2009) (would have prohibited federal agencies from adopting open access publication policies).

¹⁶⁶ Research Works Act (H.R. 3699) introduced in the House by Representatives Issa and Maloney on December 16, 2011. The bill’s co-sponsors withdrew it in February 2012. See *Legislation to Bar Public-Access Requirement on Federal Research is Dead*, CHRON. HIGHER ED., Feb. 27, 2012.

¹⁶⁷ From a U.S. political standpoint, it is probably fortunate that the largest scientific publishers are European (Reed Elsevier – Dutch (approximately 1,800 titles), Taylor and Francis – UK (more than 1,000 titles) and Springer– Germany (more than 500 titles)), without a significant employment base in the U.S.

¹⁶⁸ See Elinor Ostrom & Charlotte Hess, *Introduction: An Overview of the Knowledge Commons*, in UNDERSTANDING KNOWLEDGE AS A COMMONS: FROM THEORY TO PRACTICE 4-5 (Charlotte Hess & Elinor Ostrom, eds., 2006) (hereinafter, *Knowledge as a Commons*).

¹⁶⁹ See, e.g., LAWRENCE LESSIG, *THE FUTURE OF IDEAS*, Ch. 6 (2001) (arguing that commons systems have encouraged innovation, specifically with respect to software, telecommunications and the Internet), Yochai Benkler, *Coase’s Penguin, or Linux and the Nature of the Firm*, 112 YALE L.J. 369 (2002) (arguing that “commons-based peer production” of software has proven to be both viable and efficient, as demonstrated by the model of the Linux operating system), James Boyle, *The Second Enclosure Movement and the Construction of the Public Domain*, 66 L. & CONTEMP. PROBS. 33, 44-49 (2003) (discussing open source software), HAL ABELSON, KEN LEDEEN & HARRY LEWIS, *BLOWN TO BITS – YOUR LIFE, LIBERTY, AND HAPPINESS AFTER THE DIGITAL EXPLOSION* 277 (2008) (discussing the application of commons theory to broadcast spectrum) and

and theory to the corpus of scientific literature and, in particular, that portion of the literature that is available on an open access basis.¹⁷⁰

In previous work, I have analyzed the effect of various rule sets on the rate at which new information is added to this scientific literature commons.¹⁷¹ A principal finding of this work was the observation of embargo, exclusivity or restricted periods (which I collectively refer to as “latency” periods) that emerged, seemingly independently, in each of these settings. During such latency periods, a publisher typically retains the *exclusive* right to offer access to a published work and to charge a premium for subscription access to it. But after the expiration of the latency period, the work becomes available for free and open access (either by the publisher, the author, or a third party). The policy settings and stakeholder groups involved in these negotiations are summarized in *Table 1* below, along with the resulting “latency” period established.

JONATHAN ZITTRAIN, *THE FUTURE OF THE INTERNET AND HOW TO STOP IT* 78-79 (2008) (discussing commons approaches both to Internet content and hardware).

¹⁷⁰ Peter Suber, *Creating an Intellectual Commons through Open Access*, in *Knowledge as a Commons*, *supra* note 168, at 171.

¹⁷¹ Jorge L. Contreras, *supra* note 147, and Jorge L. Contreras, *Prepublication Data Release, Latency, and Genome Commons*, 329 *SCIENCE* 393 (2010).

Table 1
Latency-Based Negotiated Compromises in Scientific Publishing

| Setting | Stakeholders | Open Access Channel | Latency Period |
|--|---|-----------------------------------|--|
| Institutional Mandates | Universities, Scientists and Commercial Publishers | Institutional self-archiving | 6–12 months |
| Voluntary Time-Delayed OA | Association Publishers and Scientists (Members) | Publisher | 2-12 months |
| NIH Voluntary OA Policy (2005) | Funder, Scientists and Commercial Publishers | PubMed Central | 6 months |
| NIH Mandatory OA Policy (2008) | Funder, Scientists and Commercial Publishers | PubMed Central | 12 months |
| Howard Hughes Medical Institute (HHMI) | Funder, Scientists and Commercial Publishers | PubMed Central | 6 months |
| Wellcome Trust OA policy | Funder, Scientists and Commercial Publishers | UK PubMed Central | 6 months |
| Proposed Federal Research Public Access Act (2010) (not enacted) | U.S. Federal Agencies, Scientists and Commercial Publishers | n/a | 6 months |
| Research Councils UK ¹⁷² | UK Government, Scientists and Commercial Publishers | Journal OA site or self-archiving | Immediate (for journal site) or 12 months (self-archiving) |

To recapitulate: (1) in bilateral negotiations, universities and publishers have negotiated limited exclusivity periods of *six to twelve months* before university researchers are authorized to release published articles to the public, (2) membership organizations that publish scientific journals, in response to member demands, voluntarily permit open access release of articles following an exclusivity period of up to *twelve months*, (3) through agency notice-and-comment rulemaking procedures, NIH has mandated that all publications arising from NIH-funded research be released to the PubMed Central database *twelve months* after publication, (4) major charitable foundations such as the Wellcome Trust and HHMI have mandated that all publications arising from research funded by them

¹⁷² Research Councils UK Policy on Access to Research Outputs (Jul. 17, 2012) (available at http://www.rcuk.ac.uk/documents/documents/RCUK%20_Policy_on_Access_to_Rese_arch_Outputs.pdf).

be released to open access databases *six months* after publication, and (5) legislation previously introduced in Congress would have extended the NIH mandate to all federal agencies and reduced the holding period to *six months*.

Interestingly, as *Table 1* illustrates, the latency periods that have emerged in these diverse settings are generally in the range of 6-12 months. It hardly bears mentioning that, even at the high end, such periods are substantially shorter than the statutory copyright term which, as discussed in Section I above, can easily exceed a century. Though positions regarding the optimal length of latency periods still differ,¹⁷³ it appears that the scientific community is converging on a latency period in the range of six to twelve months. Such convergence suggests that there are common considerations motivating the separate negotiations¹⁷⁴ among the different stakeholder groups (i.e., publishers, libraries, scientists, governmental agencies and research institutions) in each of these diverse contexts.¹⁷⁵

B. *Optimizing Latency*

How can the observed latency convergence described in the preceding section be explained? From the standpoint of publishers, any acceptable latency period must be sufficient to enable them to recoup at least their first copy costs plus a reasonable profit. Beyond that point, further returns are not required to incentivize either the production or publication of scientific works.¹⁷⁶ As the latency period increases, publishers are able to sell not only subscriptions, but also reprints, thus increasing their value further. From the standpoint of libraries, scientists and public advocates, the greatest value is derived when the latency period is the shortest, making knowledge available for general use as soon as

¹⁷³ To be sure, some commercial publishers still argue that *any* latency period is too short. This position is reflected in the recently-introduced Research Works Act (H.R. 3699) discussed at notes 2-3, *supra*, and accompanying text.

¹⁷⁴ I intentionally use the term “negotiating” to describe both private party interactions and governmental rulemaking and legislation, which are deeply affected by input from private interest groups. See, e.g., Jessica D. Litman, *Copyright, Compromise, and Legislative History*, 72 CORNELL L. REV. 857, 870-79 (1986) (describing the lengthy and difficult negotiations leading to the enactment of the Copyright Act of 1976).

¹⁷⁵ Though it has also been suggested that the observed convergence of latency periods around the 6-12 month range may be attributable not to any inherent efficiency associated with this time period, but, at least in part, to diffusion and the imitation of the negotiated results of initial actors. But even if this were the case, there would still be great value in the establishment of a commonly-adopted latency period.

