

PAYING TO PUBLISH: USING THE AUTHOR CHARGE TO FUND THE
SCHOLARLY JOURNAL

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Thomas David Scheiding, B.A., M.A.

Philip E. Mirowski, Director

Graduate Program in Economics

Notre Dame, Indiana

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Abstract

by

Thomas David Scheiding

Asking authors to contribute to the costs of scholarly communication through an author charge pricing mechanism is increasingly being considered a credible alternative way of financing a reader-financed scholarly communication process that is widely described as facing a crisis. However the history and evolving economic justification of the author charge pricing mechanism and the potential intellectual property ramifications of having authors rather than readers pay, up to this point, has not been explored. Such a discussion however is critical to understanding the many ways by which the scholarly communication process and the research process are being re-engineered. I begin by reviewing the economics of scholarly communication literature and examining how the tools and metaphors in this literature are used to understand the serials crisis, the event where access to journals has decreased and prices and the number of titles have increased. I argue that there is a misunderstanding of the workings, determinants, and deficiencies of the scholarly communication process in both the popular and professional economics literature. This thesis focuses on one aspect of this misunderstanding – the choice of the pricing mechanism that is used to fund the scholarly communication

process. Chapter one outlines the elements of the economics of science and the economics of scholarly communication research agendas and the methodological changes both have endured over the past fifty years. Chapter two reviews the various understandings of the cause of and solution to the serials crisis. The remaining three chapters consider how author charge pricing mechanisms have been used in the past in the disciplines of physics and economics and outline the potential consequences to its use in the present day environment where research funding agencies increasingly seek ownership and control over the intellectual property created during the research process. These three chapters argue that paying for the scholarly communication process is more than just an economics problem and outline a framework for a revised economics of scholarly communication research agenda.

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INTRODUCTION

Revisions to and challenges of economic thought are often inspired by and couched in terms of crisis metaphors. Just as Marxian economists challenge neoclassical economic thought with notions of crisis in the accumulation of capital and Keynesian economists challenge neoclassical general equilibrium models with notions of crisis in the spending and saving practices of consumers and businesses, this dissertation uses a crisis in the scholarly communication process to highlight the deficiencies of the existing neoclassical economics of scholarly communication literature. The crisis situation in the scholarly communication process is generally described as one wherein there are more journals or monographs being published each year and yet the number of journals or monographs purchased by libraries each year is declining because of a decrease in the research librarian's budget coupled with higher acquisition prices. With particular focus placed on the crisis in scholarly journal communication (the serials crisis), scholars participating in the economics of scholarly communication literature overwhelmingly advocate the transition by scholarly communities to more efficient methods such as those found in an electronic medium. These electronic scholarly communication initiatives are said to simultaneously reduce production and distribution costs as well as increase the usability of scholarship.

Despite the fact that the serials crisis is portrayed as an important event for understanding the transition from a print medium to an electronic medium, the economics

of scholarly communication literature lacks a meaningful discussion of the determinants of the scholarly communication process in a discipline or the cause of a crisis in this process. The most significant deficiency of the economics of scholarly communication literature however is the negligible value accorded to the intellectual property contained in scholarly writings. It is my contention that the various accounts of the serials crisis in the economics of scholarly communication literature are deficient in so far as the economics of scholarly communication literature characterizes the situation as an example of inefficient production, sees the cause and impact of the serials crisis as the same across all disciplines, and treats the intellectual property within scholarly communication as being of negligible value. I posit that each discipline has a unique set of publishing traditions due to their varied socio-political, legal, organizational, and financial circumstances and that a desire by agents such as the research funding agency to control and own the intellectual property made explicit in the scholarly communication process has encouraged a discussion of a serials crisis and has influenced proposals to restructure the process.

Read through the lens of economic theory, the crisis situation in the scholarly journal communication process is characterized as a problem wherein more scholarly journals are being produced and fewer are accessed because of rising costs and monopolies inherent in the modern-day print publishing process. Once these deficiencies in print publishing are identified, an assumption of technological determinism is deployed in order to claim that electronic publishing initiatives will lower costs and introduce competition to the various levels of publishing, archiving, and indexing duties. In addition to assuming that scholarly communication is a homogenous process across

disciplines, the economics of scholarly communication literature also assumes that actors such as librarians and scholars behave according to the dictates of efficiency and can be characterized as public actors who seek to maximize society's welfare.

This economic analysis of the scholarly communication process is flawed in so far as it tends to focus too narrowly on neoclassical theory such that journals and articles are reduced to commodities exchanged in a marketplace setting. This critique is inspired by the belief held by many research groups that an economic analysis of scholarly communication can and should offer more than a description of the way in which the free market is able to efficiently allocate resources. This is not to say that the existing neoclassical economic narrative does not have its merits. Talking about the production and distribution of serials and the reason as to why identified inefficiencies are not removed is instructive to understanding some facets of the serials crisis. However there is a complexity to the serials crisis that contributed to my initial feeling that it is more than an inefficiency phenomenon fully captured by neoclassical economics metaphors.

The scholarly communication process in nearly every discipline is facing a crisis. The crisis however is not what the economics of scholarly communication literature makes it out to be. It is a crisis with no universal cause or solution. It is a crisis that has something more to it than the presence of profit-hungry commercial publishers or inefficient print publishing practices. It is a crisis that has its roots in a larger debate over who should own the increasingly valuable intellectual property present in the scholarly communication process; the agent that created the research, the agent that paid for the research, or the agent that published the research. The proposed revision to the economics of scholarly communication literature outlined here treats the organization and

financing of the scholarly communication process in a discipline as being heavily influenced by the actors that organize and fund research in the discipline – an actor collectively known as the research funding agency. The serials crisis represents an attempt by these actors to reorganize the scholarly communication process in a way so as to capture ownership and control over the increasingly valuable intellectual property within scholarship. To explore the diversity in the reorganization of the scholarly communication process across disciplines and the underappreciated role accorded to the research funding agency, I concentrated on two disciplines that met the following criteria:

1. Received different levels of research funding from different sources
2. Had different levels of involvement by commercial and scholarly society publishers
3. Had journals with a different funding and organizational structure

Although all disciplines are different with respect to these factors, I have decided to focus on physics and economics because they are two disciplines that are, in many cases, on opposing sides of the spectrum.

With respect to the above criteria, I have chosen physics because it:

1. Represents a discipline that once received a large amount of funding (for both research and publication) from the federal government and today receives significantly less.¹
2. Represents a discipline that has repeatedly shown an ability to reorganize scholarly communication practices and adopt new forms of technology.

¹ <http://www.nsf.gov/sbe/srs/stats.htm>

3. Represents a discipline that has a rather small community of scholars with employment of publishing scholars split between the academy, the government, and industry.² Furthermore, many of these publishing scholars are affiliated with institutions outside of the United States.³
4. Represents a discipline with a strong presence of both commercial publishers and not-for-profit scholarly society publishers. Although the American Physical Society publishes many of the top-tier journals, commercial publishers such as Elsevier publish and archive many articles as well.
5. Represents a discipline with a mix of intellectual property claims due, in part, to the various locations where the scholars are employed. Those physicists employed by the government, and whose work was once thought to belong to the 'public,' are finding their work increasingly appropriated either by the commercial publisher (who then charges the government for publishing such work) or by the government itself through classifying it or categorizing it as gray literature (and as a result, 'owned' by the government agency). Those scholars employed by the university, and whose work could also be thought of producing research either for themselves or the 'public,' are also finding their written account of research appropriated by the university or the commercial publisher. Here, the university attempts to change the status of scholars to be one of conducting work-for-hire and their published research to exist not as communication to the larger community but rather as an advertisement to the goods waiting to be sold in the technology-transfer office.

I have chosen economics because it:

1. Represents a discipline where the level of public funding has always been low and where very little funding is devoted to the support of the scholarly communication process.⁴
2. Represents a discipline where there has been very little reorganization of the scholarly communication process. The majority of communication continues to occur in print and peer reviewed articles. Furthermore, those who do publish within the top-tier journals are affiliated overwhelmingly with the academy and are located within the United States.⁵

² This can be found by looking at the affiliation of authors to major journals as well as the membership rolls of the APS.

³ Again, this can be found by looking at the affiliation of authors in the major journals.

⁴ <http://www.nsf.gov/sbe/srs/stats.htm>

⁵ Laband and Wells (1998)

3. Represents a discipline where there is a lack of influence exerted by the commercial publisher – although this is becoming less true over time. Most of the top-tier journals are published either by not-for-profit scholarly societies or by joint ventures between commercial publishers and scholarly societies.

With physics and economics being on very different sides of the spectrum concerning the level and source of funding, the involvement and roles fulfilled by commercial publishers and scholarly societies, and the funding and organization of journals, it becomes clear that a significantly different crisis situation exists in each discipline and that a phenomena such as the serials crisis has no obvious causes or universal solutions.

Discussion of a crisis in a discipline's scholarly communication process, from the standpoint of economics, often focuses on how the process is financed. Across many disciplines the scholarly communication process is financed through a reader pricing mechanism such as the journal subscription. According to economists such as Ted Bergstrom, the use of this pricing mechanism has contributed to a crisis situation that can only be resolved by using electronic scholarly communication methods that are financed by authors as well as readers.⁶ The proposal to have the scholarly communication process financed with author rather than reader charges has been met with significant resistance, in part, because the act of having authors paying to publish is considered antithetical to the verification and validation of scholarship which occurs within the scholarly communication process. This verification and validation of scholarship must show no signs of having been purchased. This is a strong belief within the academy and is the reason why scholarly society and commercially published peer reviewed and edited journals and monographs are accorded respect within the academy while vanity presses

⁶ Bergstrom and Bergstrom (2004)

such as American Literary Press, PublishAmerica, and University Press of America where authors pay to publish are not.⁷

There is however a rich history of scholarly communities simultaneously asking authors rather than readers to finance the scholarly communication process and maintaining their role as imprinter of what constitutes a meaningful intellectual contribution in the discipline. The role however of the author charge pricing mechanism within the scholarly communication process in a discipline however has changed over time. Increasingly it is becoming questionable whether the act of formally communicating in a discipline through a journal article or monograph and having it represent peer acceptance of the validity of the idea can co-exist with an author charge pricing mechanism. As the academy and the research conducted within it has been increasingly privatized, the author charge pricing mechanism is no longer just a way to pay the unavoidable costs of communication. Rather the author charge pricing mechanism, as argued in this thesis, represents just one way among many others by which the research funding agency can own and control the valuable intellectual property created by scholars in the privatized academy.

An author charge is a fee paid by the author or, in most cases, by the author's research funding agency to a journal upon acceptance of an article for publication. Across the disciplines of physics and economics it will be shown that the timing of the decision by a community of scholars to make use of an author charge pricing mechanism

⁷ On December 7, 2004, the novel Atlanta Nights was accepted by the vanity publisher PublishAmerica for publication despite the fact that; one chapter was missing, two chapters were identical to one another word-for-word, and another chapter written by a computer program that generated random text based on patterns in another chapter. James D. McDonald had collaborated with others to write this deliberately low-quality work to call into question the review standards employed by PublishAmerica. On January 25, 2005, PublishAmerica retracted acceptance of the manuscript – one day after the hoax was revealed. http://wn.wikipedia.org/wiki/atlanta_nights

for their journals in each of these disciplines, the way in which the fee was imposed upon scholars and research funding agencies, the reaction of these agents to this fee, and the conditions surrounding the decision by the scholarly societies in both disciplines to later reduce their dependence on the fee are all different. These differences in the acceptance, maintenance, and later retreat from the use of an author charge pricing mechanism in physics and economics emerge, in part, because of differences in who was funding research in these disciplines and differences in the value accorded to the intellectual property within the scholarship. These differences highlight the importance of taking into account differences in the scholarly communication process across disciplines, outline the significant role held by the research funding agency in the organization and financing of a discipline's scholarly communication process, and provide evidence of the significant value intellectual property has in the academy.

I investigate the conditions surrounding and actors involved in the acceptance of an author charge pricing mechanism in the print era in physics and economics and the events that prompted a retreat from the use of an author charge pricing mechanism in both disciplines in the early 1980s in order to understand why there is a resurgence of interest to using an author charge in the present. In the past, the author charge represented a mechanism by which the research funding agency made an explicit financial contribution towards the scholarly communication process. This contribution was initially made by the research funding agency to support scholarly society publishers and provide a means of verification for the research the agency was paying for. The author charge first appeared in physics because it was in this discipline where funding for research was significant and the amount of research that needed to be verified far

exceeded the capabilities of a scholarly communication process funded only by readers. The author charge later appeared in economics as the volume of research increased and research funding agencies and the AEA realized the reader financed scholarly communication process in economics was unable to provide the needed level of peer-reviewed research. In both physics and economics there existed, in the 1970s and early 1980s, one set of journals published by scholarly societies that were financed with both reader and author charges and another set of journals published by commercial publishers that were financed with reader charges alone. In both disciplines there was a retreat from the author charge pricing mechanism in the 1980s. This retreat occurred, in part, because research funding agencies were removing their direct financial support of the scholarly communication process.

The central question for this thesis then becomes one of why direct financial support in the form of the author charge was removed. Why was it the case that in the late 1970s and early 1980s the research funding agencies sought a scholarly communication process that they financed indirectly through reader subscriptions rather than directly through author charges? The answer, I argue, is the result of a variety of factors including a change in the intellectual property terrain, a resistance to paying the charge by scholars either unfamiliar or indifferent to the importance of paying the charge, and intense competition between scholarly societies who had traditionally published and financed journals in some disciplines with both reader and author charges and commercial publishers who published both specialty and generalist journals that were financed exclusively with reader charges. While these latter two reasons have been identified previously in the economics of scholarly communication literature as

hindrances to scholarly communities transitioning from reader charges to author charges, the first reason, the changing of intellectual property terrain, has not. It is this first reason though that emerges as significant in my archival research and it is this reason that should caution scholarly communities to transitioning to the author charge pricing mechanism in the present. In other words, this dissertation attaches to the author charge pricing mechanism the non-financial motivation held by the reader funding agency of owning and controlling the intellectual property in scholarship.

Only when the question is asked of who owns and controls the valuable intellectual property in scholarship does the research funding agency step in and re-organize the financing of the scholarly communication process around an author charge pricing mechanism. The resurgence of the author charge pricing mechanism represents just one way in which the research funding agency is attempting to capture ownership over the contested intellectual property in scholarship. While methods such as controlling the technology by which scholarly communication is distributed and accessed and altering the intellectual property agreements signed by researchers have been cited by others as overt attempts by the research funding agency to control the intellectual property in scholarship, the way the scholarly communication process is paid for has been neglected as a way to by which ownership and control over intellectual property can be captured. Chapters 3, 4, and 5 show that the role of the author charge pricing mechanism as a means to capturing ownership and control over intellectual property is real and must be taken into consideration by scholarly communities that are reorganizing the structure and financing of their scholarly communication process. This analysis of the roles served by the author charge pricing mechanism in the past and potentially the future and

discussion of why actors such as the research funding agency are motivated to be involved in the organization and financing of a discipline's scholarly communication process highlights the deficient neoclassical economic understanding of the scholarly communication process.