¹⁷⁶ See Landes & Posner, *supra* note 52, at 50 (“even with regard to expressive works especially vulnerable to being promptly and perfectly and widely copied it is unclear that manufacturers would require copyright protection lasting more than a few years in order to be able to recover the reasonable cost of creating the work.”)

possible. The longer knowledge is withheld from the public, the less value they obtain from it (as it becomes obsolete or superseded by later discoveries and refinements).

Figure 1
Value as a Function of Latency

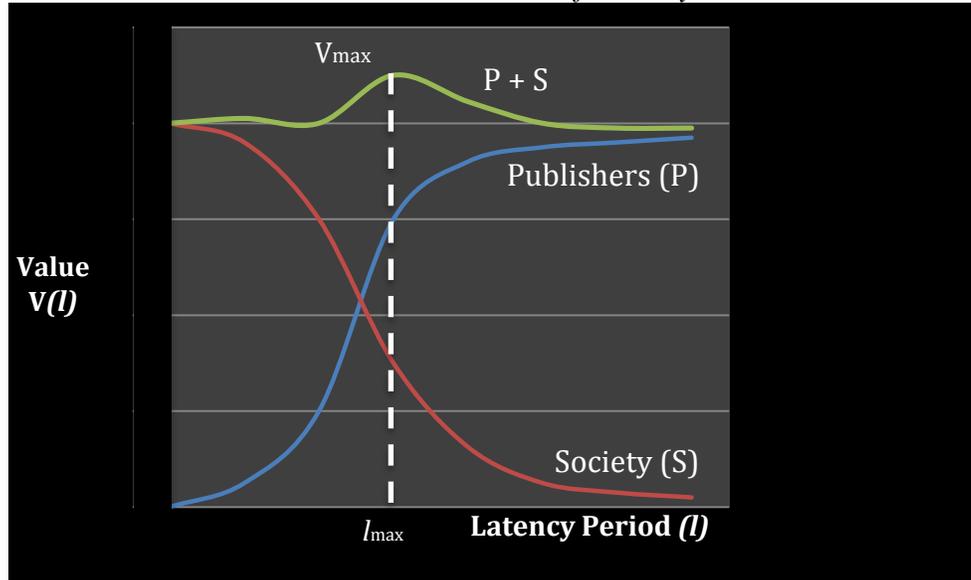


Figure 1 illustrates, in a highly stylized fashion, the value ($V(l)$) derived from a particular scientific article by publishers and society as a function of latency period (l). Curve P represents the value function $V(l)$ of publishers. If the latency period is zero, the work will be freely copiable by the public as soon as it is released, reducing the publisher's value from the work to zero. As l increases, however, the publisher is able to sell subscriptions that include the work, together with individual reprints, increasing V until a plateau is reached at some maximal value. Conversely, curve S represents the value function $V(l)$ for society. Social welfare is greatest if the work is freely accessible as soon as it is released ($l = 0$), and decreases as the latency period increases. At very long latency periods, social value approaches zero (consider the example of Tesla noted above).

Curve P+S represents the sum of the values achieved by Publishers and Society. The maximum of P+S is thus the value-maximizing latency period (l_{max}). At this point, publishers are likely to recoup sufficient costs and profit to enable their ongoing operations, but are unlikely to agree to allow l to decrease further. Also at this point, the work is also sufficiently recent to enable society to make valuable use of it.

The model described in *Figure 1* is easily extrapolated from a single scientific article to the total supply of scientific articles published by a particular publisher. In this case, P would represent the aggregate value of the publisher's works, and S would represent the aggregate public benefit

flowing from such works. The latency period would be that applied to each article and would result in a similar P+S curve representing total value. Likewise, a single value-maximizing latency value l_{\max} would emerge. I suggest that the observed latency periods between six and twelve months described above, each of which has been privately negotiated in a different context, represent a convergence toward an aggregate value-maximizing l_{\max} for scientific publishing.¹⁷⁷ In other words, an “optimal” latency period for scientific publishing.

VI. TOWARD A PRIVATELY-ORDERED SOLUTION

If an optimal latency period does exist with respect to scientific publishing, and if l_{\max} indicates the appropriate length of the exclusivity term that should be afforded to scientific publications, then there are several potential applications of this observation in addressing the market inefficiencies caused by the serials crisis. One could point to this period in arguing for a legislative reduction of the copyright term for scientific journal articles. Such a legislative proposal might look similar to Shavell’s proposal to abolish copyright in academic works altogether, but would avoid some of the challenges of that proposal.¹⁷⁸ Nevertheless, as discussed in Section II.C above, the tailoring of intellectual property rights through legislative reform is difficult and uncertain to achieve desired efficiency gains. Likewise, the observed optimal latency period could be used as a basis for further agency mandates, such as the expansion of the NIH OA Policy to other agencies. But while the NIH OA Policy has been a great success, as discussed in Section IV.B, such policies are subject to political vagaries and cannot be depended upon in the long run. Thus, I propose a latency-based private ordering approach to address the serials crisis and attendant social welfare deficit.

A. *The Role and Nature of Private Ordering*

¹⁷⁷ Not surprisingly, the publishing industry continues to take a public position that one year is too short a period to recoup publishing costs. See Assn. of American Publishers, *The Impact of the NIH Public Access Policy on Professional and Scholarly Publishing* (available at <http://www.publishers.org/issues/5/9/>) (visited August 18, 2012) (“[i]n the life sciences, on average, only 60% of an article’s lifetime usage takes place in the first year of publication, leaving 40% commercial value of an article lost when it is available free 12 months after publication, [and] only 15% of the value of an article in American Psychological Association (APA) journals is recouped after the first year of publication”).

¹⁷⁸ Reducing copyright in scientific works to one year instead of eliminating it altogether would enable publishers to recoup costs and continue to operate without radically altering the financial model of the publishing industry (i.e., by changing the entire industry from a reader-pays to an author-pays model), thus avoiding the uncertainty and instability that such a change might bring.

The term ‘private ordering’ refers to rules systems that are conceived, observed and often enforced by private actors through extra-legal means. Since Robert Ellickson’s seminal study of the unwritten code governing the behavior of cattlemen and farmers in rural California,¹⁷⁹ a large body of scholarship has grown in this area. Commentators have analyzed private ordering systems employed by groups ranging from Hassidic diamond wholesalers,¹⁸⁰ Memphis cotton merchants¹⁸¹ and Japanese organized crime syndicates¹⁸² to the privately-chartered Internet domain name authority ICANN,¹⁸³ the New York Stock Exchange¹⁸⁴ and modern credit rating agencies.¹⁸⁵ While these communities vary dramatically in their composition, goals and patterns of interaction, they share a single, notable trait: the substitution of internally-administered rules for governmentally-imposed rules.

In economic terms, private ordering solutions arise when governmental allocations of rights have proven inefficient. The Coase Theorem, as it has come to be known, holds that in the absence of transaction costs, parties will bargain to the same efficient outcomes regardless of the initial allocation of rights.¹⁸⁶ This reasoning has been used to argue that uniformly broad intellectual property rights will not necessarily lead to uniformity costs and diminished social welfare, so long as parties are free to bargain to an efficient outcome.¹⁸⁷ Of course, it is generally acknowledged that transaction costs in intellectual property transactions are non-zero, and today, according to Carroll, “most agree that difficulties in valuing patents and copyrights raise transaction costs to the point that allocative efficiency will depend upon the content of intellectual property entitlements.”¹⁸⁸ But even in the face of inefficient initial allocations of intellectual property rights, private ordering can play a role in reallocating resources to their most efficient usage. As such, private ordering can serve as a robust alternative to governmental tailoring of

¹⁷⁹ ROBERT C. ELICKSON, *ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES* (1991).

¹⁸⁰ Lisa Bernstein, *Opting out of the Legal System: Extralegal Contractual Relations in the Diamond Industry*, 21 J. LEGAL STUD. 115 (1992)

¹⁸¹ Lisa Bernstein, *Private Commercial Law in the Cotton Industry: Creating Cooperation Through Rules, Norms, and Institutions*, 99 MICH. L. REV. 1724 (2001)

¹⁸² Curtis J. Milhaupt & Mark D. West, *The Dark Side of Private Ordering: An Institutional and Empirical Analysis of Organized Crime*, 67 U. CHI. L. REV. 41 (2000).

¹⁸³ James Boyle, *Governance of the Internet: A Nondelegation Doctrine for the Digital Age?*, 50 DUKE L.J. 5 (2000).

¹⁸⁴ Jonathan R. Macey, *Symposium: Public and Private Ordering and The Production Of Legitimate And Illegitimate Legal Rules*, 82 CORNELL L. REV. 1123 (1997).

¹⁸⁵ Steven L. Schwarcz, *Private Ordering of Public Markets: The Rating Agency Paradox*, 2002 U. ILL. L. REV. 1 (2002).

¹⁸⁶ See NICHOLAS MERCURO & STEVEN G. MEDEMA, *ECONOMICS AND THE LAW: FROM POSNER TO POST-MODERNISM* 67 (1997).

¹⁸⁷ See Carroll, *Uniformity Cost*, *supra* note 85, at 859.

¹⁸⁸ Carroll, *Uniformity Cost*, *supra* note 85, at 859 (citing Clarissa Long, *Proprietary Rights and Why Initial Allocations Matter*, 49 EMORY L.J. 823, 828-29 (2000)).

intellectual property rights.¹⁸⁹ In the following Sections, I will outline a private ordering approach to scientific publishing that draws upon the observed latency periods identified above.

B. *The Problem of Collective Action*

As described in Section V.A, various stakeholder groups involved in scientific publishing have converged on a latency period in the range of 6-12 months. Yet the adoption of solutions based on this period has been fragmented, and such solutions benefit only a fraction of the overall publishing market. Thus, the NIH OA Policy, perhaps the most influential initiative to adopt a latency period, only affects biomedical literature generated by NIH-funded researcher. Voluntary OA policies implemented by member-based societies only affect those journals and members of those societies. And OA mandates adopted by individual institutions only affect research generated by researchers within those institutions. Thus, despite the seeming trend toward the adoption of latency periods, the benefits and burdens of this approach are spread unevenly across the scientific community.¹⁹⁰

Putting aside for the moment funder and governmental OA mandates, which, as discussed above, may not be sufficiently robust to suffice as long-term solutions to the serials crisis, it is instructive to consider the position of a hypothetical research institution, State U. Assume that the administration of State U is both familiar with the serials crisis and that State U has been affected by the crisis through its own library's cutbacks. Assume also that State U has some number of faculty members whose research is funded by non-NIH sources and who wish to submit articles to scientific journals published by P, a commercial publisher. What incentive does State U have to approach P to negotiate an arrangement whereby its faculty publications would be released on an OA basis? Let us assume that State U already has a subscription to P's journals. The benefit of P's OA release of those articles would inure not to State U, but to other institutions, such as City College, who choose not to subscribe to P's journals (either because they are unable to afford them or because

¹⁸⁹ See Carroll, *One Size*, *supra* note 84, at 1393 ("the theoretical advantages of publicly tailored rights are minimized by tailoring through private ordering supported by judicial and other public enforcement.")

¹⁹⁰ For example, an NIH researcher at Harvard Medical School who published a paper in the *New England Journal of Medicine* would, knowingly or not, be participating in three separate instances of private ordering with respect to the publication of that paper: through the NIH OA Policy, through NEJM's voluntary OA policy, and through Harvard's OA mandate. On the other hand, a psychology researcher at a small Midwestern college whose research was funded by the American Psychiatric Association and who published his work in Elsevier's *Cognitive Psychology* would engage in none of these private ordering solutions.

they choose to allocate their available funds to different journals). Moreover, State U's faculty would likely perceive a *risk* from their university administration attempting to negotiate an OA arrangement with P, as those negotiations could be unsuccessful and potentially result in P's retaliation against State U faculty members by rejecting their submissions. Based on these considerations, State U has little incentive, individually, to negotiate an OA arrangement with P and, in fact, faces a disincentive in terms of the perceived risk incurred by its own faculty. Thus, given the time, effort and legal expense required to engage in such negotiations, and the fact that such negotiations would need to be conducted not only with P, but also with other publishers (Q, R and S), it is not surprising that State U will generally decline to engage in such negotiations.¹⁹¹

The example of State U reveals the classic collective action problem described by Mancur Olson in 1965:

If the members of a large group rationally seek to maximize their personal welfare, they will *not* act to advance their common or group objectives unless there is coercion to force them to do so, or unless some separate incentive, distinct from the achievement of the common or group interest, is offered to members of the group individually on the condition that they help bear the costs or burdens involved in the achievement of the group objectives ... These points hold true even when there is unanimous agreement in a group about the common good and the methods of achieving it.¹⁹²

In effect, Olson's insight is that individuals will not act to achieve a common goal unless they have *individual* incentives to do so, the achievement of the *common* good being insufficient to motivate their action. This observation is borne out by the relatively modest take-up of the open access publishing models described in Section III. Accordingly, for any

¹⁹¹ See Reichman & Uhlir, *supra* note 62, at 402-03 (in the case of research materials (e.g., biological samples) and databases, universities are most likely to act in their own self-interest, without regard to "the research needs of the larger community").

The counter-example, of course, is "H", a large and prestigious university that engages in such negotiations out of a commitment to principle and with sufficient confidence in its own bargaining position, and the indispensability of its own faculty to the publishing enterprise, that it sees little risk in doing so. See Erik Priest, *supra* note 144, at x.

¹⁹² MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION – PUBLIC GOODS AND THE THEORY OF GROUPS 2 (2d ed. 1971). Olson's quotation summarizes the collective action problem raised by self-interested action by group members. This problem is distinct from the better-known collective action problem arising from informational deficits among group members, as exemplified by the classic Prisoner's Dilemma game. See *generally*, RANDAL C. PICKER, GAME THEORY AND THE LAW 202 (1994).

private ordering solution to address the serials crisis effectively, it must overcome this collective action barrier.

Two classic “solutions” to the collective action problem involve state action and firm action.¹⁹³ In the selection quoted above, Olson himself recognizes the power of the state to compel private actors to cooperate for the public good. This “solution”, however, is not always palatable to the members of the community and, as discussed above, is dependent on political exigencies. Likewise, theories of firm action posit the intervention of an entrepreneur who organizes and compensates members of the community in pursuit of an efficient result. Neither of these “solutions” has obvious applicability to the collective action problem manifested by the serials crisis.

Elinor Ostrom, however, poses a third alternative to influencing collective action in the context of common resources: the shaping of norms.¹⁹⁴ As defined by Ostrom and Sue Crawford, “norms” are “prescriptions held by an individual that an action or outcome in a situation must, must not, or may be permitted”.¹⁹⁵ However, unlike formal rules, norms are not backed by binding enforcement mechanisms.¹⁹⁶ She explains, first by recasting Olson, and then by introducing the possibility of changing the norms that otherwise would drive group members toward their own self-interested, but less socially-valuable, positions:

This points to the importance of larger institutions that enable participants in social dilemma situations to have sufficient autonomy that they can change the rules that affect their ongoing situations ... [M]any individuals have crafted ingenious institutions that help them reach mutually productive rather than mutually unproductive outcomes.¹⁹⁷

As discussed below, changing norms will play an important role in addressing the collective action problem in scientific publishing.