There is a need for an economics of scholarly communication research agenda that can account for scholarly communication practices as they actually exist across the disciplinary landscape. Mirowski and Sent (2002) revealed that there are several scholars already actively involved in revising the economics of science literature such that it can discuss the changes that have occurred over time with regard to the source of funding for the research process, the changing priorities within the academy, and changes in the economic, political, and legal conditions. Building on Mirowski and Sent (2002), Sent and Klamer (2002) called for a revised economics of scholarly communication research agenda that can account for the different social and economic structures of scholarly communication processes over time. The time constraints of the symposium organized by Sent and Klamer and the space constraints of the Journal of Economic Methodology issue where many of the papers from this symposium were published left little room for outlining what a revised economics of scholarly communication research agenda informed by the reality of the serials crisis ought to look like. This analysis of the author charge pricing mechanism represents a first attempt at revising the economics of scholarly communication literature.

Chapters one and two review the economics of scholarly communication and serials crisis literatures. Chapters three and four look at previous attempts in physics and economics to implement an author charge pricing mechanism. These chapters show that

pricing mechanisms, in addition to allowing institutions the ability to achieve their financial goals, also allow for the pursuit of a set of non-financial goals (higher academic prestige, more research funding, more tuition revenue, etc.) where ownership and control can be exerted over the scholarly communication process by an institution. The author charge pricing mechanism in both of these disciplines is described as a solution that makes the appropriate actors in the scholarly communication process pay for the benefits they receive. However, it will also become apparent in these two chapters that author charge pricing mechanisms such as the page charge, besides being designed to cover publication costs, also carry with them the non-financial goals (goals such as the ownership and control over scholarship) of the actors that serve as advocate for them. While chapters three and four discuss the use of the page charge pricing mechanism in economics and physics in the print era, chapter five explores the potential consequences that would accompany a revival of an author charge pricing mechanism in the electronic era. Given the technology that will be used to produce and distribute scholarship in the electronic era and the characterization of the scholarly journal as a public good, an author charge pricing mechanism is argued to be a more beneficial and efficient way to finance the scholarly communication process than a reader subscription pricing mechanism. What I find, however, is that the author charge pricing mechanism in the electronic era potentially has several negative consequences associated with it with the most serious of these being the establishment of a claim over the scholarly article's intellectual property by the agent that bears the financial burden.

CHAPTER 1

THE ECONOMICS OF SCIENCE AND THE ECONOMICS OF SCHOLARLY COMMUNICATION – A REVIEW

The economics of science and economics of scholarly communication fields of study, at first glance, would appear to reflect nothing more than the imperialist tendencies of neoclassical economists who are always on the lookout for a new application of their constrained optimization theories. The economics of science field and economics of scholarly communication sub-field, however, are different from fields such as the economics of the family or the economic of crime where this imperialism is most apparent. First, whereas in the economics of science and economics of scholarly communication literatures there exists a sustained interest in contributing to and revising the research agenda, the economics of crime or of the family fields were contributed to only haphazardly once it was established that neoclassical economic theories could in fact be used. Second, whereas the researchers who often have no formal training as well as little interest in neoclassical economics are the same ones who actively contribute to the economics of science and economics of scholarly communication literatures, this is hardly the case in the economics of crime or of the family fields where formally trained neoclassical economists constitute the majority of researchers. When we examine the

scholarship on the economics of science and economics of scholarly communication literatures, we find scholars with a wide range of training that use the authority accorded to the neoclassical economic paradigm during the second-half of twentieth century as a means to either justify the current institutional structure of the research and communication process or to provide evidence regarding why a new institutional structure is needed. Given this characterization of the economics of science and economics of scholarly communication as fields of study that represent something more than evidence as to how encompassing neoclassical economic theory can be, it becomes imperative, for the purposes of understanding how others are using this literature to achieve their own objectives, to trace how and why these literatures have changed over time.

This chapter summarizes the methodological changes both the economics of science and economics of scholarly communication fields have undergone over time. This chapter begins by summarizing the economic narratives of the research process and the way these narratives have changed over time. The same method of summarization is then applied to the economic narratives of the scholarly communication process.⁸

Tracking these literatures over time, I argue that changes to these literatures have been motivated by various intellectual crises within neoclassical economics as well as by organizational and financial crises within the research and communication process. Characterizing crisis narratives as devices for motivating methodological changes in the economics of science and economics of scholarly communication literatures, I conclude with a discussion of how recent crises have inspired changes to the economics of science

⁸ To the best of my knowledge, this is the first review of the economics of scholarly communication literature.

literature and how the same needs to occur in the economics of scholarly communication literature.

1.1 The Economics of Science Literature – a Summary of the Use of Economic Metaphors to Describe the Research Process

The economics of science research agenda, as described by those who practice it, is motivated by the belief that economic theories, models, and metaphors can best describe aspects of the research process and, in so doing, suggest changes that will allow the process to operate in an optimal fashion. Hands (2001) notes that there are at least two ways that economics enters into a narrative about the research process. First, research is generally thought of as an activity that generates macroeconomic growth. Second, it is assumed that research, an activity conducted by individual researchers with self-interested agendas, is better modeled with economics because of the focus in the discipline on the collective consequences of actors engaged in self-interested behavior.

Sent (1999) lists six groups of individuals that are active participants in economics of science research agenda. Naturally, the first group consists of those formally trained as neoclassical economists. The second group consists of those scholars who want to highlight the economic framework of the individuals and institutions involved in the research process in order to model scientific knowledge as an object no different – and no purer – than knowledge in other disciplines. The third group consists of sociologists of science who seek to explain the social structure of the research process and the way in which individual and group (lab) interests are jointly pursued while

focusing on the exchange of credit. The fourth group consists of philosophers who use market models from economics in order to account for the social nature of knowledge. The fifth group consists of actual scientists who perhaps have a side-interest in the economic nature of their activities. The final group consists of science policy specialists who argue that funding (the amount and source) influences the organizational structure of the research process. As will be seen throughout this thesis, each of these six groups has a different way of using neoclassical economic metaphors to describe the research process. In this section, I summarize the research trends in the economics of science literature from after World War II to the early 1990s.⁹ Whereas this research in the 1940s was viewed through a production framework, by the late 1960s and until the early 1990s, it came to be thought of in terms of an information processing and cognitive framework.

1.1.1 Research in a Production Framework

In the years before the World War II, there was a vigorous debate in the United States and the United Kingdom over whether the public or the private sector should organize and fund scientific research.¹⁰ With the war creating an immediate need for mechanical and electronic computing, rocket propulsion, and atomic weapons, government officials in both countries side-stepped the debate and directly provided

⁹ By no means is this the first such review of the economics of science literature. My literature review is drawn from Sent (1999), Mirowski and Sent (2002), and Hands (2001) and employs similar production, information processing, and cognitive framework delineating categories for organizing economics of science research.

¹⁰ This debate, not coincidentally, mirrored that occurring in the economics discipline over whether a market-based or planned economy should exist (a debate more popularly known as the socialist calculation debates). It is a debate that will emerge again in chapter 5 when it is discussed how the scholarly communication process should be funded in the electronic era.

support for the types of research they wanted. After the war, the financial and organizational resources extended by the government were credited with ending the war earlier. Once participants in the research process reached an agreement that the public benefits when there exists a strong research infrastructure, the debate over how to finance the process narrowed in on the question of who should be in charge of distributing funds from the public coffers – government bureaucrats or the scientists themselves.¹¹

In the economics of science, the prevailing model of the research process was called the linear model. The linear model views research in a production framework where a generic commodity of basic scientific knowledge is produced and used as an input in applied research where the goal is the improvement in the efficiency of the production process or the quality of the good produced. Given that basic research was conducted in the labs and lacked any immediate market application, economists proposed that there needed to be a subsidy large enough such that the socially optimal quantity was produced – this optimal quantity was based on the satisfaction of the first-order condition where the marginal social benefit equals the marginal social cost. Without this subsidy, neoclassical economic theory predicted that the competitive market would under-produce basic research because of its positive externalities (a market failure situation). This classification of basic research as a public good generating positive externalities was used to justify the subsidy for such research given by the federal government and to segregate such research activities from other roles served by the research university. Applied research, on the other hand, was believed to extend the findings learned during basic research activities and lead to the creation of better products that could then be sold in the

¹¹ Kleinman (1995) details the political debate after the war.

marketplace and generate macroeconomic growth. Neoclassical economic theory dictates that this research be financed and directed by private institutions that operate in a market setting. Nelson (1959) and Arrow (1962) use the linear model to argue that the federal government, as part of its role in creating the conditions necessary for stable macroeconomic growth, ought to subsidize basic research. The linear model generated recommendations for the efficient and optimal location for basic and applied research (basic research conducted within the public realm and applied research conducted within the private realm), financial structure (basic research subsidized with public funds and applied research with private funds), and legal structure (weak property rights assigned to basic research and stronger property rights associated with applied research). The linear model also encouraged researchers to focus on locating the public and private boundaries of science and the problems that ensue when they are not accurately and optimally determined.

Encouraged by results agreeable to both Keynesian macroeconomists who favored government expenditures to stabilize macroeconomic growth and Walrasian microeconomists who favored the conception of basic research as government subsidized public good, a sizeable number of researchers contributed to the economics of science literature. It also did not hurt that research in the economics of science field justified the existing Cold War institutions and traditions for funding and organizing research. Acting in the interests of scholars, university administrators, military planners, the federal government, as well as micro and macro economists, the economics of science literature enjoyed a period of relative stability after the war. Mirowski and Sent (2002) document four changes that caused this shift in the economics of science literature from a

production framework to an implicit contracts and information processing framework during the late 1960s and extending into the 1990s:

1. A shift in the economics discipline away from Walrasian general equilibrium theory and towards strategic reasoning theories such as non-cooperative game theory in microeconomics
2. A shift in the economics discipline away from synthesizing neoclassical and Keynesian theory in macroeconomics
3. An emphasis in economics placed on the limited cognitive abilities of the economic agent
4. A shift in society from a Cold War science regime.

The economics of science research agenda changed, in part, because the discipline of economics changed (as reflected in the first three changes). Instead of focusing on Walrasian microeconomic and Keynesian macroeconomic theory, economists shifted to game theory, specifically non-cooperative games containing a Nash equilibrium. This emphasis on non-cooperative game theory fostered a view of individuals and institutions engaged in strategic reasoning with an emphasis placed on bounded rationality and an acceptance of the fact that the rational economic actor has a limited cognitive capacity and that there is uncertainty in the epistemic value of what is evaluated. As a result, economists did not view science research as producing an unquestioned commodity of knowledge or organized along a strongly enforced public/private divide; instead, economist saw science research as producing knowledge that contains a degree of epistemic virtue that must then be processed by those with limited cognition and exchanged such that it becomes information. The fourth change, the shift away from the

Cold War science regime, solidified the transition with it no longer being necessary to justify a public subsidy for research.

The economics of science research agenda was revised as a consequence of the diminishing emphasis placed on the public good narrative and the assumed connection between the linear model and economic growth. Building on an understanding of the researcher as an information processor with goals different from those of the group, an increasing number of economists focused on the contractual relationships between individual scientists and the laboratory that employs them within an institutional setting. Instead of conflating knowledge with technology and focusing on the public good status of the output of the research process, the economics of science research agenda focused on how knowledge became transformed into information. The motivating question of the literature became one of how to organize institutions optimally given uncertainty and the divergence in goals between individuals and groups.

1.1.2 Research in an Implicit Contracts and Information Processing Framework

In the second era of the economics of science research agenda, research was modeled as generating knowledge of unknown epistemic value that is then transformed into information. The emphasis on the linear model of basic research leading to applied research and subsequent macroeconomic growth was replaced with an emphasis on how the goals of cognitively challenged researchers, reward structures, and transmission costs influence the content, form, and quantity of research knowledge and the way it is converted into information. The research agenda of the economics of science shifted

away from the public good theory of research towards theories of non-cooperative game theory in order to understand how implicit contracts within research communities allow researchers to simultaneously hold goals that maximize the benefits of research to society and themselves. As a result, researchers were no longer assumed to seek only truth and research itself was modeled as containing information of varying epistemic values determined, in part, by the social and financial structures in the research process.

The literature's defining piece during this period is David and Dasgupta (1994). David and Dasgupta see the problem as one of society searching for an optimal institutional structure that can deal with both the divergence between private incentives and social welfare and the principal-agent problem between researchers and the research funding agency. David and Dasgupta argue that the institutional structure needed is one where incentives exist for scientists to disclose their findings quickly as well as promptly validate the findings of others. This 'open science' institutional structure co-exists with a research system termed 'technology' where secrecy and market forces reign supreme. In open science, an individual's own interest is best served by making reliable results available as quickly as possible. An individual cannot receive priority and, thus, credit unless the research findings are made public. Once knowledge that is produced in open science is disclosed, this knowledge becomes the non-rival commodity of information that can be allocated efficiently by the market. David and Dasgupta describe this combination of open science and corporate science as optimal because a world where research is driven only by market forces creates a situation where findings are released more slowly.¹² Open science is justified on the basis that it enables the rapid release of

¹² Note that the only variable that would change is the speed of disclosure, not the content of the knowledge disclosed.

results. Because the activities conducted within the academy generate benefits for all of society (these benefits are frequently characterized as positive externalities), financial support extended to basic research can be justified.

Wible (1994), like David and Dasgupta, uses economic tools to discuss the structure of science institutions and determine whether these institutions generate scientific results in a cognitively efficient fashion. He argues that there are two economic theories – a substitutes and complements approach – applicable to the production of science. The dominant view, such as we see in David and Dasgupta, is that institutions such as the government and philanthropic foundations are substitutes to the market. For Wible, this framework also reinforces the view that the ultimate goal is efficiency and encourages a limited view of the role of institutions – non-market institutions intervene only to rectify market failures. As a result, Wible argues that the substitutes theory of science institutions cannot alone explain the structure of science production. Wible argues that we also need a complements approach wherein non-market institutions complement market-based institutions. Drawing on the idea that knowledge is fundamentally uncertain (epistemic uncertainty); Wible argues that those involved in the research process have attempted to solve this problem by promoting institutional diversity. Non-market institutions allow for the production of science in a different way than occurs in market institutions and a consequence of this diversity is that the knowledge itself becomes more certain. Consequently, science is economic in so far as it entails an organization of production such that epistemic scarcity is alleviated.