C. *A Private Ordering Proposal: A One-Year Latency-Based License*

As discussed in Section I.C.1, copyright *term* is not the only culprit behind the serials crisis. A related factor that has enabled publishers to exert significant control over the dissemination of scientific information is

¹⁹³ These two approaches are summarized in ELINOR OSTROM, GOVERNING THE COMMONS – THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION 40-41 (1990).

¹⁹⁴ See ELINOR OSTROM, UNDERSTANDING INSTITUTIONAL DIVERSITY 121 (2005).

¹⁹⁵ *Id.*

¹⁹⁶ *Id.* at 149-50.

¹⁹⁷ *Id.* at 132.

the transfer of copyright by authors to publishers. The transfer of copyright, by definition, gives a publisher the exclusive right to exploit a work during its full copyright term. Assuming that copyright term will remain at its current duration for the foreseeable future, an author could seek to limit a publisher's control over the dissemination of a work by *contractually* limiting the amount of time that the publisher has control over dissemination of the work. Specifically, rather than assigning the copyright in the work to the publisher, the author could grant the publisher a *license*. A license is simply a contractual right to exercise one or more intellectual property rights during a specified period of time. An appropriate license to publish a scientific article might grant the publisher the *exclusive* right to reproduce and distribute the work during some period (e.g., the previously-identified one year latency period), followed by a *non-exclusive* right to reproduce and distribute the work during the remainder of the copyright term.¹⁹⁸

Such a publication license (which I term a “Latency-Based License”) would provide the publisher with all necessary rights to exploit the work (i.e., to reproduce and distribute it) throughout the copyright term. In addition, during the latency period, the publisher's right would be exclusive, meaning that neither the author nor any third party could legally reproduce or distribute the work. Moreover, while the license remained exclusive, the publisher would have the right to enforce the copyright in the article against infringers (unauthorized copiers).¹⁹⁹ After the latency period, however, though the publisher would retain a right to publish and exploit the work, it would no longer have the *exclusive* right to do so, nor to enforce the copyright against infringers.²⁰⁰ Accordingly, after the exclusivity period the author would have the right to reproduce and distribute the work freely and could, if he wished, grant this right to others with or without compensation. Such distribution could be accomplished through Green OA self-archiving, a centralized repository such as PubMed Central, or through a Gold open access journal.

¹⁹⁸ A similar licensing proposal has been made in the Netherlands by the SURF Foundation working with the UK Joint Information Systems Committee (JISC). See SURF, License to Publish (available at <http://www.surf.nl/auteursrechten/en/landschap/relationships/authorpublisher/Pages/Licence-to-Publish.aspx>) (visited August 18, 2012) (proposing a 6-month latency period).

¹⁹⁹ 17 U.S.C. 501(b) (conferring standing to sue on the “legal and beneficial owner of an exclusive right under copyright”).

²⁰⁰ Publishers, of course, may own the copyright in the collective work constituting a particular issue of a journal. See 17 U.S.C. Sec. 101 (defining “collective work” to include periodical issues). However, in the Internet age, it is more likely that individual articles, rather than traditional journal “issues” would be the subject of most copying.

One important right restored to the author under the Latency-Based License would be the right to disaggregate article content for repurposing, excerpting, aggregation, annotation, searching, indexing and other uses. Such rights are becoming increasingly important as online tools grow in sophistication. For example, journal articles often contain data-rich figures with meaningful captions. Yet captions are not searchable in most online articles. In fact, many online journal articles are not full-text searchable at all, and search engines are limited to indexing of abstracts and journal-identified keywords. Journals have been reluctant to permit full-text indexing of articles and uploading of article text to semantic databases that would enable sophisticated data mining. Instead, researchers are often required to identify articles via abstract searching, and then inefficiently scan or search articles individually using desktop tools such as Adobe Acrobat Reader. Under the Latency-Based License approach, authors would have the right to authorize the disaggregation of article content in order to facilitate sophisticated searching and data mining following expiration of the latency period.

A Latency-Based License approach would complement, not replace, institutional and funder OA mandates. Though the license would restore copyright control to the author after the latency period, it would not require the author to make his or her work publicly accessible. This important component of the open access equation must still be supplied by institutions and funders that can impose such requirements on individual researchers.²⁰¹

While the use of a Latency-Based License by an individual author when publishing a particular article would ensure the free accessibility of that article, the goal of this proposal is to effect a change more broadly within the scientific publishing industry. Thus, I propose that research institutions, as a group, adopt a standardized Latency-Based License for use by researchers when publishing their scientific articles. I propose that the latency period for this standardized license be set, at least initially, at one year, which reflects the negotiated (and possibly value-maximizing) period observed in the scientific publishing industry. In the weak version of this proposal, institutions would make this template Latency-Based License available to their researchers and *encourage* its use. In the strong version, use of the Latency-Based License by researchers would be *mandated* by institutions.²⁰²

²⁰¹ Such measures may also be needed to prod apathetic researchers to make their works available after the expiration of the one-year latency period, after they have moved on to other projects and have potentially forgotten about previously-published, but newly “freed” articles. (Thanks to Eric Priest for this insight).

²⁰² Debate continues regarding the advisability of permitting researchers to “opt out” of institutional open access mandates. One of the principal critiques of Harvard-style mandates is that they permit faculty members to opt-out of OA requirements with little inconvenience, thus encouraging authors to take the path of least resistance, which often means acceding to whatever terms a publisher offers in order to expedite

D. *Evaluating the Latency-Based License as a Tailoring Solution*

The Latency-Based License that I propose in Section C above is a privately-ordered means of tailoring publishers' intellectual property rights in scientific literature that can replace the publishing industry's current copyright assignment model. This proposal is intended to increase the quantity of public scientific knowledge and thereby increase net social welfare,²⁰³ without unduly burdening the publishing industry or disrupting the production of scientific literature. In analyzing this proposal, it is instructive to consider its potential costs and benefits in terms of Carroll's three-part tailoring framework. On the basis of this analysis, which is described below, I believe that the proposed Latency-Based License is likely to be effective in reducing uniformity costs and increasing overall social welfare, introduces few administrative hurdles and is politically feasible to implement.²⁰⁴

1. *Effectiveness.*

a. *As compared to assignment of copyright to the publisher.* If we acknowledge that copyright duration gives rise to uniformity costs in the market for scientific publishing,²⁰⁵ we must ask whether the proposed Latency-Based License is likely to be effective in

the publication of one's article. See Shavell, *supra* note 78, at x. The question of permitting opt-outs from a mandatory Latency-Based License structure would need to be considered carefully during the development of any template Latency-Based License.

²⁰³ The idea of a contractually-based commons is not new. See Reichman & Uhler, *supra* note 62 (arguing for a contract-based commons of scientific research data), Peter Lee, *Contracting to Preserve Open Science: Consideration-Based Regulation in Patent Law*, 58 Emory L.J. 889, 917 (2009) (describing efforts by patient groups to use contractual means to ensure access to patents) and Michael J. Madison, Brett M. Frischmann & Katherine J. Strandburg, *Constructing Commons in the Cultural Environment*, 95 CORNELL L. REV. 657 (2010) (identifying various "constructed" cultural commons).