Despite this persistent debate over non-market institutions' participation in the research process, Mirowski and Sent (2002) note that the terms of the debate began to

change in the 1990s when economists found it increasingly difficult to preserve the justification for public support for many kinds of open science research, difficult to characterize the university setting where much of the research occurs, and difficult to differentiate open science from corporate research and development activities. Scholars, particularly those scholars not actively involved in furthering the research agenda of neoclassical economics, pushed the economics of science research agenda into a new direction. These scholars questioned the use of market metaphors and felt less inclined to construct a model of the research process that preserves the methodological boundaries of neoclassical economics. But before I stake out what this new economics of science research agenda has become most recently, I want to outline the economics of scholarly communication sub-field, the changes it has undergone over time, and its relationship to the economics of science field.

1.2 The Economics of Scholarly Communication Literature – a Summary of the Use of Economic Metaphors to Describe the Communication Process

Given that scholarly communication is typically characterized as a critical component to the research process, economic discussions of the research process often encourage the complementary economic discussion of the scholarly communication process.¹³ As a result, changes to economics of scholarly communication research

¹³ While others have extensively summarized the economics of science literature and the changes it has undergone over time, the same cannot be said for the economics of scholarly communication literature. In fact, I did not find a single literature review of the economics of scholarly communication sub-field. Although the economics of scholarly communication, by its name alone, indicates that all forms

agenda over time mirror the changes occurring in the economics of science research agenda. When the economics of science literature focused on the public good aspects of basic research and basic research's need for subsidies enabling macroeconomic benefits from applied research, the economics of scholarly communication literature modeled journals as a critical component of the basic research process and thus deserving of a subsidy. Later, when the economics of science research agenda attempted to distinguish knowledge from information and de-emphasize the linear model, the economics of scholarly communication was temporarily renamed the economics of information and journals became the primary vehicle for translating research knowledge into information (an exchangeable commodity) usable by more parties.

During the cold war regime of funding and organizing research, the economics of scholarly communication literature characterized journal articles as an input and output of the research process. During this time, the journal was treated as a public good that was under-produced by the market. Drawing on this notion of the journal, the economics of scholarly communication literature argued for the subsidization of the scholarly communication process. In the privatization regime of funding and organizing research, the economics of scholarly communication literature focused on how to maximize the journal's ability to efficiently communicate of information.

1.2.1 Scholarly Communication as an Output and Input

At the end of World War II, neoclassical economics understood research in a production framework. It was at this time that the economics of scholarly

of scholarly communication from letters to books to journal to textbooks to conversations to conferences are up for discussion, the focus here is overwhelmingly devoted to journals.

communication subfield emerged – a sub-field known as the economics of scholarly communication, a subfield devoted to the study of how communities of scholars communicate with one another and to the public. In the years leading up to World War II, there was widespread agreement that the scholarly journal communication process was under considerable financial and organizational strain. The Great Depression curtailed the ability of non-profit organizations like the scholarly society and university to support publishing. This lack in funding in the face of unrelenting manuscript submissions marked the emergence of a crisis. The dramatic increase in government support of research during World War II gave way to a general call, across many scholarly communities, for a renewed financial commitment by the government to the scholarly communication process.

In light of the government's financial and organizational support of basic research justified by the linear model of the research process, economists came to define scholarly communication as an input and an output in the research production process. One of the few tangible outputs to basic research was the scholarly article written after the results were collected. This article was also an input in the production of future basic and applied research. Subsequently, economists concluded that there needed to be an organizational and financial structure of scholarly communication that reflected the role of scholarly journal article as an input and output of the basic research process. Economists recommended that the scholarly communication process be configured such that the social returns from the public subsidy to basic research were maximized. Coupling the government's considerable financial investment in basic research across disciplines like physics with an environment where scholars are forced to publish to

receive status in their profession, the scholarly communication process in those disciplines found itself under considerable strain – more specifically, the journals were unable to increase in size and lacked sufficiently specialized titles. Neoclassical economic theory dictated that the journal and the journal’s primary distribution and archival site, the research library, deserved a public subsidy as an extension of the government’s financial support of basic research activities. Such a subsidy could be used to enlarge the scholarly communication process and consequently would foster an environment where the social returns to basic research were maximized. By the 1940s, the government responded by directly publishing a great number of technical reports, preprints, working papers, and even a few journals in the fields where they sponsored basic research. In addition, by the 1950s, the government also created policies whereby authors could direct research grant monies to the journal that published the research findings and created a policy that allowed a portion of indirect monies associated with a research grant to be used by university librarians to pay for journals.

In the 1960s the economics of scholarly communication literature modeled the journal as a multi-faceted commodity in order to justify a mix of public and private revenue sources. This method of modeling was encouraged by the fact that the end of lavish Cold War funding, starting in the 1960s, caused many researchers to argue that their favorite journals qualified as public goods and thereby deserved the support of the government. For example, Barzel (1971) modeled the American Economic Review (AER) as a quasi-public good. Barzel wrote:

The ideas contained in a publication such as the *Review* constitute the core of its public-good component, since their availability to some does not reduce their availability to others. However, ideas are not directly ‘consumed.’ For the consumer to obtain access to ideas, they must be

published and disseminated at costs which increase with the number of consumers....It thus seems proper to consider the *Review* as a semipublic good—a mixture of a purely public and purely private good.¹⁴

Barzel's article represented more than an intellectual exercise of applying neoclassical economic theory to an everyday object such as the journal; rather, Barzel's article argued, based on neoclassical economic theory, that financially challenged scholarly societies such as the American Economic Association deserved a public subsidy for producing a journal.

Barzel estimated the costs and benefits of producing the AER in an attempt to determine whether the optimal number of pages are produced under the reader subscription revenue system. Barzel specified the cost and demand functions and found that a 1% increase in pages in 1965 would generate \$1,100 in additional revenue and \$1,400 in additional expenses. For Barzel, the question boiled down to whether or not the public benefited enough such that \$300 in excess expenses was justified. This was answered by comparing the consumer surplus to the cost of conducting the research.

Barzel found that, from 1930-1965, the consumer surplus was \$30,000. A 1% increase in pages would translate into a lower bound increase in consumer surplus of consumer surplus, with the lower bound determined by taking the real subscription price at its peak in 1941. A 1% increase in pages would translate into an upper bound of \$1900 in consumer surplus, with the upper bound determined by multiplying the 1941 subscription price by three. Barzel did not attempt to determine the total cost of producing the research for an article that appears in the AER. Instead, Barzel asked whether or not the total research cost needed to create another article of the same quality

¹⁴ Barzel (1971), 665.

was less than the lower bound of \$300, between the lower bound of \$300 and the upper bound of \$1,900, or greater than the upper bound of \$1,900. If the total cost of an article was greater than the upper-bound of the increase in consumer surplus (\$1,900), then a rational economic actor would need to reconsider increasing the size of the journal. Barzel failed to hypothesize what the cost of creating a research article would be yet concluded that the AER has public good qualities and deserves a public subsidy.

In a similar study, Berg (1972) calculated the private and social demand and cost functions for the Journal of Physical Chemistry in an attempt to determine whether or not the total costs of production exceed the total private benefits. Neoclassical economic theory dictates that, if these costs are greater than the private benefits, the journal should not receive a public subsidy. With linear demand curves for the journal for the time period of 1956-1966, Berg found that a member of the scholarly society that published the journal (the American Chemical Society) placed a marginal value of \$0.0015 on an additional page of research while the variable cost was \$0.003. Thus the marginal cost of producing and distributing a page from a scholarly journal exceeded the marginal private benefit. When Berg looked at the demand function for the journal by institutions so as to estimate the marginal social benefit, he found a marginal value of \$0.0125. With the same variable cost of \$0.003, the journal would be undersized for these types of subscribers according to the social demand function. Berg recognized that the private demand for subscriptions by members of the American Chemical Society represented the lower bound to the net benefits of producing the journal and the social demand for subscriptions by institutions representing the upper bound. Consequently, Berg concluded that the journal was under-sized and should receive a public subsidy.

This research, specifying the public and private demand functions of journal titles, served the interests of researchers in general who sought to secure the financial position of a title while there was still government funding for research, and it also served the interests of researchers in the economics of science field whose focus was on delineating all aspects of the research endeavor, including scholarly communication, into public and private categories. But as the economics of science in the 1970s began to distinguish knowledge from information and modeled scholars as cognitively challenged agents that operate in a network, the economics of scholarly communication literature was transformed into the economics of information literature.

1.2.2 Scholarly Communication as a Process that Translates Knowledge into Information

Just as the research agenda of the economics of science changed starting in the 1970s, so too did research agenda in the economics of scholarly communication. As we saw in section 1.1.2, the economics of science research agenda changed when it began to distinguish knowledge from information and to deemphasize the linear model and the notion of research as the production of a public good. Focusing on the way in which information moves between agents, scholars in the economics of science literature altered the economics of scholarly communication literature such that it became the economics of information. The focus in the economics of information literature was finding the most efficient institutional structure capable of translating knowledge created during the research process into information. In addition, despite the persistent studies on the public

good qualities of journals and articles, economists concentrated on the cost of creating, evaluating, and using information, how to price and market it, the characteristics of the demand and supply function of information, and the economics of inquiring and deciding.

Within the economics of information, the researcher is understood not as a producer or consumer of the scholarly article but as an agent who translates knowledge into information, who processes information generated by others, and who translates information through the research process back into knowledge. The economics of scholarly communication literature shifted such that there was a closer analysis of the contents of scholarly communication, with particular emphasis on exchangeable information commodity processed by agents with limited abilities. In addition, the economics of scholarly communication literature devoted more attention to creating the most efficient means by which to distribute information – a field known as information economics.

Information economists described their field of study in the following way:

Economics of information observed in the literature revolves around input, process and output comparisons of products and services. Information transfer systems involve a large number of processes performed by many different participants. For example, in publishing scholarly works through journals, participants are authors, publishers, abstracting and indexing services, libraries and readers, to name a few. Each of these participants does something to the information, which forms the processes in a traditional economic sense. In order to perform the processes the participants must allocate input resources (i.e., labor, equipment, supplies, etc.), which are measured in terms of costs. The output from the processes of all the different participants takes the form of an information product (e.g., manuscript, journal, index, etc.) or service (e.g., provision of journals in a library, online searches, etc.). Each output of the processes has some value, which differs depending upon from whose perspective the value is being viewed. If the perspective is that of the participant who is performing the process, the output is in terms of the quantities of products produced (or amounts of services performed) and the attributes of the products such as quality (or the performance of the services such as speed

of response). Then, from this perspective, the economic analysis involves a comparison of the input (cost) and output (quantities, performance or attributes) associated with the processes. Such comparisons include productivity (which compares quantity of output with labor effort input) or efficiency (which compares attributes or performance with cost).¹⁵

This description suggests that researchers in the economics of information were most concerned with how to attach a value to information, and it also suggests that the problem faced by information economists is that the value of information, if characterized as the usefulness or utility of information, cannot usually be determined until after the information has been obtained. Complicating the search for a solution to this problem further is the fact that the value of information is situationally and intrinsically bound to the transmitter and the receiver.

The struggle to ascribe a value to information, the flood of new journal titles published by both commercial and non-commercial publishers, and the increased emphasis by institutions on the contents of a scholar's publication record encouraged researchers in the economics of scholarly communication to rank journals.¹⁶ These ranking studies provided economists with a way to convert an otherwise ambiguous notion of 'information' into a context-free quantitative entity that could be subjected to an economic analysis. Scholars needed a rank-ordered list of journals to help them

¹⁵ King, Roderer, and Olsen (1983), 1-2

¹⁶ Disciplines that conducted the majority of research in ranking journals included economics, criminal justice, management, sociology, political science, accounting, operations research, and psychology. The question is why these social science disciplines have rank-ordered lists of journal titles while the natural and life sciences generally lack them. I conjecture that there are at least two reasons why this seems to be the case. The first has to do with the fact that social science journals position themselves such that they incarnate a theoretical position rather than a segment of the discipline as is often the case in the sciences. By not tolerating the existence of multiple paradigms, rankings of journals (theoretical positions) are not as important in the sciences. Second, the academic reward system in the social sciences and humanities for research depends almost exclusively on publication records whereas academics in the sciences can tout their ability to secure outside financing, obtain patents, or organize research groups. As a result, more focus is placed on the quality of publications in the social sciences.

decide which journals they would submit articles. Tenure, promotion and hiring committees needed a rank-ordered list of journals in order to evaluate an academic's record of publications. Funding agencies needed a rank-ordered list of journals in order to decide what researchers to support. Libraries needed a ranked-ordered list of journals in order to determine which acquisitions would be used most.

There emerged, within the literature, a variety of methods by which journals were rank-ordered. These methods included familiarity and respect for the title by practitioners, the use of the journal's articles in graduate courses, and, most importantly, the use of the journal's articles in other scholarly articles.¹⁷ This last method, often referred to as "citation analysis," is based on the idea that an author who cites a journal has found this journal to be useful. It follows that the more frequently a journal is cited then the greater its influence in the scholarly communication process. The use of the citation analysis method for ranking journals was strengthened in 1973 when the Institute for Scientific Information (ISI) was formed and started collecting and publishing citation indexes. Using bibliometric statistics (citation counts and the number of articles) across 8,600 journals (5,000 in science, 1,500 in the social science, and 1,100 in the arts and humanities), the ISI ranked journal titles according to 'impact factor.' The impact factor represents the ratio of citations received to number of citable items (articles). In short, the impact factor indicates the mean number of times an average article has been cited over a 2-year period while accounting for the advantage that older, larger or more frequently published journals enjoy if rankings are based only on the total number of

¹⁷ McDonough (1975) suggests that each criterion is a valid component of a journal's quality but that each by itself provides only partial information on the quality.

citations received.¹⁸ Although controversial, the impact factor variable created by the ISI has come to be used for more journal ranking lists than any other bibliometric measure, and many researchers insist that it is the most valid measure for evaluating journals.¹⁹

In addition to ranking journal titles, the economics of scholarly communication, with its goal to describe how different scholarly communities deal with the problem of epistemic scarcity, focused on the types of quality control (peer review) mechanisms within a community. Cole *et al.* (1978), Peters and Ceci (1982), and Laband (1990) each found that the peer review process accurately gauged the quality (epistemic value) of a submission. Blank (1991) analyzed the value contributed to the intellectual content in scholarly articles by various forms of peer review. Specifically, Blank compared double blind reviewing, where both the reviewers and authors' names and affiliations are anonymous, to the single-blind, where the author's name and affiliation are revealed to the reviewer. Drawing on data from the AER, Blank found that the two forms of peer review differed significantly in terms of acceptance rates, comments, and decisions of whether to accept or reject the article. Interestingly, Blank also revealed that economics journals, on the whole, employed a mix of double-blind and single-blind review policies while the refereeing practices employed by journals in other disciplines consistently depend on a singular method of review – chemistry, biology, physics, mathematics, psychology, and anthropology employed single-blind procedures and political science and sociology employed double-blind procedures. In general, the conclusion in the

¹⁸ A journal's 2001 impact factor would be calculated in the following way: 2001 impact factor = (number of 2001 citations to 2000 + number of 2001 citations to 1999) / (number of articles (citable items) published in 1999 + number of articles (citable items) published in 2000)

¹⁹ Buffardi and Nichols (1981), Dometrius (1989), and Vinkler (1988). See Nisonger (1994) for an analysis of the limitations of the Journal Citation Reports issued by ISI

economics of scholarly communication literature was that the peer review mechanisms in a discipline reflected a scholarly community's choice of the methods that best guaranteed epistemic certainty in information.