²⁰⁴ It is possible that antitrust concerns may be raised with respect to the collective action taken by institutions in developing and/or adopting an industry-wide form of Latency-Based License. While a full analysis of these issues is beyond the scope of this paper, I believe that such concerns would not be justified, as the development of a non-binding industry-wide template agreement would be unlikely to harm competition either among publishers or research institutions, or to exert undue collective pressure on any cognizable market. Cf. European Commission, Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Co-operation Agreements ¶301 (2011) ("As long as participation in the actual establishment of standard terms is unrestricted for the competitors in the relevant market (either by participation in the trade association or directly), and the established standard terms are non-binding and effectively accessible for anyone, such agreements are not likely to give rise to restrictive effects on competition.")

²⁰⁵ See notes 85-86, *supra*, and accompanying text.

reducing this uniformity cost. One of the primary differences between the proposed Latency-Based License and the current regime in scientific publishing is the limitation of publishers' exclusive rights to a latency period of one year, rather than the full copyright term (life of the author plus seventy years). This one-year period was selected based on the observations described in Section V.B above, which supply the "evidentiary basis" for tailoring called for by Carroll.²⁰⁶ Yet, such evidence alone is not sufficient to demonstrate the effectiveness of the Latency-Based License proposal. In analyzing it further, the effect of this proposal on three principal constituencies (readers, authors and publishers) must be considered.

It is relatively straightforward that the proposed Latency-Based License, if broadly adopted, would increase the quantity of scientific literature available to readers, as distribution and publication of the literature could be conducted freely after the expiration of the latency period. Absent countervailing factors, social welfare measured by reader access to knowledge would increase under the proposed regime.

The impact of the proposed Latency-Based License on authors and publishers is somewhat entwined. If publishers have only one year of exclusivity in the articles that they publish, then, in order to continue to provide the services that they currently provide,²⁰⁷ they will need to recoup their costs plus a reasonable profit during this abbreviated exclusivity period. Commercial publisher revenue today consists of three principal components: subscriptions, reprints and advertising. I will analyze these in turn.

The largest component of commercial scientific publishing revenue is attributable to subscriptions (85% according to Page, Campbell and Meadows). Even if articles become available on an OA basis one year after initial publication, some percentage of researchers will still demand access to articles as soon as they are published and will be unwilling to wait to access them until after the latency period.²⁰⁸ It is thus possible that the number of subscribers will remain relatively close to their pre-adjustment

²⁰⁶ See Carroll, *One Size*, *supra* note 84, at x.

²⁰⁷ I assume that it is socially desirable for publishers' intermediation services to exist. See notes and accompanying discussion.

²⁰⁸ There are many reasons why researchers would not wish to wait until the expiration of a latency period to access articles, particularly those that are closely related to their own research. The two most prominent reasons for this impatience are the need for researchers to cite the most current literature in their own papers and in grant applications. In each case, it would be embarrassing at best for a peer reviewer to identify recent literature of which the author/applicant is unaware. Most importantly, such an omission could signal to reviewers that the author/applicant is not fully conversant with the literature in the field, a damning conclusion that could lead either to rejection of an article or a critical deduction from a grant application score.

values and publishers' percentage drop-off in subscription revenue will be relatively small. While more empirical research is needed, support for this conclusion can be found by examining the effect that the adoption of the mandatory NIH OA Policy has had on subscriptions for biomedical literature.²⁰⁹ Existing data indicate that the largest commercial publishers of biomedical journals suffered *no* noticeable drop-off in subscription revenue in the two years immediately following NIH's adoption of its mandatory OA policy.²¹⁰ In fact, the revenue of the two largest scientific publishers in the medical field, Elsevier and Wolters Kluwer, increased slightly from 2008 to 2009. Thus, while publishers may see some drop-off of subscription revenue from institutions who value particular publications at the margin, it is likely that subscription revenue will remain relatively stable under a publishing agreement incorporating a latency period of one year.²¹¹

Advertising rates are typically tied to a journal's subscription base. To the extent that journal subscriptions do not drop significantly as a result of the public release of articles after the latency period, one would not expect to see a significant drop in advertising revenue.

The most significant area in which journals are likely to see revenue reductions stemming from post-exclusivity open access is reprints. As noted in Section I.B.2, publishers earn reprint revenue both from traditional print reprints (additional "glossy" copies of articles that authors have traditionally sent to colleagues) and, more importantly today, one-time access charges for online versions of articles. Once an article becomes publicly-available, it is unlikely that a non-subscribing researcher who needs access to the article will pay the journal for it. Thus, a publisher will only have the opportunity to earn reprint revenue from articles only during the latency period. Assuming that the useful life of an article is longer than one year, and that demand for copies of the article will continue for some years following the expiration of the latency period, some loss of reprint revenue would be expected and the percentage by which publisher reprint revenue drops following a shift to an early-release model is likely to be relatively high. However, because reprint revenue represents only a small percentage of overall journal revenue (8% according to Page, Campbell and Meadows), even a steep decline in reprint revenue would not have a great impact on overall journal revenue.

²⁰⁹ As discussed in Section IV.A, the NIH OA Policy requires that all articles based on research funded by NIH must be deposited into NIH's publicly-accessible PubMed Central repository within one year following initial publication.

²¹⁰ See Dorsey et al., *supra* note 44, at Fig. 2.

²¹¹ Likewise, in each of the other cases cited in Section V.B in which a latency period has been observed, I am unaware of any reported impact on publisher revenue or profit.

Based on this analysis, it is likely that commercial publishers faced with a regime in which they enjoy exclusive rights to publish articles for only one year would not suffer significant declines in subscription or advertising revenue, and any reduction in reprint revenue would amount to a small percentage of the whole. Thus, it is reasonable to conclude that such a shift would allow journals to continue to recoup their costs plus a reasonable profit. This conclusion is borne out by the observed convergence of the industry in independent negotiations on such a latency period. If publishers do not experience significant financial distress from this shift and thus maintain current publishing models, authors are also unlikely to reduce their output of research articles.

Thus, the proposed shift from a copyright assignment regime to a more limited Latency-Based License regime is likely to produce net social welfare gains: public access to scientific literature will increase, publishers will experience minor losses of reprint revenue but will otherwise maintain near-current levels of revenue and profitability, and author output of articles is unlikely to change.

b. As compared to a zero-copyright regime. In assessing the proposed intellectual property tailoring solution it is also useful to compare its likely efficiency gains with those of Shavell's copyright abolition proposal. As discussed in Section II, abolishing copyright in academic works would make those works available to the public immediately, thus enhancing social welfare from the outset, whereas the proposed Latency-Based License would not result in the release of works until the expiration of the latency period, yielding a deferred social welfare gain.²¹² Thus, viewing only the effect on readers, the Shavell proposal appears to result in greater welfare gains. However, as discussed in Section II, abolishing academic copyright would push the publishing market toward an author-pays model with unpredictable consequences for authors. If author charges were raised high enough, the production of academic works could be diminished, resulting in a social welfare deficit. Thus, it is unclear whether an abolition approach would yield a net social benefit or cost, whereas it is likely that the proposed Latency-Based License would yield a net social benefit.