The economics of scholarly communication research agenda in the 1990s focused on how scholarly communities create and distribute information in an electronic medium. The challenges in an electronic medium included how to price a digital information good when that good's marginal cost was close to zero, how to protect ownership over an object that in the electronic era was easy to copy, and how best to distribute scholarship over a digital network. Shapiro and Varian (1999) claimed that an electronic medium does not, in of in itself, require the use of new economic principles to model the scholarly communication process. They explained:

...we kept hearing that we are living in a 'new economy.' The implication was that a 'new economics' was needed as well, a new set of principles to guide business strategy and public policy. But wait, we said, have you read the literature on differential pricing, bundling, signaling, licensing, lock-in, or network economics? Have you studied the history of the telephone system or the battles between IBM and the Justice Department? Our claim: you don't need a new economics. You just need to see the really cool stuff, the material they didn't get to when you studied economics.²⁰

In other words, the fact that information exists in an electronic medium requires no different set of economic principles than was the case when it existed in a print medium. Economists in the economics of scholarly communication in the 1990s split into two groups: one group of researchers focused on the costs to distributing scholarship in an electronic vs. a print medium while a second group of researchers used neoclassical

²⁰ Shapiro and Varian (1999), X.

economic principles to advocate a particular redesign of the scholarly communication process.

In the first group, several economists claimed that electronic methods of scholarly communication made the scholarly communication process more efficient by reducing production costs. Stevan Harnad, the founder of the electronic journal Psycoloquy, claimed that electronic publishing could lead to a cost savings of up to 70%, since in a purely electronic environment, only two costs remain: peer review and editing. With an audit by PricewaterhouseCoopers, Bot, Burgemeester, and Roes (1998) found that the Electronic Journal of Comparative Law (EJCL) was cheaper to produce than comparative print journals. They found that EJCL cost \$5,021 an issue – with 4 issues a year, this translates into a volume cost of \$20,084. With an estimated 600 subscribers, the average annual cost per subscriber for a journal volume would be \$33. Even if an allowance was made, with printed journals having a hefty profit margin, the average cost would have been nowhere near the \$175 average annual subscription price of a law journal subscribed to by a typical law library.

Odlyzko countered the arguments made by Harnad by claiming that publishers, by switching to an electronic format, could only save at most 30% (with most of the cost savings achieved with an elimination of printing and mailing expenses).²¹ Odlyzko's argument is reinforced by the fact that the prices of electronic versions of established print journals are often little, if any, lower than those of the basic paper versions. Fisher (1999) agreed, somewhat, with Odlyzko's conclusion when she estimated the direct and

²¹ Various researchers estimate that first copy costs of acquisition, peer review, editing, and conversion to a digital format, costs which exist in both the print and electronic medium, account for more than 80% of total publishing costs. Tenopir and King (2000) found that the reproduction and distribution of journals constitute very little of the total cost. The bulk of the cost of producing a journal is in editorial, referee, and other professional services.

overhead costs associated with the purely electronic journal, Chicago Journal of Theoretical Computer Science, and a similar print journal, Neural Computation. She found that while total production cost per page was 291% higher for the print journal – mainly due to printing and binding costs, overhead costs were 1240% higher for the electronic journal – mainly due to the higher general and administrative costs. She concluded that while the electronic journal might cost less, the cost savings were not as significant as one might have initially expected them to be.

In the second group, economists are investigating ways in which information in an electronic medium can be distributed more efficiently than in a print medium. One possible way by which this efficiency can be achieved is by altering the way information is paid for. The pricing structure where a few libraries pay the entire cost of the journal is blamed for causing problems in the print era. After these few libraries pay exorbitantly high prices for access to the journal, the distribution of articles to other institutions is made through the cost and time inefficient inter-library loan and document delivery systems. According to Derk Haank, libraries need to switch from a pricing model based on subscriptions to journals by a few libraries to a license pricing mechanism where all libraries pay for the whole database of journals with the price determined by the size of the institution.²² The problems experienced during the print era of scholarly communication collectively known as the serials crisis can be removed by instituting a pricing policy that removes the free-rider problem. Dissenters, such as Bergstrom (2001), believe that transitioning to electronic site licenses is beneficial only for

²² Poynder (2002)

commercial publishers who want to maximize revenue through price discrimination practices.

A second possible way by which efficiency can be achieved is by altering the way information is distributed. In the print era, the most efficient manner of distribution was collecting many articles in a journal issue and several journal issues into a volume. The electronic era offers the opportunity to unbundle articles from the journal title as well as the opportunity to bundle similar journal titles together. Although bundling and unbundling techniques may provide enhanced access to researchers, the economics of scholarly communication literature has focused on how these methods affect revenue for the publisher. Bakos and Brynjolfson (2000) argue that a decision to bundle should be based on the tradeoff between the benefits of aggregation and the marginal costs of production and distribution. They found that the lower transaction and distribution costs that characterize the scholarly journal communication process in the electronic era make unbundling (disaggregation) an attractive option for sellers (in this case, publishers). Countering the belief that pure bundling was the preferred strategy, Chuang and Sirbu (2000) used conventional economic utility maximization models to argue that publishers and scholars would benefit most from a combination of bundled and unbundled sales of scholarly journal articles (mixed bundling).

It is here where the economics of scholarly communication literature stops. While there have been occasional studies of the cost effectiveness of a particular electronic method of distribution or of the monopoly status of commercial publishers and the fact that their profit maximizing behavior works to the detriment of scholarly communities, researchers in the economics of scholarly communication continue to focus

on cost effectiveness studies and dust off old neoclassical economic principles in order to understand and offer solutions to a widely cited crisis in the scholarly communication process in many disciplines. This occurs despite the fact that the economics of science research agenda has started to change and despite the fact that few in the economics of scholarly communication literature have discussed what exactly the serials crisis is.

Changes in the economics of science research agenda and the presence of an unexplained serials crisis make it apparent that a new economics of scholarly communication research agenda is needed. In the next section I will outline the revisions that have been made to the economics of science literature, the revisions that need to be made to the economics of scholarly communication literature, and how revisions to both of these literatures are the result of a variety of changes that have occurred in how research is conducted and paid for.

1.3 Towards Revising the Economics of Science and Economics of Scholarly Communication Literatures

In section 1.1, I documented the changes that occurred in the economics of science research agenda. Whereas research was first viewed through an input and output production framework, this methodological approach changed in the 1970s such that research was seen as information with an unknown epistemic value and was handled by agents according to an information processing framework. In section 1.2, I documented the changes that occurred in the economics of scholarly communication research agenda. Whereas scholarly communication was first characterized as an input and output in the

production of research, this conception of scholarly communication changed in the 1970s such that it was seen as a device that translates knowledge into information. This section both reviews the various political, economic, social, and intellectual changes that motivated these revisions to the economics of science and economics of scholarly communication literatures and outlines the most recent ways in which these literatures are being revised. What will be seen is that while many economists have studied the way the economics of science research agenda is being restructured, very few have examined how to revise the economics of scholarly communication research agenda in light of revisions to the economics of science research agenda and the serials crisis.

1.3.1 Political, Economic, Social, and Intellectual Changes and Crises and their Influence on the Economics of Science and Economics of Scholarly Communication Research Agendas

The changes made to the economics of science and economics of scholarly communication research agendas correspond with changes in the dominant science regime.²³ When there are changes in a science regime there are corresponding changes in research funding priorities, the degree of organizational control exerted by a funding agency, the types of individuals that engage in research, where research scholars work, and who owns the research created by the scholar. As the science regime changes, the economics of science and economics of scholarly communication theories legitimizing

²³ With the social constructivist idea that the research process is a site where various actors pursue revealed and unrevealed goals and that this is reflected in the prevailing institutional configuration, science regimes can be understood as generalizing the institutions and the environment they interact with as they create constraint and opportunity structures.

the organization and methods of funding research and scholarly communication practices have changed as well. Slaughter and Roades (1996) have posited the existence of three science regimes in the United States from World War II up until the 1990s: the Cold War, the war against disease, and the struggle to maintain economic competitiveness. In each of these science regimes, the source, justification, and motivation of research changes in response to crises in society.

In terms of the source of research funding and the disciplines it was devoted to; there were high levels of federal funding to the physical sciences during the Cold War, a mix of federal and industrial funding to the life sciences during the war against disease, and a greater level of industrial and institutional funding to the life and computer sciences and engineering during the economic competitiveness era.²⁴ Bourdieu (1988) and Kleinman (1995) both argued that World War II and the Cold War that followed created a unique opportunity for institutions (namely the federal government) to influence the research process and represented a time when scientists could translate their symbolic capital (their reputation for having helped win the war) into real capital (control over a portion of the federal research resources).²⁵ Scientists advocated a system of research policymaking that transferred control over the resources for the conduct of basic research to themselves and, in the interest of what they saw as national economic welfare, advocated that administrators within research laboratories grant property rights to those undertaking the research as opposed to giving these rights to the government who funded it. With the government willingly funding research in the physical sciences based on

²⁴ This history of research funding during the latter half of the 20th century is well documented in Mirowski and Sent (2002), Slaughter and Roades (1996), Kleinman (1995), and Martino (1992).

²⁵ Kleinman (1995), 65.

security and economic criteria and the crisis of the Cold War, a research and development coalition formed between the Department of Defense (DOD) / Department of Energy (DOE) / National Aeronautics and Space Administration (NASA). Together, these agencies contributed nearly a third of all federal spending on research and development throughout the 1960s.²⁶ By 1975, these three agencies contributed only 17.7% of all federal spending on research and development.²⁷ The shift in science regimes reflected society's declining commitment to the Cold War and mounting dedication for the war against disease. By 1971, the National Institutes of Health (NIH) contributed 36.7% of federal funds spent on research and development and by 1985, this climbed to 45%.²⁸ Starting in the 1980s, there was yet another transition in science regimes. Slaughter and Roades argued that the Cold War and the war against disease crisis narratives were abandoned as profits fell. During the Cold War, falling profits meant businesses wanted to produce both military and consumer products. During the war against disease, profits levels became more important as more hospitals and insurance programs transitioned from a non-profit to a for-profit status. As a result, in the late 1970s and early 1980s, these firms joined forces to push for research and development policies that commodified research, established government subsidies for high-technology industries, and moved university research and development activities towards commercial science and technology ventures. This new science regime was known for its economic competitiveness wherein the focus of those awarding research funding was the fight against economic decline. In these first two science regimes, the federal government was

²⁶ Mirowski and Sent (2002)

²⁷ Mirowski and Sent (2002)

²⁸ Mirowski and Sent (2002)

free with its resources. Universities benefited from cost-plus contracts, long-term funding, and little oversight of research. In the third science regime, the federal government reduced its commitment to funding and organizing scientific research while companies in the private sector (and research universities who act as if they are) increased their funding for research and development. As a result, those administering research funds placed greater emphasis on cost, on products and processes geared for immediate market use, on short-term funding, and on more oversight of research. These funding patterns reflected society's notion of which institutions should be involved in the research process.

These three science regimes and the institutional funding and organizational consequences they posed on the research process were, as we saw in section 1.1 and 1.2, justified by economic theories of science. During the Cold War, the economics discipline became more methodologically homogenous, with neoclassical Walrasian general equilibrium theories defining microeconomics while Keynesian growth accounting theories defined macroeconomics. During this same period of time, all researchers were focused on the establishment of links between microeconomics and macroeconomics. This trend within economics to link microeconomics with macroeconomics influenced the economics of science and economics of scholarly communication literatures, and researchers increasingly concentrated on identifying the public good aspects of research and scholarly communication activities. Starting with the war against disease and continuing through the economic competitiveness science regime, researchers de-emphasized linkages between micro and macroeconomic theory and the use of general equilibrium tools; instead, these researchers described research and scholarly

communication activities through non-cooperative game theory and a modeling of individuals as actors with limited cognitive abilities. The consequence of the shift in economics towards game theory was an economics of science and economics of scholarly communication literature that concentrated on the types of research and communication institutional structures that best generate trustworthy knowledge, contemplated how to transfer this knowledge into information, and questioned how to create economic growth with less priority given to finding a justification for public support.

Today we are in the midst of yet another change in science regimes. It is a regime change that started when the government reduced its financial commitment to research throughout the 1980s and early 1990s. As a result, universities have had to compete vigorously with one another over a smaller amount of funds. This pursuit of funds has taken on a privatization feel as the financially starved academy – especially those institutions that are public – welcomes with open arms research funding from private industry. This new science regime, the globalized privatization regime, is defined by the rise of the contract research. In contract research, corporations contract out research and development tasks to research teams housed in an academic setting. As corporate funds replace governmental and university funds devoted to research, pursuit of profits and the protection of intellectual property replace the priorities of the past (the defeat of communism, a healthy population, and a prosperous domestic economy). Accompanying this change in science regimes have been changes in the economic method of analyzing the research and scholarly communication process – namely a questioning of the dominant market metaphors as well as the conception of the researcher as a rational economic agent that simultaneously pursues individual and social goals. The result,

which I outline in the next two subsections, is the emergence of a revised economics of science research agenda.

1.3.2 Revising the Economics of Science Literature

In the revised economics of science research agenda, science is modeled as existing in a network containing cognitively challenged agents. With market metaphors being replaced with notions of path dependence, spontaneous emergence of order, and evolutionary epistemology, this revised economics of science research agenda emphasizes the institutional structure of the research endeavor in ways previously unconsidered. Taking lessons from industrial organization theory and network economics, this revised economics of science research agenda appreciates the way theory choices are made within a research community and the interaction between research funding and organizing institutions (university, corporation, and government). Some examples of such works that pursue this research agenda include Callon (2002), Ziman (2002), Brock and Durlauf (1999), Turner (2002), McSherry (2001), and Mirowski (2001). This research agenda was discussed during a NSF sponsored conference held before the Allied Social Science Association meetings in 1995 and during a NSF sponsored conference at the University of Notre Dame in 1997 (with the papers presented at the latter conference appearing in Mirowski and Sent (2002)).