Moreover, the proposed Latency-Based License has the virtue of preserving stability in the market and would not result in a significant disruption of existing market roles or dynamics. A broad market shift from

²¹² I have previously argued that delaying the addition of knowledge to an information commons diminishes the total quantity of knowledge within the commons at a given point in time, making its contents less valuable than they would have been absent such delay. See Contreras, *Latency Analysis*, *supra* note 147, at x. However, this tradeoff may be justified to achieve policy compromises that enable the creation of the commons in the first place.

a reader-pays to an author-pays model, however, has never been attempted, and the results are unpredictable. While some element of uncertainty is inherent in any proposal for legal change, assuming other factors are equal, the preferable approach is often the one that introduces less volatility to the market.

c. *As compared to existing OA models.* As noted above, the Latency-Based License would restore to the author rights in his or her work following the expiration of the latency period. At that time, the author would be free to distribute the work via a Green OA self-archiving platform or via other means. Proponents of Green OA might ask why the Latency-Based License is preferable to approaches such as the SPARC Addendum, which are currently in use and already reserve to the author the right to self-archive his or her work. There are several important differences between current Green OA approaches and the Latency-Based License. First, the Latency-Based License does more than reserve a non-exclusive self-archiving right to the author, it restores to the author full copyright ownership, with all concomitant rights including the right to enable disaggregation and searching of content. Second, upon the restoration of these rights, the author has the ability to distribute the final, published version of his or her work, not a less citable pre-print or post-print version. Finally, the Latency-Based License approach creates a framework for establishing a uniform latency period across the entire industry, eliminating the effects of disparities in institutional negotiating power.

The proposed Latency-Based License also has advantages over existing Gold OA models, as it would enable the current publishing infrastructure to continue to operate without a radical (and unpredictable) shift in publishing economics.

2. *Administrability.* The second prong of Carroll's tailoring framework requires an assessment of the ease and cost of administering the proposed Latency-Based License proposal. The Latency-Based License is a contractual private ordering solution that does not depend on the amendment or enactment of laws, rules or regulations. As such, it has both strengths and weaknesses as compared to a legislative solution. The most notable benefit of a legislative solution over a private ordering solution is that the former automatically applies to all parties within the jurisdiction, whereas the latter must be implemented party-by-party on a piecemeal basis. It is for this reason that Carroll suggests that in some cases, private ordering may be viewed as less efficient, or more costly, than the establishment of broadly-applicable rules.²¹³ However, this inefficiency

²¹³ See Carroll, *One Size*, *supra* note 84, at 1399 ("to the extent that transaction costs limit the scope of effective private ordering, some progress toward the theoretical ideal of tailored rights can be made when rights are defined as formally uniform while

occurs when multiple individual parties are required to bargain separately with each other to achieve the desired result, thereby increasing overall transaction costs. The proposed Latency-Based License is intended to remain uniform across all transactions (other than in the details of the specific work, author and journal). Thus, the aggregate effect of multiple licenses between institutions and publishers more closely resembles that of a broadly-applicable rule than a multiplicity of individual transactions. For this reason it is generally acknowledged that the use of standardized contracting forms is both an efficient and effective means of establishing relationships between parties.²¹⁴ Thus, individual and aggregate transaction costs under the proposed Latency-Based License regime should not be any greater than they are under the copyright assignment regime in place today, and would likely be less (as publisher assignment agreements are not themselves uniform and thus require legal resources to review and interpret).

In fact, the very need for legislation to be generally applicable highlights a significant advantage of the Latency-Based License over the abolition of academic copyright. While the legislative proposal would require Congress to define, and courts to interpret, new categories of material exempt from copyright protection (with the attendant line-drawing difficulties noted above),²¹⁵ each Latency-Based License would apply unambiguously to a particular scientific article. There would be little doubt when or how to apply the license to the work, as there could be if the work were instead subject to a broad statutory exclusion. And although disputes will invariably arise between contracting parties, courts are accustomed to engaging in contractual interpretation. In contrast, courts interpreting a new statutory exception have no direct precedent to guide them. Thus, unburdened by the administrative and interpretive difficulties that would necessarily attend the abolition of academic copyright, the proposed Latency-Based License would be highly administrable.

3. *Political Economy.* Unlike the proposal to abolish copyright in academic works, the private ordering solution proposed in this article would require little political or legislative action. As such, its implementation is far more feasible from a political economy standpoint than the copyright abolition proposal, and even than efforts to expand agency mandates beyond the NIH OA Policy.

incorporating features that yield differential results in how the rights actually function”).

²¹⁴ See, e.g., KARL LLEWELLYN, *THE COMMON LAW TRADITION: DECIDING APPEALS* 362-63 (1960) (“[t]he content of the standardized terms accumulates experience, it avoids or reduces legal risks and also confers all kinds of operating leeways and advantages, all without need of either consulting counsel from instance to instance or of bargaining with the other parties”).

²¹⁵ See Section II.B.2, *supra*.

E. *Collective Action and Changing Norms*

In order to effectuate a wholesale change in the market for scientific literature and thereby reverse the impact of the serials crisis, a substantial number of research institutions would need to endorse and adopt the proposed Latency-Based License. Yet, as discussed in Section VI.B, there has historically been little incentive for individual research institutions to negotiate with publishers over access to published articles. Such negotiations are perceived to be time-consuming, resource-intensive and potentially prejudicial to the interests of researchers at those institutions. Thus, despite the general social welfare gains that could be achieved through broad adoption and use of the Latency-Based License, a collective action problem must be overcome for such an approach to be successful.

Responding to the collective action dilemma articulated by Olson, Ostrom suggests that the shifting of group norms may foster collective action.²¹⁶ But how does one go about changing norms in the face of the resistance noted above? Below is a suggested approach to developing and implementing the proposed Latency-Based License regime in scientific publishing that takes these measures into account.

1. *Drafting a Consensus-Based License.* The first step in fostering the adoption of a Latency-Based License will be the development of a broadly-accepted model agreement template. Such a template could then be used by all research institutions and publishers without the investment of significant legal or managerial resources. A major advantage of using an industry-wide agreement template is that it gives all market participants equal information about major terms and sets expectations accordingly. Thus, with the bilateral university-publisher agreements described in Section III.B.4 above, institutions lack information regarding the terms negotiated with publishers by peer institutions, and each institution is left to negotiate in an informational vacuum. With a standardized template agreement, each institution begins from the same base of knowledge and can be assured that the terms offered are consistent and reasonable.

Industry-specific template agreements have been adopted successfully in a number of different fields from online advertising²¹⁷ to

²¹⁶ See notes 194-195, *supra*, and accompanying text.

²¹⁷ See Interactive Advertising Bureau, Standard Terms and Conditions for Internet Advertising for Media Buys One Year or Less Version 3.0 - Dec 2009 (available at <http://www.iab.net/guidelines/508676/tscs3>).

residential real estate purchases.²¹⁸ In addition, cross-industry agreements, most notably the Creative Commons suite of content licenses,²¹⁹ have gained widespread acceptance. The licensing of a scientific article to a publisher is a relatively straightforward legal transaction, and there is no technical reason that a template agreement could not be developed for this purpose.

A key element in the development of a successful template agreement is participation by a broad cross-section of the industry. Broad participation both invests multiple participants in the success of the enterprise and makes it more likely that they will themselves be leaders in adopting the resulting product. Though it may seem counter-intuitive, not only researchers but publishers should be invited to participate in the development of the Latency-Based License template. Such participation will mute later complaints of process bias and unfairness, and will enable publishers to voice legitimate concerns regarding the terms to which they will be expected to accede. Even if publishers do not meaningfully participate in the drafting, they will be less likely to raise claims of exclusion if they are invited to do so. And though large commercial publishers may be resistant to changing the industry's current intellectual property regime, it is possible that a Latency-Based License approach may gain support among association and learned society publishers, thus weakening objections that may later be raised by commercial publishers.

The process of drafting and agreeing upon a template agreement can take months or years, and is best organized by a neutral body that commands some level of respect in the field. For example, a committee of the American Bar Association (ABA) acted as the "convenor" in drafting the Model Trading Partner Agreement for Electronic Data Interchange (EDI).²²⁰ With respect to a template Latency-Based License for scientific publishing, various potential conveners come to mind, including the ABA, open licensing groups such as Creative Commons, broad-based scientific associations such as the American Association for the Advancement of Science (AAAS), and archive-focused organizations such as the Scholarly Publishing and Academic Resources Coalition (SPARC).