In this revised economics of science literature, authors discuss how neoclassical economists use certain types of metaphors to describe the research process. These authors also discuss the method of organization employed by institutions who engage in research (namely the university and the firm), the relationship between the institution that

funds research and the researcher, how rival theories emerge in a scholarly community, and the manner by which individual researchers make choices. Part of the motivation behind this change in the economics of science research agenda has been the frustration among scholars that an economic analysis has often entailed a narrative recognizable only to those formally trained in neoclassical economics. The effort to broaden the reach of the economics of science beyond neoclassicism has also been inspired by the widespread agreement that neoclassical economic metaphors and models are unable to properly capture the dynamics of funding and organizational influence of the government, the university, and the corporation. If anything, the economics of science, under the influence of neoclassical economics, is accused by many authors in this new research agenda of doing little more than justifying the existing patterns of patronage.

Like previous transitions in the economics of science research agenda, part of this change in the economics of science research agenda can be understood as being motivated by crisis. Mirowski and Sent (2002) argued that the crisis inspiring the globalized privatization regime of science had at least two defining characteristics. First, this crisis was defined as a time when the legal claims over intellectual property became increasingly contested. Second, the crisis was defined as a time when the university – the site where most research is conducted – was increasingly privatized. The alternative Mirowski and Sent (2002) proposed was an economics of science able to account for the various strategic coalitions that produced a research scene where academic research, military research, and industrial research were indistinguishable. The changes in the economics of science research agenda were guided by the belief that a broader economic analysis could be used to analyze and respond to the financial and organizational changes

that had occurred and as a result provided a deeper understanding of, measurement of, and evaluation of the research process.

1.3.3 Revising the Economics of Scholarly Communication Literature

From sections 1.1 and 1.2 we learned that changes to the economics of science research agenda informed changes to the economics of scholarly communication research agenda. Given these recent revisions being made to the economics of science literature, it should not be surprising that there would be an attempt to revise the economics of scholarly communication research agenda as well. Towards the close of the twentieth century there emerged an interest in revising the economics of scholarly communication research agenda yet again. This new economics of scholarly communication research agenda accounts for the changes that have occurred over time with regard to the sources of funding, changing priorities within the academy, and changes in the economic, political, and legal conditions. The revisions to the economics of scholarly communication literature are motivated further by the various crises in the scholarly communication process.

This shift away from the existing economics of scholarly communication research agenda occurs as scholars question the idea of modeling the journal as a commodity and express disagreement with narratives that described scholarly communication as a homogenous process across the disciplinary landscape. These critiques, while once made by a few methodologists of economic thought, has garnered more credibility as more agree that the economics of scholarly communication literature has failed to produce an explanation for the cause of the serials crisis let alone offer a solution to it. At the same

time, changes to the economics of science research agenda starting in the 1990s demanded a different concept of the scholarly communication process. Instead of seeing the scholarly communication process as maximizing the epistemic value of information given financial and time constraints faced by individuals, there was a need for an economic theory of scholarly communication that could appreciate the institutional structure and the various methods of disclosure and validation within a scholarly community. With an interest in how the traditions and practices followed by a scholarly community emerged and were sustained in a discipline over time, researchers seek an economic of scholarly communication research agenda able to capture the way research results are generated, reported, and validated and in the process, explain the cause of and offer solutions for the resolution of the serials crisis in a way that appreciates the reality of the situation in each discipline.

Sent and Klamer (2002) offered us the first overview of how the new economics of scholarly communication research agenda should be structured. Their vision, outlined in a mini-symposium they organized, consisted of an appreciation of the influence of various university, government, scholarly society, and commercially situated institutions on the defining elements of the process in each discipline. They also stressed that the changes this process had undergone over time in each discipline was a consequence of changes in the funding and organization of the research process. Four of the papers presented at this mini-symposium on the revisions being made to the economics of scholarly communication literature were subsequently published in the Journal of Economic Methodology. The first paper, Owen (2002), described the existence of a new information chain defined by networked digital resources. He also argued that this

development needed to be reflected in our understanding of how and why institutions support initiatives such as digital libraries. Viewing science as a network where scholars vie for attention and use clustering techniques to obtain it, the second paper, Klamer and van Dalen (2002), offered a better understanding of why the electronic era was structured the way it was without resorting to unrealistic market-based models. The third paper, Parks (2002), tackled the way the electronic era of scholarly communication will be paid for. Rather than believing the hype that digital technology would liberate the process and provide access free of charge, Parks showed how authors, editors, referees, readers, university administrators, librarians, and publishers all faced little incentive to transition away from subscription and site license revenue mechanisms. Although this narrative would seem to indicate that it was nearly impossible to resolve the serials crisis, the fourth paper, Plasmeijer (2002), provided such hope by showing that the crisis could be resolved through increasing the awareness of prices and costs among the librarians and academics who make use of the scholarly communication process.

Several other authors have participated in this revised economics of scholarly communication literature. Schonfeld (2003) recounts the history of the digital archival project JSTOR (with attention devoted to the project's organizational structure and the way in which the Mellon Foundation, the University of Michigan, journal publishers, and subscribing institutions interacted with one another over time). Appel (2000) conducted a study of how the research agenda and scholarly communication process in biology was influenced by the National Science Foundation. Finally, Kling and McKim (1998) explored how scholarly communication differences across disciplines will persist in the electronic era. The revisions to the economics of scholarly communication research

agenda are quite recent and this dissertation will outline first what precisely the serials crisis is that is shaping the research agenda and second what this revised research agenda is seeking to correct in the previous economics of scholarly communication research agenda.

First, identification of a crisis often accompanies, justifies, and shapes the revisions being made to a research agenda. In the economics of scholarly communication research agenda, this crisis is the serials crisis. As indicated in the introduction, a crisis in the scholarly journal communication process does exist. However it is not merely a cost inefficiency phenomenon as the existing economics of scholarly communication literature has made it out to be. Rather the crisis represents a period of time when the funding, organizational structure, and goals of the research and communication processes are being re-engineered and re-negotiated. In terms of the scholarly communication process, there is active discussion over the role that should be served by the process and negotiation over how the process should be organized and financed. As an actor argues for a particular role or organizational/financial structure of the scholarly communication process, that actor has to simultaneously identify the strengths and weaknesses in the existing scholarly communication process. As the next chapter will show, the described weakness often takes the form of cost inefficiencies or distributional breakdowns generalized as a serials crisis. While these inefficiencies do in fact exist, they do not represent the crisis. Rather, the serials crisis represents a unique period of time when the scholarly communication process can be restructured. This restructuring process is made possible because actors have convinced others that the present organizational or financial structure of the scholarly communication process is unsustainable. Thus, narratives of a

serials crisis are often designed to simultaneously blame one group or one structure for problems in the scholarly communication process and advocate for a different organizational or financial structure.

Rather than representing a time when inefficient scholarly communication practices are no longer sustainable, the serials crisis represents instead a time when research priorities, methods of organization and funding, and the motivations of research funding agencies have changed and altered the research process and the manner by which research results are communicated. Given that research funding regimes heavily influence the research process, it would stand to reason that the organization and financing of scholarly journals are affected as well. As we will see in the next chapter, this defense or repudiation of the journal's organization or financing is made with economic metaphors such as efficiency and the public good. Librarians, scholars, publishers, and universities classify this time of negotiation as a crisis in order to convince others that journals should be organized in a particular way. As will be shown in the next chapter, serials crisis narratives are constructed in such a way that they permit an opportunity to overhaul scholarly communication processes under the guise of the seemingly innocent goal of increasing economic efficiency. These serials crisis narratives fail to appreciate the reality of the situation whereby scholarly communication practices were being reconfigured to reflect the changing priorities of the funding and organizing agencies of research. As I will show, the serials crisis, or any other crisis situation in the scholarly communication process, does not have a single cause such as cost-inefficient practices; rather, certain institutions and groups use the serials crisis

rhetoric to argue for an overhaul of the scholarly communication process in order to achieve other goals.

Second, the revisions made to the economics of scholarly communication research agenda should correct for deficiencies in the existing literature. There are at least four deficiencies in the existing economics of scholarly communication literature that will be dealt within the remaining chapters; homogeneity of the scholarly communication process across disciplines, a mischaracterization of the serials crisis problem and the consequences to transitioning to an electronic medium, a neglect of the influence over the scholarly communication process by the research funding agency, and the treatment of the intellectual property within scholarship as being of negligible value and as having uncontested ownership. In this dissertation, I use the author charge pricing mechanism to highlight the deficiencies in the present literature and to guide the revision process.

1.5 Conclusion

In this chapter where I outline the changes to the economics of science and economics of scholarly communication literatures over time and the way they have been influenced by crises, I noted the recent emergence of a revised economics of science and revised economics of scholarly communication research agenda. In describing the more active attempts being made to revise the economics of science literature, I found that the same degree of research effort was not being extended to revising the economics of scholarly communication literature. In fact, I found that the initial call for a revised

economics of scholarly communication research agenda dated back only to 2002 and that this was all the more surprising given the amount of discussion of a crisis in the scholarly communication process. With this dissertation's goal to stake out what the revised economics of scholarly communication research agenda should consist of, the next chapter places the various crises in the scholarly communication process in historical perspective. Placing the serials crisis in a historical context sets the stage for understanding how a serials crisis can both motivate transitions in the use of scholarly communication objects and inform the subsequent revisions that then occur in the economics of scholarly communication literature.

CHAPTER 2

CRISES IN THE SCHOLARLY COMMUNICATION PROCESS

2.1 Introduction

The previous chapter reviewed the economics of science and economics of scholarly communication literatures and related changes in the research process, the scholarly communication process, and changes in the economic understanding of these processes to changes in the research funding regime. The previous chapter concluded with a discussion of the deficiencies of the present economics of scholarly communication literature and the recent attempts to revise it. This chapter summarizes the historical and present understanding of the serials crisis in order to highlight the deficiencies of the economics of scholarly communication literature. This chapter reviews the literature that discusses the existence of a serials crisis. This chapter begins with a summary of the crisis events that have plagued the scholarly journal communication process over time. In the discussion of the most recent crisis, I identify at least four different cited causes for the crisis. After delineating these interpretations of the cause of the serials crisis, the proposed solution that accompanies each interpretation, and the way these cited causes and solutions are packaged in the economics of scholarly communication literature, I conclude that the narratives on the serials crisis, inspired by

the existing economics of scholarly communication literature, fail to recognize that the organization and financing of journals is influenced by the organization and financing of research. It becomes apparent that discussion of a crisis in scholarly communication tends to accompany dramatic shifts in how research is organized and financed. In other words, the serials crisis event is not so much a time of unsustainable inefficient practices as it is an event constructed by actors such as the research funding agency who have an interest in structuring and financing the scholarly communication process in a particular way.

2.2 An Overview of the Serials Crisis

The determinants of the scholarly communication process in a discipline are rarely, if ever, explicitly revealed. The literature discussing scholarly communication processes tends to grow only when there is mention of a crisis. Two examples of this crisis motivation are the monograph crisis and the serials crisis. Whereas the monograph crisis affects disciplines in the humanities and social sciences and is characterized as a situation where publishers produce fewer monograph titles and libraries acquire fewer titles (because of higher prices), the serials crisis affects disciplines in the life, natural, and social sciences and is characterized as a situation where publishers (especially commercial publishers) produce specialty journal titles yet libraries acquire fewer titles (namely because of higher subscription prices). Of these two events, the crisis discussed most often is the serials crisis.²⁹ The serials crisis is cited as the impetus behind

²⁹ The attention devoted to the serials crisis at the expense of the monograph crisis is a fact noted by Sent and Klamer (2002). They remark that one cause of this phenomenon is the discipline affiliation of those that research scholarly communication processes and their tendency to focus on those forms of

initiatives that radically restructure the scholarly communication process. The serials crisis is cited by many in the academy as representing problems that emerge when scholarly activities are privatized. And finally, the serials crisis is the primary focus of the economics of scholarly communication literature. Given my effort to outline the nature of the revisions being made to the economics of scholarly communication literature and their shortcomings, it is only fitting that the focus in this dissertation be on the serials crisis as well. In this section, I provide a broad historical overview of crises in the scholarly journal communication process.

2.2.1 A Scholarly Communication Crisis is not a New Phenomena

Discussion of a crisis in scholarly journal communication processes is by no means new. It was, in fact, a crisis in the scholarly communication process that first prompted the publication of journals.³⁰ Before journals, scholarly communication was conducted through a combination of personal correspondence, books, and academic meetings. As a consequence of the increase in the amount of financial resources devoted to research and the increasing number of scholars writing about their findings, it soon became apparent that there were too many materials for scholars to keep track of and that there was a desperate need for a system whereby research could be reviewed for accuracy before being read by others.³¹ A crisis situation had developed where the existing

scholarly communication that they use (in this case, the journal). I hypothesize that the serials crisis is accorded more attention because more parties seek to control and own the scholarly journal and/or article.

³⁰ This idea appears in Price (1963) and Kronick (1976)

³¹ One individual, for instance, commented in 1613 that “One of the diseases of this age is the multiplicity of books; they doth so overcharge the world that it is not able to digest the abundance of idle

scholarly communication system had lost its ability to effectively and efficiently distribute and validate research findings to others. Price (1963), Houghton (1975), and Kronick (1976) all argued that the solution was the introduction of the scholarly journal in the mid-seventeenth century. These early journals, such as *Journals des sçavans* and *Philosophical Transactions of the Royal Society*, published letters written to scholarly societies, published articles from a variety of disciplinary perspectives, reprinted excerpts from academic meetings, reviewed the increasing number of books being published, and indexed materials from other journals.

By the nineteenth century, scholars in the natural and life sciences, government officials, and business leaders were reliant on the journal for the communication of research findings. This was a time when journals were increasingly discipline-specific, when there was an increase in the financial and organizational support accorded to the scholarly research and communication process, and when many research libraries and scholarly societies were established. A consequence of these events was that the number and size of journal titles grew dramatically. Whereas in 1750 there were only 10 scholarly journals, there were 100 titles by 1800, and there were 300 titles by 1830.³² The growth in the number of titles alone prompted John Henry, the Secretary of the Smithsonian, to write in 1851 that

It is estimated that about 20,000 volumes, including pamphlets purporting to be additions to the sum of human knowledge, are published annually; and unless this mass be properly arranged, and the means furnished by which its contents may be ascertained, literature and science will be overwhelmed by their own unwieldy bulk. The pile will begin to totter under its own weight, and all the additions we may heap upon it will tend

matter that is every day hatched and brought forth into the world.” S.B. Barnes citing Barnaby Rich in Kronick (1976), 171.

³² Price (1963)

to add to the extension of the base, without increasing the elevation and dignity of the edifice.³³

Scholars, librarians, and research funding agencies at the time felt they could no longer be conversant with all that was being published.³⁴ Price (1963), Kronick (1976), Manzer (1977), and Osburn (1986) cited the emergence of the abstract journal in the mid-nineteenth century as the solution to this first crisis in scholarly journal communication. Price (1963) described this deterministic invention of the abstract journal *vis a vis* the growing size of serials when he wrote that

...By about 1830 there was clearly trouble in the learned world and, with an assemblage of some three hundred journals being published, some radically new effort was needed. Yet again there was an invention as deliberate and as controversial as the journal itself: the new device of the abstract journal appeared on the scene.³⁵

Price concluded that the emergence and growth of the abstract journal was a function of the size of number of journals based on his observation that the number of scientific journals increases exponentially over time (a doubling of the number of titles every fifteen years) and his belief that, when the amount of information in the archive becomes larger than some critical quantity, it is necessary to introduce a time-saving method for keeping abreast of the contents of the research archive. With respect to scientific journals, Price argued that this point was reached once there were approximately 300 journals.

³³ As quoted in Kronick (1976), 40-41

³⁴ By 1789, the report that yet another new journal was being produced prompted an established journal to print that “this is truly the decade of the journal, and one should seek to limit their number rather than to increase them, since there can also be too many periodicals.” Kronick (1976), 171.

³⁵ Price (1963), 98.

Manzer (1977) held a slightly different opinion on the relationship between the journal and the abstract journal based on the fact that, although the growth rate of the abstract journal was exponential and positively correlated with overall journal growth, there was no evidence of a causal relationship between the number of journals and the number of abstract journals. Manzer also found that the abstract journal, contrary to Price's account, really did not enter the scholarly communication process in a meaningful way until the latter part of the 19th century.³⁶ Despite these differences in interpretations of the rise of the abstract journal, Price and Manzer both agreed that the unrelenting growth of the journal literature created a crisis situation and that this was partially and temporarily resolved with the introduction of the abstract journal.

2.2.2 The Serials Crisis – 1900 to 1970

By the beginning of the 20th century, the scholarly journal communication process in many disciplines had, again, reached a point of crisis. This crisis was different in many ways from the first crisis in the mid-nineteenth century: first, it was a crisis involving both journals and abstract journals; second, it was now a crisis experienced by individual academics as well as university librarians; third, not only was there a concern about the growing size of the literature but also a concern expressed by librarians and scholars regarding the rising cost to acquire and make the literature available to others; fourth, it was a crisis where dramatic differences in the severity of the crisis across

³⁶ Manzer (1977) finds that the abstract journal only had a meaningful impact on the scholarly journal communication process once it moved from being produced by industrious individuals to a task undertaken by scholarly societies, industry, and the government.

disciplines were discussed. Works (1927) voiced many of these concerns when he concluded, on behalf of the Association of Research Libraries (ARL), that

Librarians are suffering because of the increasing volume of publications and rapidly rising prices. Of special concern is the much larger number of periodicals that are available and that members of the faculty consider essential to the successful conduct of their work. Many instances were found in which science departments were obligated to use...their allotment for library purposes to purchase their periodical literature which was regarded as necessary for the work of the department.³⁷

This crisis emerged at a time when the federal government and philanthropic foundations increased their financial support of research, when scholars found themselves pressured by universities and research funding agencies to communicate via journals, and when professional associations increased the size and number of journal titles they published. The problem was that the increased burden placed on journals for publishing research was not matched with an increase in financial support for producing them. Another problem was the fact that libraries were using ineffective methods by which to archive and index the increasing number of materials being received.

The primary focus in the discussion of this second crisis was the existence of a cost crisis. Costs were rising, and not just because there were more journals to buy and these journals were more expensive. Rider (1944), for instance, concluded that even if the library's acquisition prices could be lowered, the problem of the library's inability to effectively manage the journal literature, given that the journal's size was doubling every 16 years, would still persist. This rate of increase in the number of acquired materials translated into increased archival, indexing, binding, and circulation costs. The result was a situation that Rider called 'the library problem.' Rider's solution was to engage in

³⁷ Works (1927)

a detailed cost analysis of all library activities in order to eliminate inefficiencies. Rider's argument that this crisis was caused by the library institution and could be resolved by revamping institutional procedures reflected a larger effort in the librarian profession to transform the library arts discipline into a library science and, eventually, an information science.³⁸

Referring to the 'library problem,' librarians were able to convince philanthropic foundations to fund research on how to make the library more efficient, and they were able to convince the federal government to cover a portion of the cost of operating a research library. These subsidies took the form of allowances for library costs that were attached to research grants made by the federal government and philanthropic foundations. Academics and scholarly societies in the sciences, by citing this 'library problem,' were able to secure a subsidy for publishing journals from the agency that funded their research. This subsidy took the form of author charges. Author charges were fees that were imposed by the publisher and were to be paid by authors out of their research grant. The imposition of such charges, as we will learn extensively in the next two chapters, was heavily supported by philanthropic foundations in the 1930s and by the federal government starting in the late 1950s. Besides solving the problem with increased funding, there was also considerable interest in solving the problem through the use of technology that would increase the efficiency of the library institution (namely

³⁸ See Burke (1994) and Lilley and Trice (1989) for an early history of library and information science and how they evolved out of the study of library arts. One of the seminal figures in the shift from library science to information science was Eugene Garfield. See Cronin and Atkins (2000) for a discussion of his involvement.

microfilm).³⁹ By the late 1950s, the literature proposed solving the serials crisis through several means such as the ‘professionalization’ of the library arts, increased financial support for academic research libraries and the publication of journals, and the limited use of alternative mediums, such as microfilm. As will be shown in chapters three and four, disciplines like physics and economics relied very differently on these publication subsidies and also reduced or eliminated their dependence on them for very different reasons. These differences emerged, in part, because these disciplines received different amounts of research money from different sources. Scholarly societies, research funding agencies, librarians, and scholars reacted to these differences with the decision to pay for journals in a particular way. When the research funding regime changed, these actors needed to re-negotiate the way the scholarly communication process was financed. In the late 1970s, changes in the research funding regime – including a shift away from federal government support – translated into both disciplines restructuring the financing of their journals such that the subsidy no longer played a significant role.

2.2.3 The Serials Crisis – a Review 1970 to Present

In the 1970s the federal government and philanthropic foundations reduced their funding of research and consequently the scholarly communication process. In disciplines such as physics, the reduction in research funding was dramatic and created a situation where the scholarly communication process had to be re-organized such that it

³⁹ Proponents of the use of microfilm technology in the library setting include Bush (1945), Rider (1944), and Clapp (1963). The idea was that libraries could share in paying the cost of creating the microfilm master and save money both in the cost of the acquisition but also by reducing the need for shelf space. Microfilm technology was also touted as making the search for materials easier and enhanced access of rare or fragile materials to patrons. Finally, microfilm technology would force libraries to more closely coordinate their efforts – something lacking prior to the 1920s.

relied less on the previously existing author charge publication subsidy. In the 1970s, disciplines such as economics, where previously the government devoted less money to research, the amount of funding from the government actually increased resulting in a restructuring of the scholarly communication process in economics such that it relied more heavily on a publication subsidy like the author charge. In addition to the disorder created by the changes in the financing of journals in the 1970s, there was also disorder in the organization of journals. The century-old publish and perish philosophy in the academy was increasingly applied, and there was a dramatic increase in the specialization of disciplines. Not only were more journals needed, but also more specialized publication outlets. With larger volumes, more titles, and fewer financial resources, librarians found it increasingly difficult to maintain a commitment to scholarly journals. The severity of this crisis situation, from both a size and cost perspective, increased when commercial entities began to publish journals. Not only did these publishers increase subscription rates at increments previously unheard of (in part to compensate for currency fluctuations between the publisher's European base of operations and their United States customers but also to increase profits), but they also increased the number of titles offered and paid for it all by relying on higher priced institutional subscriptions (a funding mechanism favored in an environment where subsidies from the federal government and philanthropic foundations decreased).

Librarians, who controlled the early discussion of this third serials crisis, approached the situation as an inefficiency problem. But instead of using the crisis as a rallying call for change in the library institution or librarian profession, as was the case during the second crisis, the third serials crisis was used by librarians to blame the

involvement of the commercial publisher. Focusing on higher serial subscription prices and the fact that the highest priced titles were published by commercial entities, librarians claimed that corporate greed was to blame for the serials crisis. This charge was backed up with cost-effectiveness statistics which revealed consistently that scholarly society- and university press- published journals were more cost effective per page, per citation, and per use than commercially published titles.⁴⁰ Researchers initially hoped that these statistics alone would both encourage fellow librarians to cancel their subscriptions to higher-priced titles and transition to less-expensive alternative titles as well as remind academics of how important it is to publish and review articles for journal titles that impose less of a financial burden. When this campaign proved to be unsuccessful because academics would complain with every threatened cancellation to a specialized title they deemed essential, there was an effort by librarians to encourage academics and scholarly societies to collect cost-effective statistics and conclude for themselves that the commercial publisher was to blame for the communication problems their discipline was facing.⁴¹ In addition to blaming the presence of the profit motivated commercial publisher for the serials crisis, librarians also disagreed with the method by which the scholarly communication process was financed (higher priced institutional subscriptions). It is important to recognize that with the third serials crisis a blame rhetoric began to appear in the discussion of the crisis. As a result, research on the topic became as much an activity designed around understanding and resolving the crisis as it was an object

⁴⁰ Bergstrom (2001) and Barschall (1988)

⁴¹ Most of these studies were undertaken in the natural and life sciences. Cost-effectiveness surveys were also conducted in 1983 in mathematics by the American Mathematical Society.

designed to foster alliances between librarians, academics, universities, research funding agencies, and publishers.

In these short summaries of the three crises in scholarly journal communication, it is revealed that there was an increasing tendency over time to blame someone or something as causing the problem. Solutions in the first two crises – the creation of abstract journals and a professionalization of library arts – reflected a belief that what was needed was a fine-tuning of the institutional structure in order to handle the growing size of the literature. The changes proposed to resolve this third serials crisis however involve a radical restructuring of the goals, aims, and ownership of the scholarly communication process (with the bulk of the effort devoted to removing the commercial publisher). Since many of these changes are justified with neoclassical economic metaphors through the economics of scholarly communication literature, the next section outlines the cited causes to this most recently mentioned manifestation of the serials crisis, the advocated solutions, and the varied use of these metaphors.

2.3 Understanding the Serials Crisis through the Existing Economics of Scholarly Communication Literature

The discipline of economics, as evidenced by titles ranging from “An Economic Analysis of the Demand for Scientific Journals” in 1972 to “An Economic Analysis of Scientific Research Publishing” in 2003, has been used extensively by researchers to

analyze the scholarly communication process over the past thirty years.⁴² This section shows how researchers of the scholarly communication process have invoked neoclassical economic principles to bolster their understanding of the cause and solution to the serials crisis.

Although there are a number of bibliographies and monographs covering the history of the scholarly communication process in general (as evidenced in the previous section), there are no comprehensive bibliographies or literature reviews on crises experienced in scholarly journal communication.⁴³ While there are a number of monographs, articles, and bibliographies that summarize this latest manifestation of the serials crisis in order to extol the virtues of an electronic scholarly communication initiative, these literature reviews are overwhelmingly self-serving in nature and focused on blaming only one set of institutions.⁴⁴ Although there are an increasing number of studies whose titles contained the word ‘economic,’ what follows is the first literature review of this third manifestation of the serials crisis with a focus on how neoclassical economic metaphors are employed to explain the cause of the event and offer a solution.

In this section I identify four groups that are cited as causal agents of the serials crisis and, from the interpretation of the crisis, four different solutions that are said to resolve it. As noted in the previous section, the interpretation of the serials crisis often encountered is that commercial publishers have caused the situation. It is a view that has been reinforced, as of late, with neoclassical economic notions of monopoly. Yet another view blames both the organization of the academy and the publishing industry for the

⁴² Berg (1972) and Wellcome Trust (2003)

⁴³ Morton et al. (1988), Kronick (1976), Lindsey (1978), Manzer (1977), and Houghton (1975).

⁴⁴ Bailey (2004), ACRL (1993, 1995), Okerson (1996), O'Donnell (1995).

crisis. Using neoclassical economic notions of imperfection information and industrial organization, the problem was still described as being caused by commercial publishers that charge too much. However some level of blame has also been accorded to the academy where winning the race to publish in the highest-ranked title was rewarded more than winning the race of publish in the most cost-effective journal title. Still others have blamed the decentralized institutional structure of the research library for the crisis. This view has been reinforced with neoclassical economic notions of economies of scale and efficiency gains through competition with the crisis said to have been resolved with the use of network technology that permitted additional parties to archive material and distribute it to others. A final view remains committed to the idea contained within the first two crises that no one is to blame for the crisis (that it is a natural phenomenon) and that what is needed is minor institutional reform. This view of the crisis has been reinforced with the neoclassical economic notion of the free-rider problem and promotes the idea that the problem could be resolved by the use of a pricing mechanism that spreads out the financial burden of scholarly communication over more parties.

In the tables that follow, I divide up the interpretations of the serials crisis according to who was blamed for it and the neoclassical economic metaphors used to bolster the claim. While I am certain that the list of the authors in each table is by no means complete, that many of the nuances of the economic arguments contained in the texts were not covered, and that the party blamed for causing the crisis is more complicated than can be captured by categories such as ‘commercial publisher’ or ‘librarian,’ at the same time there must be a realization of the fact that the present analysis of the serials crisis is in complete disarray. Fingers are pointing in every

direction and millions of dollars are being spent on solutions that purportedly pave the way to a utopian future. As disorganized as the various interpretations of and solutions to the serials crisis seem to be, what they share in common is a use of neoclassical economic principles. However it will become apparent that the use of orthodox economic tools and metaphors has, to the detriment of understanding the cause of and solution to the serials crisis, encouraged an instrumental approach of identifying the inefficient actor and advocating a solution that increases efficiency. This approach is especially problematic since it assumes that scholarly communication processes are organized around principles of efficiency and that the serials crisis represents a culmination of inefficient scholarly communication practices. The following tables also highlight the linkages that presently exist between the library scientists and economists and outlines ways in which a revised economics of scholarly communication research agenda can incorporate both sets of scholars. In the existing interpretation of the serials crisis, librarians, for the most part, have only limited interaction with economists and vice versa. Librarians, in constructing narratives of the serials crisis, classify it as an 'economic' problem and extensively collect cost effectiveness statistics for journals in various formats and from a variety of publishers. The 'economics' practiced however by these librarians would hardly be classified as such by formally trained economists. Economists, in applying their economic models and notions of the market as a superior information processing device to the scholarly communication process, can identify several inefficient aspects in the production, distribution, and storage of scholarly journals. These inefficiencies, described using theories from industrial organization and game theory, however are hardly considered to be useful by librarians. Librarians however claim that economists

have a flawed understanding of the scholarly communication process because of their assumption of homogeneity in the scholarly communication process across disciplines. This 'distance' between the librarians and economists, as evidenced above, limits our understanding of what the serials crisis is and how it can be resolved. The revised economics of scholarly communication research agenda, as a result, needs to include both types of scholars.