One important strategic decision that the project organizers must make is whether one or more governmental agencies or non-profit funders

²¹⁸ See, e.g., Cal. Assn. Realtors, California Residential Purchase Agreement and Joint Escrow Instructions (available at <http://bankerrealty.com/CALF.%20PURCHASE%20AGR.pdf>).

²¹⁹ See www.creativecommons.org/licenses/. See generally Michael W. Carroll, *Creative Commons and the New Intermediaries*, 2006 MICH. ST. L. REV. 45.

²²⁰ See JANE KAUFMAN WINN & BENJAMIN WRIGHT, *THE LAW OF ELECTRONIC COMMERCE* 5-62 (2004 update) and Electronic Messaging Services Task Force, *The Commercial Use of Electronic Data Interchange – A Report and Model Trading Partner Agreement*, 45 BUS. LAWYER 1645 (1990).

should be involved in the drafting effort. Obvious candidates would include NIH and the Wellcome Trust, both of which have been active in advocating for greater open access to the scientific literature. While, the involvement of a large funder would probably command greater attention from the industry, such involvement would also have the potential to politicize the drafting process. Thus, the advantages and drawbacks of involving a large funder in this activity should be weighed carefully.

2. *Achieving Adoption – Nudging Norms.* Once a template Latency-Based License template has been developed and approved by the drafting group, it can be “rolled out” for use by researchers submitting articles to journals. In order to realize the potential efficiency gains of such an approach, the use of the Latency-Based License template must be adopted by a broad segment of the scientific community and used in place of publishers’ current copyright assignments. In effect, the basic legal model for scientific publishing, and the assumptions underlying that model, must change. Changing long-held assumptions and practices, of course, is not easy, but below are a few suggested approaches:

a. *Following the Leader.* A handful of large research institutions have already shown strong public support for open access initiatives from self-archiving to their own institutional mandates.²²¹ It is likely that these leader institutions would also represent the first wave to adopt the proposed Latency-Based License. However, it may not be obvious to smaller or less research-focused institution that such an approach will be fruitful or worth the effort for them. Moreover, researchers at smaller institutions are likely to be more susceptible to fears of retaliation by publishers, and thus less inclined to use the new template unless required to do so. Thus, leader institutions should offer support and advice to other institutions regarding administrative steps that can be taken to adopt the new approach as smoothly as possible. Their example can also demonstrate that immediate publisher reprisals will not necessarily flow from use of the new model.²²² Once leader institutions have begun the process of shifting to the new intellectual property model, norms will already have begun to shift in this area.

b. *Following the Money.* Though the proposed shift to a Latency-Based License does not require direct action by governmental or non-profit funders of scientific research, funders can lend significant support to this effort. Such support can come in two forms: general public endorsements by high-ranking agency officials, and express acknowledgements that use of a Latency-Based License would either be

²²¹ See Sections III.B.1 and III.B.4, *supra*.

²²² I am aware of no evidence that Harvard, MIT or other large research institutions have been disadvantaged by publishers as a result of their existing open access mandates.

acceptable or preferred when complying with funder OA mandates. For example, NIH could encourage the use of a Latency-Based License in lieu of the limited publisher submission to PubMed Central that currently occurs.²²³ At some point, if the Latency-Based License achieved significant adoption, NIH could even specify its use in satisfying the requirements of the NIH OA mandate.

c. *Emphasizing (Individual) Efficiencies.* Absent coercion, individual actors are most likely to be persuaded to act to achieve a public goal if they receive an individual incentive for doing so. Under the “theory of the firm” strategy, an entrepreneurial organizer will compensate individual group members to entice them to work toward an efficiency-enhancing public goal.²²⁴ Absent direct compensation, individual members of the group must be persuaded that it is in their individual self-interest to work toward the public goal.

In the case of shifting the scientific publishing market toward use of a uniform Latency-Based License template, such individual incentives do exist. These include the reduction of both transaction costs and transactional uncertainty. Currently, every scientific publisher uses a similar, but slightly different, set of legal instruments to acquire the copyright in articles that it agrees to publish. In the first instance, these legal instruments are provided to researchers at some point during the publication process. Most scientists lack the legal training to understand either the language or the legal ramifications of the documents that they are asked to sign. Upon receiving these documents, researchers are thus presented with two imperfect options: either sign the documents and hope for the best, or refer them to the institution’s legal counsel for review. The first option could result in unintended negative consequences, as the documents are drafted by the publisher and likely to take positions as favorable to the publisher’s interests as possible. The second option would add time (a drawback from the researcher’s standpoint) and cost (a drawback from the institution’s standpoint). Even worse, the reviewing legal counsel might recommend (or require) that the publisher’s agreement be amended in some way before execution, leading to the researcher’s expenditure of more time and effort and, worse still, the publisher’s possible withdrawal of the publication offer.

The use of a uniform template Latency-Based License would reduce each of these costs dramatically. First, transactional uncertainty would be avoided, as the template agreement would be uniform across all publication transactions and its effect would be well-understood by institutional counsel. An institution could thus advise its researchers to sign any Latency-Based License that conformed to the approved template without further legal review. Second, transaction costs would be reduced, as the

²²³ See Section IV.B.2, *supra*.

²²⁴ See note 193, *supra*, and accompanying text

need for legal review of publication agreements would be more limited once all transactions were conducted using the standardized template agreement.

3. *Precedents in Law and Licensing.* While the copyright assignment model currently employed by the scientific publishing industry has been in place for decades, the use of this model is not standard throughout the larger publishing industry. For example, trade book publishers typically seek only a license to publish a book, though this license may be exclusive with respect to certain markets, geographies or formats (e.g., hardcover, paperback, audiobook, digital download, etc.). Thus, there is no “magic” to the scientific publishing industry’s legal approach: it is simply the product of industry custom and usage, and can be changed.

While it is true that bringing about new norms of interaction could initially meet resistance, there are numerous precedents suggesting that such a shift in the scientific publishing market is not beyond reach. As discussed in Section III.B.1, many universities already encourage their faculty to utilize the SPARC Addendum or a similar document to reserve self-archiving rights for published articles, and many publishers have honored such requests.²²⁵ Similarly, in 2007 a group of major research universities and associations adopted a document entitled *Nine Points to Consider in Licensing University Technology*.²²⁶ The *Nine Points* document responded to growing concerns over the commercial influence on university technology transfer practices and contained recommendations to university licensing officers regarding the retention of teaching and research rights, ensuring broad access to research tools and meeting the needs of neglected populations. Since its release, nearly 100 institutions worldwide have formally adopted the *Nine Points* document, and it has become a standard fixture in the discussion of university technology licensing.²²⁷

Even more relevant is the experience in academic legal publishing. In the past, academic legal journals (law reviews) required that authors assign copyright to them, much as scientific journals do today.²²⁸ However, beginning in the early 1990s, a small number of law professors began to object to this practice.²²⁹ The number of dissenters grew, and in 1996 the

²²⁵ See note 124, *supra*, and accompanying text

²²⁶ In the Public Interest: *Nine Points to Consider in Licensing University Technology* (Mar. 6, 2007) (available at http://www.autm.net/Nine_Points_to_Consider.htm).

²²⁷ See Assn. University Tech. Managers, *Endorse the Nine Points to Consider* (available at https://www.autm.net/source/NinePoints/ninepoints_endorsement.cfm) (visited August 18, 2012) (listing 99 signatories to the *Nine Points* document).

²²⁸ See generally, Benjamin J. Keele, *Copyright Provisions in Law Journal Publication Agreements*, 102 L. LIBRARY J. 269 (2010) and Michael W. Carroll, *The Movement for Open Access Law*, 10 LEWIS & CLARK L. REV. 741, 754 (2006).

²²⁹ E-mail correspondence with Professor Mark A. Lemley (on file with author).

American Association of Law Schools (AALS) appointed a Special Committee to develop a model publication agreement for law reviews.²³⁰ The committee's work resulted in a model Author/Journal Agreement (AJA) that was released in 1998. The AJA grants the publishing law review a one-year exclusive license to publish an article and allows the author to retain ownership of the copyright.²³¹ Other legal academics, including Mark Lemley of Stanford Law School, developed their own forms of non-assignment publication licenses.²³² In 2005, Professors Michael Carroll and Dan Hunter initiated the Science Commons Open Access Law Program, which also developed an Open Access Model Publishing Agreement and promoted limited-duration exclusivity for law review publishing.²³³ In 2008, the directors of the libraries of twelve major U.S. law schools met in Durham, North Carolina and adopted the *Durham Statement on Open Access to Legal Scholarship*.²³⁴ Among other things, the Durham Statement "urge[d] faculty members to reserve their copyrights to ensure that they ... can make their own scholarship available in stable, open, digital formats."²³⁵ The Durham signatories recommended that the AALS model publishing agreement be used to achieve this end.

These efforts have had a significant impact on the legal publishing market. According to one study, by 2009 only twenty-two percent of law reviews requested an assignment of copyright.²³⁶ Thirty-three percent requested an exclusive license, most of which were time-limited, and forty-five percent only requested a non-exclusive license.²³⁷ According to this study, many law review publishing agreements resembled either the AALS or Science Commons model agreements, further indicating the influence of the law professors' efforts over industry practices.²³⁸

The experiences described above suggest that norms pertaining to the terms of legal agreements, and academic publishing agreements in particular, can be changed with effort and determination. Thus, just as legal academia has effected a significant shift in the law review publication market, it is possible that scientific publishers may be persuaded to adopt new norms of publishing that are more responsive to the needs of the

²³⁰ Bari Burke, Memorandum 98-24 to Deans of Member and Fee-Paid Schools re. Model Author/Journal Agreement (May 18, 1998) (available at <http://www.aals.org/deansmemos/98-24.html#1>).

²³¹ Burke, *supra* note 230.

²³² Lemley, *supra* note 229.

²³³ See Science Commons, Open Access Law Program, <http://creativecommons.org/science/literature/oalaw/> and Carroll - *Open Access Law*, *supra* note 228, at 754-55.

²³⁴ Durham Statement on Open Access to Legal Scholarship (Nov. 7, 2008) (available at <http://cyber.law.harvard.edu/publications/durhamstatement>).

²³⁵ *Id.*

²³⁶ Keele, *supra* note 228, at 274.

²³⁷ *Id.*

²³⁸ *Id.* at 276.

scientific community.²³⁹ To this end, the recent mathematicians' boycott of Elsevier²⁴⁰ has demonstrated that even the largest publishers will respond to their customers (and content providers) when they demand it.

F. *Broader Implications - Latency Beyond Science*

While it is the primary aspiration of this paper to offer a proposal to address the serials crisis in scientific publishing, I also hope that the methodology and general approach presented herein may have some applicability to fields beyond the sciences that are subject to similar intellectual property uniformity costs. Madison, Frischmann and Strandburg identify several fields in which “commons” of intangible assets have been created.²⁴¹ One of these is garage band music. Musical compositions are protected by copyright in much the same way as scientific publications. Despite outward appearances, there are a number of similarities between the structures of the music industry and the scientific publishing industry: both involve the creation of works by a large number of disaggregated producers, both are dominated by intermediaries (music publishers/record labels and journal publishers) that obtain exclusive rights to distribute those works, both sets of intermediaries have traditionally performed selection, quality-control and distribution functions, and both industries are undergoing radical change due to the advent of digital technologies. It could also be argued that the long duration of copyright and the near-absolute control over musical content exercised by music publishers/record labels creates social welfare losses and lessens content production: uniformity costs in a different guise.

It is possible that the lessons learned, and the approaches adopted, in the scientific publishing industry could be relevant to the far larger market for music. Could private ordering solutions – new forms of limited-duration, latency-based music publishing agreements or recording contracts – yield welfare-enhancing results? A full analysis of private ordering arrangements within the music industry remains to be conducted along the lines that I have outlined here, but it would not be surprising if such an analysis revealed the emergence of latency periods in certain contexts.²⁴²

²³⁹ I recognize, of course, the significant differences between the legal and scientific publishing industries, including the fact that most law reviews are student edited publications that are financially supported by law schools, rather than stand-alone commercial publishing enterprises. Nevertheless, I believe that the shift in norms at law reviews is, at the very least, informative to the discussion of scientific publishing.

²⁴⁰ See notes 1-4, *supra*, and accompanying text.

²⁴¹ Madison, Frischmann & Strandburg, *supra* note 203.

²⁴² Eric Priest offers one possible example from the music industry in China, where free copies of most songs become available on file sharing sites soon after they are released. Record labels have been relatively unsuccessful in preventing widespread copying by enforcing their copyrights. Thus, according to recent reports, Chinese

And the need for alternate models of allocating rights will only become more important as composers increasingly seek to build on prior work through sampling, remixing and mashing, much as scientists build upon the work of their predecessors.²⁴³

CONCLUSION

The serials crisis in scientific publishing can be traced to the long duration of copyright protection and the assignment of copyright by researchers to publishers. Over-protection of scientific literature has enabled commercial publishers to increase subscription rates to a point at which access to scientific information has been curtailed with negative social welfare consequences. The uniformity costs imposed by such over-protection can be addressed by tailoring intellectual property rights, either through legal change or private ordering.

Current open access channels of distribution offer alternative approaches to scientific publishing, but neither the Green OA self-archiving nor the Gold OA author-pays models has yet achieved widespread acceptance. Moreover, recent proposals to abolish copyright protection for academic works, while theoretically attractive, may be difficult to implement in view of current legislative and judicial inclinations. Likewise, funder open access mandates such as the NIH OA Policy, which are already responsible for the public release of millions of scientific articles, suffer from various risks and political uncertainty.

In this paper, I propose an alternative private ordering solution based on latency values observed in open access stakeholder negotiation settings. Under this proposal, research institutions would collectively develop and adopt publication agreements that do not transfer copyright ownership to publishers, but instead grant publishers a twelve-month exclusive period in which to publish a work. This limited period of exclusivity should enable the publisher to recoup its publishing costs and a reasonable profit through subscription revenues, while restoring control of the article copyright to the author at the end of the exclusivity period. This approach would also complement and facilitate compliance with existing institutional and funder open access mandates. The balanced approach proposed in this article addresses the needs of both publishers and the scientific community, and

record labels have reached informal agreements with online search giant Baidu that would prevent users from using Baidu to search for a song during the first two weeks after its release, when labels make the majority of their revenue from the song. In exchange, the labels would relax their enforcement efforts against Baidu. In this highly dynamic market, two weeks may be an optimal latency period.

²⁴³ See, e.g., KEMBREW MCLEOD & PETER DICOLA, CREATIVE LICENSE – THE LAW AND CULTURE OF DIGITAL SAMPLING (2011) (describing significant market failures in the digital sampling of music).

would, I believe, avoid many of the challenges faced by existing open access models.