2.3.1 Viewpoint #1: Blame the Commercial Publisher

Blaming the commercial publisher for the serials crisis has been the dominant approach and appears in narratives that contain neoclassical economic inspired images of commercial publishers engaging in monopolistic competition and the journal as an object that possessed public good qualities. An overview of this literature consists of the following:

TABLE 1

THE COMMERCIAL PUBLISHER AS CAUSAL AGENT
OF THE SERIALS CRISIS

Institution Blamed	Commercial publisher
Economic Theory Employed	Monopolies in the publishing industry and the journal modeled as a quasi-public commodity.
Crisis Narrative	Commercial publishers have merged with one another and have used their increased market power to raise prices and make the terms of access to readers more restrictive. The crisis represents the market's inability to adequately supply the journal commodity to those that demand it. With the journal understood as a quasi-public commodity, the serials crisis is modeled as a market failure.
Data Used	Association of Research Library expenditure data, cost-effectiveness surveys, commercial publisher profit levels and pricing practices, and personal observations.
Advocated Solution	Early narratives, based on cost-effectiveness data, advocate better informing academics of the situation and encouraged them to transition to scholarly society published journals that cost less. Later narratives, while continuing to promote non-commercial journal titles, urge scholarly communities to move away from the journal format entirely and to preprint and institutional archives instead.
Vision of the Future	Guardedly optimistic because of the strong market power and unfair practices of commercial publishers and the reluctance of 'public' institutions to provide a subsidy for scholarly journal communication.
Authors	<p><u>Journal Modeled as a Quasi-Public Good:</u> Berg (1972), Barzel (1971), Arrow (1962)</p> <p><u>Monopoly Power of the Commercial Publisher:</u> Wyly (1998), McCabe (1998, 2002), Office of Fair Trading (2001), Department of Justice (2001), Ordover and Willig (1978), Kahin and Varian (2000), Shapiro and Varian (1999)</p> <p><u>Solutions:</u> Bergstrom (2001), Branin and Case (1998), Ginsparg (1998), Getz (1992), Kingma (2000), Harnad (1998), DeLoughry (1993), Donovan (1998), and Rambler (1998).</p>
Comments	This is the interpretation of the serials crisis most often encountered.

This choice of neoclassical economic metaphors to describe the serials crisis comes from the researcher's need to reconcile what are considered to be three unwavering facts:

1. As shown in cost effectiveness surveys, there is a discernable difference between the prices paid for journal titles owned by commercial publishers and the prices paid for journal titles owned by professional societies and university presses.
2. Libraries have effectively spent more money on acquisitions only to end up acquiring fewer titles. This was demonstrated with Association of Research Library (ARL) data in McCabe and Case (1998) which essentially showed that the ARL's 114 member libraries spent 142% more on journals in 1997 than 10 years before, but ordered 6% fewer titles.
3. Commercial publishers have been able to maintain high profit levels. This was demonstrated with data collected by Wyly (1998).

With these facts, this latest manifestation of the serials crisis is modeled as a problem caused when private institutions produce the public good of scholarly communication.

With an assumption that commercial and non-commercial publishers have similar production processes and face similar costs, the research question became one of why do publishers charge drastically different prices and how does each publisher's production costs translate into the prices they charge.

A lack of connection between the costs borne by the publisher and the prices charged by the publisher would implicate the publisher as the causal agent of the serials crisis. Wyly (1998) concluded that there was no such connection between the costs and prices of journals when he found that both subscription prices and profit levels increased dramatically while costs did not (with the implication being that commercial publishers are exercising their monopoly power to generate rents). He found that the commercial publisher Elsevier in 1997 enjoyed a higher net profit margin than 473 of the S&P 500 listed companies and that the commercial publisher Wolters Kluwer provided higher returns on equity than 482 of the S&P 500 listed companies. In an analysis of biomedical

journal titles, McCabe (2002) agreed with Wyly when he found that, after controlling for the suggested scale economies exhibited by individual titles, an unexplained price inflation residual remained – a residual that he attributed to the monopoly power of the large commercial publishers. McCabe found that prices charged by publishers were positively related to the number of journal titles the publisher offered and that in the case of the proposed merger of Wolters Kluwer and Waverly, his game theoretic model predicted an average price rise of between 20 and 30 percent. McCabe was also able to show that past mergers of publishers were associated with higher prices and also higher profits. For example, the Elsevier/Pergamon merger resulted in an average journal price increase of 22% for former Pergamon titles and 8% for Elsevier titles. Moreover, the largest commercial publishers appeared to be price leaders and pulled the prices of other publishers up. McCabe's research suggested that as research was privatized, commercial publishers benefited from higher profits and the public lost and had to pay higher prices. With this narrative of high prices, stable costs, and high profits, neoclassical economic theory was then paraded out as proving that commercial publishers were greedy and creating inefficient outcomes in the scholarly communication process. McCabe predicted that unless a restructuring of publishing duties occurred, the crisis situation would persist because of the vast market power of the largest commercial publishers.

Researchers in the 1990s readily admitted that non-commercial publishers, like commercial publishers, also charged a price that didn't match their costs. The difference between these two types of publishers however was that while the non-commercial publisher's profit satisficing motive was seen by these researchers as beneficial for the scholarly research process as a whole; commercial publishers engaged in profit

maximizing behavior in an attempt to earn a maximum return for their shareholders. While commercial publishers only published titles that earned a profit, learned societies attempted to earn a return for the society and used excess revenue derived from their publication activities to cross-subsidize other activities. This distinction between the types of publishers led to the prediction that the serials crisis would be eliminated if the scholarly article was returned to a public good status and publishers engaged in profit satisfying rather than profit maximizing. The solution to the serials crisis based on this particular understanding of the problem consists of persuading academics and librarians to make use of existing non-commercial print journals or establish new electronic journals. With regard to the latter solution, some researchers such as Ted Bergstrom have endorsed initiatives like the Scholarly Publishing and Academic Resources Coalition (SPARC), while other scholars such as Paul Ginsparg and Stevan Harnad have advocated the use of preprints and institutional archives as substitutes to the journal format.

2.3.2 Viewpoint #2: Blame the Academy and the Publisher

Neoclassical economic tools and metaphors in this narrative are used to blame both the commercial publisher and the academy for causing the serials crisis. In this narrative, commercial publishers are partially blamed for the crisis by virtue of the fact that they maximize profit by taking advantage of the inelastic demand for a journal title they exert monopoly power over (elements from viewpoint #1). However the institutional structure of the academy, with its administrative policies that emphasize publishing in highly-ranked titles, are blamed as well because it provides an incentive for

academics to care less about a journal title's cost-effectiveness and more about its impact factor in their decisions of where to submit manuscripts and the journal titles they request that librarians purchase. The summary of this literature is as follows:

TABLE 2

THE ACADEMY AND PUBLISHER AS CAUSAL AGENTS
OF THE SERIALS CRISIS

Institution Blamed	Publisher and Academy
Economic Theory Employed	Monopolies in the publishing industry and price inelasticity of demand for journal titles.
Cause of Crisis	As the academy expanded, university administrators used the quality of publication records to execute their “publish or perish” directive. This resulted in a race to publish in journal titles that had a high impact factor. This created an inelastic demand environment that was then exploited by commercial publishers who have monopoly power in the publishing industry.
Data Used	Bibliometric studies and cost-effectiveness surveys
Advocated Solution	Solutions involve making academics conscious of the financial costs that their manuscript submission practices have and separating out the publishing act from the quality control act. Both solutions work to increase the elasticity of demand for journal titles and reduce the pricing power of the commercial publisher.
Vision of the Future	Pessimistic because of the rigidity of the institutional structure of both publishers and the academy.
Authors	Plasmeijer (2002), Cronin and Atkins (2000), Dometrius (1989), Vinkler (1988), Wellcome Trust (2003), Parks (2003), Bergstrom (2001), Harnad (1992), and Ginsparg (1998)
Comments	This is essentially a toned down version of viewpoint #1 with the difference being that blame is spread across an additional party – the academy

Based on this interpretation of the cause of the serials crisis, one solution is simply for academics to make their submission and review choices conscious of the costs that their choices impose. Here, academics are to be educated that their choices of where to submit and review manuscripts and what journals they deem essential for the library have real financial costs. To communicate these costs to academics, librarians and scholars conduct journal price surveys, identify those titles that are cost effective, inform others of the findings, and provide incentives for authors to publish and validate the findings of others in cost effective journals. The race to publish in the most influential journals would change to publishing in the most influential as well as cost-effective journals.

A second solution to the serials crisis based on this understanding of the cause of the problem involves separating out publication from the peer review process.⁴⁵ This effectively reduces the ability of the publishers to control access to published pieces. Authors simply submit their manuscript to the editorial board of a journal as they did before. However, instead of receiving both a judgment of quality and a publication decision, the author receives only an assessment of their work that they could then use in their decision of how and where to publish it.

This interpretation of the serials crisis is becoming more popular as scholars participate in the discussion. Unlike librarians who blame everyone but themselves for the crisis, it appears that scholars are more willing to accept a share of the blame for the problem with the hope that it removes that they perceive to be a bigger problem in the scholarly communication process: the pressure to publish in a small set of titles that have been deemed as influential.

⁴⁵ Edmonds (2000)

2.3.3 Viewpoint #3: Blame the Library

Armed with neoclassical economic tools and metaphors, researchers in this viewpoint blame the librarian for the crisis. This narrative is constructed by commercial publishers who resurrect the idea from the second serials crisis that the problems associated with the scholarly journal becoming a larger financial burden are a consequence of diseconomies in scale within the institutional structure of the research library. Whereas, in the first two tables, the research focused on rising material acquisition prices, the literature appearing in this table questions whether acquisition costs are that significant when compared to non-acquisition costs. This literature can be summarized as follows:

TABLE 3

THE LIBRARIAN AS CAUSAL AGENT
OF THE SERIALS CRISIS

Institution Blamed	Library
Economic Theory Employed	Diseconomies of scale in maintaining print-based archives and bibliographic indexes
Cause of Crisis	The decentralized duties of indexing and archiving drains library budget money away from acquisitions.
Data Used	Association of Research Library expenditure data and cost data for individual libraries
Advocated Solution	Increased use of networking technology allowed for economies of scale to be realized
Vision of the Future	Optimistic because of the widespread use by scholars of electronic projects such as JSTOR and data which indicates that these projects generate cost savings.
Authors	Odlyzko (1995, 1998), Gherman (2000), Montgomery (2000)
Comments	This argument dates back to the second serials crisis. At that time, economies of scale (although that term was not used) were captured by increased use of commercial indexing services, greater reliance on interlibrary loans, and the use of microfilm. Today, academics, proponents of digital libraries, publishers, university administrators, and the federal government advocate this cause of the serials crisis problem in order to justify large-scale electronic initiatives that achieve economies of scale (namely digital libraries).

With this literature there is a departure from the belief that a resolution of the crisis will come from reducing subscription prices. Instead, attention is devoted to the growing cost of indexing, archiving, and making available the journal literature to scholars in the print era.

For Odlyzko (1995), there was an attempt to capture the magnitude of all the cost components of the scholarly journal communication process. Odlyzko began his analysis by looking at price and profit data from publishers. Similar to the authors from the first two tables, he found that the situation of high prices and profit levels emanated from a lack of competition in the industry. And while Odlyzko agreed with other researchers that inefficiencies in the publishing market existed (that material acquisition prices were too high), he did not conclude like those in the previous tables that production inefficiencies were the central cause of the serial crisis. For Odlyzko, a more likely cause emanated from inefficiencies contained in the library system (distribution). Or to put it another way, he believed that that material acquisition prices were not as high as non-acquisition prices and that the serials crisis was caused not by monopolies in the publishing industry but by diseconomies of scale within the research library institutional structure. Odlyzko suggested, based on the fact that non-acquisition library costs for each article were double the cost of the acquisition (the marginal revenue of each article for the publisher), that the serials pricing crisis was really a library costs crisis.⁴⁶ A serials crisis existed because libraries had to provide access to huge collections of library materials at a single place even though each individual piece was used rather infrequently.

⁴⁶ This fact is reiterated by Tenopir and King (2000).

Based on Odlyzko's interpretation of the cause of the serials crisis problem, the crisis will be resolved as the costs to preserving an item and making it accessible were lowered.⁴⁷ This will occur as electronic databases of materials replaced costly print holdings. However, the evidence backing up this claim is sparse. In fact, there is only one example of a research library institution that has transitioned almost entirely to an electronic medium and tracked its financial burden. In 1998 Drexel University decided to migrate to an electronic journal collection as quickly as possible. If a journal was available electronically, only that version was purchased. Whereas in 1998 Drexel University had only one electronic journal, by 2000 Drexel University had 6,000 titles. At the same time, duplicate print materials were disposed of. Montgomery (2000) provided the following estimate of library operational costs at Drexel in 2000:

⁴⁷ Odlyzko takes the example of Harvard libraries to show that the circulation of 1.4 million items out of a total collection of 13.6 million items cost \$53.4 million dollars in 1997 (an average of \$38 an item).

TABLE 4

COST BREAKDOWN
OF PRINT AND ELECTRONIC JOURNALS
AT DREXEL UNIVERSITY

	Electronic Journal	Current Print Journals	Bound Print Journals
Space ⁴⁸	\$5,000	\$40,000	\$205,000
System costs	\$10,000	\$2,500	\$2,400
Supplies and services	\$(2,000)	\$600	\$8,000
Staff	\$125,000	\$46,000	\$42,000
Total	\$138,000	\$90,000	\$258,000

Source: Montgomery (2000)

Based on only this study, there seems to be some evidence indicating that electronic journals pose the least cost on the library and that much of the savings came from economies of scale in archiving. This solution of using digital materials to lower non-acquisition prices within the library, not surprisingly, has been met with some opposition. Librarians, for obvious reasons, are reluctant to see the crisis as a diseconomies of scale problem because it meant a loss of their own job security. Case (1998), for instance, has rejected this narrative claiming that print materials were used more heavily than the data suggested (thus lowering the per-use archival cost associated with a printed journal title) and that the ARL data used by Odlyzko overestimated non-acquisition library expenditures by assuming a high uniform cost to store a square foot of materials.

⁴⁸ The operational costs of print for a library are dependent on the estimate that space is valued at \$20 a square foot.

2.3.4 Viewpoint #4: No One (or Everyone) is to Blame

In this last neoclassical economic inspired interpretation of the cause to the serials crisis there is a return to the belief that dates back to the first serials crisis that no one (or alternatively everyone) is to blame for the problem. Price (1963) believed that crisis situations were a natural part of the communication process given the fact that the scholarly literature grew at an exponential rate to reflect the growing size and scope of the research endeavor. Consequently, the resolution of this latest crisis came from employing a different pricing mechanism. This literature is summarized in the following table:

TABLE 5

NO CAUSAL AGENT
OF THE SERIALS CRISIS

Institution Blamed	No one is to blame. The crisis is an inherent part of the scientific process. This latest crisis is caused by the widespread use of the wrong kind of pricing mechanism
Economic Theory Employed	Price theory and the free-rider problem
Cause of Crisis	The serials crisis is caused by the free-rider problem where fewer and fewer libraries subscribed to a journal title and instead gained access through the inter-library loan system and where authors bore none of the costs that their scholarly communication practices posed. The cost structure of producing journal titles were such that a few institutions and even fewer authors paid the cost of producing a title.
Data Used	Basic data on the use of titles by subscribers and non-subscribers and the cost structure of journals.
Advocated Solution	Although the crisis is a natural part of the scholarly communication process, over time it can be alleviated through the use of a 'fairer' pricing mechanism that removes the free-rider problem by spreading out costs to those parties that receive a benefit. The types of pricing mechanisms proposed include the site license and page charge.
Vision of the Future	Optimistic
Authors	Poynder (2002), Kaser (2002), Bakos and Brynjolfsson (2000), Chung-I Chuang and Sirbu (2000), Olivieri (1997), Varian (1994-2004), and Wellcome Trust (2003).
Comments	Researchers in the economics field who have formal training in neoclassical economics tend to adopt this view.

What is striking here is that, while the previous tables all contained neoclassical economic metaphors, few of the authors who claimed to conduct an economic analysis of the scholarly communication process were actually formally trained as neoclassical economists. Only now do we have a viewpoint that is adopted by formally trained neoclassical economists. The serials crisis problem, for these researchers, is said to have emerged when commercial publishers responded to the demands by scholars for highly specialized journal titles. With the realization that highly specialized journal titles would have few subscribers, commercial publishers decided to cover the substantial costs to producing a title by offering subscriptions almost exclusively to institutions. From this, neoclassical economists trace out a chain of events where initial cancellations by librarians trying to reduce acquisition costs became problematic because of the revenue and cost structure of publishing journals. Essentially, when librarians reduce costs by cutting the number of acquisitions, each journal's total number of subscribers declines, and the fixed costs are spread out over a smaller number of institutions. The resulting increase in subscription price serves to only further engender cancellations by librarians. As a result, publishers and librarians are trapped in a vicious cycle where prices increase to accommodate declining subscription membership numbers and the price increases, in turn, lead to yet more cancellations and still higher subscription prices.

Given this scenario, some neoclassical economists such as Kaser (2002) and Poynder (2002) have argued that the resolution for this latest crisis emerges when there is a switch from a pricing model based on single subscriptions for journals by a few libraries to a model where libraries purchase a license to the whole database of journals

with the price determined by the size of the institution.⁴⁹ This proposal for a scholarly communication process funded by site licenses to all of a publisher's titles, while advocated by the large commercial publishers like Elsevier, has been met with stiff resistance from academics such as Bergstrom (2001). Bergstrom argued that a site license pricing mechanism works to the detriment of the academy by shifting the notion of access from perpetual ownership, as was the in the print era, to leased access in the electronic era. With only leased access, librarians and scholars have a reduced ability to cancel a title – either because the title is part of a much larger package that cannot be split up or because cancellation removes access to those materials leased in the past. The lack of money for such a big purchase and the lack of incentive to pay for access to less-used material leads to librarians resisting such a recommendation.

As an alternative, some researchers of the scholarly communication process have sought expanded use of author charges like the page charge.⁵⁰ The page charge, set at a rate which allows the publisher to recover their fixed costs to publishing an article, makes authors conscious of the significant financial costs their demand for highly specialized journal titles imposed (note the elements of viewpoint #2 here). Authors and the research-funding agency willingly pay the fixed costs to publication because of their demand for a specialized communication venue. Librarians benefit from the use of an author charge pricing mechanism because with such a revenue model they cease to bear the entire financial burden of the scholarly communication process. Publishers presumably also benefit from an author charge pricing mechanism in that they no longer

⁴⁹ Poynder (2002) and Kaser (2002)

⁵⁰ See the 10th report of the Science and Technology Committee of the UK House of Commons for a good summary of this research. This report is available at:
<http://www.publications.parliament.uk/pa/cm200304/cmselect/ccsctech/319/39902.htm>

face uncertainty when setting the subscription price and anticipating the number of subscriber cancellations that would result from price increases. However, an impediment to the scholarly communication process transitioning to an author charge pricing mechanism is that not all disciplines have research funding agencies that are willing to pay such a charge. In addition, as I explore in extensive detail in chapter five, the research funding agency, by paying such a charge, acquires an ownership claim over the published research. Whether or not a site license or author charge pricing mechanism is used, these researchers all agree that the serials crisis signals that the scholarly communication process of a size and specialization such that the old methods of paying for the process are no longer adequate.

In these four tables, it becomes apparent that there are a variety of stated causes and solutions for the serials crisis. In this dissertation, I do not argue that one point of view is more accurate than another. Rather, I analyze why serials crisis narratives are constructed in a particular way, why certain institutions are advocates of such a narrative, why the various proposed electronic initiatives are structured and funded the way they are, and how the economics of scholarly communication literature can and should be revised to address these issues. As I indicated earlier, this revised economics of scholarly communication research agenda should also bridge the divide that exists between researchers formally trained as economists and researchers, such as the librarian, who are most knowledgeable about the scholarly communication process in a discipline.

2.4 A Critique of the Existing Economics of Scholarly Communication Literature as Applied to the Serials Crisis

Across these four viewpoints, a variety of neoclassical economic principles are used to simultaneously locate the cause of the serials crisis and to stake out how the event can be resolved. In this section, I explore four assumptions made in the neoclassical economic description of the scholarly communication process, and discuss the way these assumptions prevent the economics of scholarly communication literature from fully understanding the cause of the serials crisis and from finding a solution for the crisis.

These assumptions include:

1. The existence of homogeneity in the scholarly communication process across disciplines
2. A belief that the serials crisis represents a market failure of some type. Also, the belief that a single actor or group of actors is to blame, and that the crisis can be resolved by introducing competition or by altering an aspect of the organization of the process such that the primary goal is an improvement in efficiency
3. A stable location for the journal and scholarly communication process with respect to public and private funding sources and ownership
4. A belief that the intellectual property within scholarship has a negligible value and uncontested ownership.

What follows is a discussion of each of these assumptions.

2.4.1 Assumption #1: Homogeneity of the Scholarly Communication Process across Disciplines

One assumption contained within the economics of scholarly communication literature is that the scholarly communication process is relatively homogenous across disciplines. As a result, the literature models disciplines as facing the same serials crisis problem and in need of the same solution. This assumption is present throughout each of these viewpoints. It is assumed, for instance, that commercial publishers have equal influence in the scholarly communication process across disciplines, that academics are under equal pressure to publish or perish, that research funding agencies in each discipline equally support scholarly communication practices, and that the journal literature produced is accessed and used in the same way across disciplines.

I relax this assumption in order to recognize how scholarly communities within a discipline have different reasons for publishing written accounts of research, how scholarly communities within a discipline use different communication formats to meet their needs, and how scholarly communities within each discipline have different ways of paying for this process. Differences across disciplines with respect to their scholarly communication process emerge because each scholarly community contains a mix of academics and research organizing and funding institutions who each pursue a unique set of goals (revealed and unrevealed) in the scholarly communication process. Given the differences in the scholarly communication process across disciplines, it should hardly be surprising that the serials crisis manifests itself differently in each discipline.

If this lack of understanding of the serials crisis as a discipline-specific problem was the only limitation of the literature, there might be comfort in the fact that researchers need only to take a few more intellectual steps back and appreciate the sheer complexity of the problem. The other limitation, though, is that researchers participating in the economics of scholarly communication literature are not as concerned with understanding the serials crisis as they are interested in using the serials crisis as a tool to justify a universal electronic scholarly communication initiative. With this assumption of homogeneity of the problem, the serials crisis literature encourages academics, librarians, and universities to adopt quick-fix solutions across the publishing landscape as the means to resolve recurring discipline-specific problems caused by a variety of circumstances. The assumption of homogeneity also allows the researcher to neglect the influence the research funding and organizational structure has on the communication of academic research.⁵¹ Two research questions that ought to motivate the economics of scholarly communication literature should be what caused the serials crisis in a discipline and how can it be resolved. These questions can only be answered when the assumption of the homogeneity of the scholarly communication process across disciplines is relaxed.

2.4.2 Assumption #2: The Serials Crisis is a Phenomena Best Captured by and Resolved with Neoclassical Economic Principles

A second assumption contained within the economics of scholarly communication literature is that the serials crisis is an inefficiency condition caused and perpetuated by

⁵¹ Mirowski and Sent (2002)

one set of participants in the scholarly communication process at the expense of another set of participants. Modeling the journal as a commodity exchanged in a marketplace setting, neoclassical economists understand the serials crisis as an event representing a failure of the market to provide the socially optimal level of access to researchers.

Journals represent something more than a commodity, and thus it is not readily apparent why neoclassical economics should be the theoretical framework for understanding the serials crisis when the framework itself lacks a concept of crisis.⁵² These unrealistic interpretations of the problem inspire the following unrealistic visions of the future: the commercial publisher will disappear from the scene; physical libraries will be succeeded by digital archives; academics will submit, review, and cite articles based only on cost-effectiveness considerations; universities will drop their requirement that researchers publish extensively in journal titles with a high impact factor; peer reviewed articles will give way to un-reviewed preprints; and site licenses to all the titles offered by the publisher will overtake subscriptions to individual titles or smaller bundles. Rather than agree that neoclassical economic metaphors provide us with an irrefutable account of the crisis and network-based technology a ready-made solution, I argue that there is a need to explore the shortcomings in the literature's description of the present and predictions of the future.

Finally, neoclassical economics is characterized as a type of economics where markets are considered the optimal information processing devices.⁵³ As a result, problems in the scholarly communication process are reduced to being manifestations of market failures. Yet, as chapter four will demonstrate, economists themselves are

⁵² My thanks to David Ruccio for this point.

⁵³ Mirowski (2001)

reluctant to alter their own scholarly communication process to rectify market failures. If economists are unwilling to alter their scholarly communication process such that market failures are corrected, why should other disciplines be held to that same standard?

2.4.3 Assumption #3: The Stable Location of the Scholarly Journal along the Public/Private Divide

The third assumption is that the scholarly journal can be optimally located along the public/private continuum with respect to the funding and ownership of research. This continuum is assumed to have stable boundaries over time with the actors in each realm identifiable and possessing a revealed set of goals. As the above tables showed, there is a need to move the economic discussion of the scholarly communication process beyond the methodologically constricting public/private divide to explore the way institutions pursue their goals through the funding and organization of the process. Only then can one understand why certain people continue to talk about a crisis and continue to structure it as a particular kind of economic problem. Only then can one understand why certain individuals and institutions fund and organize specific kinds of electronic solutions. One must determine the social forces that create the need for telling a serials crisis story and that serve as an advocate for a specific form of communication in the electronic age. Relying on the public/private divide to describe and to justify the actions of institutions may be convenient and expedient, but such a tactic does little to address an institution's true motivation.

2.4.4 Assumption #4: The Intellectual Property in Scholarship is of Negligible Value and has an Uncontested Owner

Finally, the economics of scholarly communication research agenda assumes that the intellectual property contained in scholarly articles is of a negligible monetary value and that ownership over the intellectual property is freely gifted by the researcher to the public. This assumption emerges out of the linear model of the research process. In this model, the scholarly communication process represents the means by which the public good of basic research is translated into the more valuable and privately owned intellectual property in applied research. This assumption permits the researcher to both neglect changes in the intellectual property legal structure over time as well as assume that the particular structuring and financing of the scholarly communication process in a discipline by no means reflects an attempt by the research funding agency to own and control the intellectual property in scholarship. However the linear model of research that justifies this assumption is antiquated and, as Mirowski and Sent (2001) note, has been sufficiently undermined such that few economists of science employ the model. In a discipline where well-defined property rights are paramount, why is it that the economics of scholarly communication glosses over ownership issues? Furthermore, why is it that researchers in the economics of scholarly communication just assume that the monetary and intrinsic value of this intellectual property is of such a negligible size that it would be foolhardy for actors such as the scholar, the publisher, and the research funding agency to fight over ownership to the intellectual property in a scholarly article?

2.5 Towards a New Understanding of the Serials Crisis

Given these assumptions in the economics of scholarly communication literature, I conclude that previous narratives of the serials crisis and its solutions are flawed. In this section, I lay the groundwork for a new narrative of the serials crisis. This better understanding of the serials crisis, in turn, serves as a case study of how to restructure the economics of scholarly communication research agenda. There is a need for a revised economics of scholarly communication research agenda that can account for scholarly communication practices as they actually exist and can account for the changes that have occurred over time with regard to the source of funding for the research process, the changing priorities within the academy, and changes in the economic, political, and legal conditions. The following four statements represent the major revisions being made to the economics of scholarly communication research agenda.

2.5.1 Statement #1: The Serials Crisis is a Problem that Exists Differently across the Disciplinary Landscape

There is a unique crisis situation in each discipline due to the fact that each discipline has its own set of publishing practices, style of organization, and method of financing the scholarly communication process. In chapters three and four I explore the scholarly communication process in physics and economics and ask how these two disciplines both rely on journals as the primary means of scholarly communication yet have structured these journals with respect to funding, size, and specialization differently.

Chapters three and four investigate the influence various research funding agencies have had on the financing and structuring of the scholarly communication process. These chapters also trace out how changes in who these funding agencies are and their motivations.

2.5.2 Statement #2: The Serials Crisis is something much different (and more) than an Inefficiency Problem and the Solution is something more than Charging for it accordingly

I posit that the serials crisis is more than an inefficiency problem and as a result, the solution is something more substantial than using the ‘proper’ pricing mechanism. Besides showing that scholarly communication practices differed across disciplines, chapters three and four explore the financing of the scholarly communication process in these two disciplines. More specifically, I focus on the experimentation by the scholarly society in each of these disciplines (the APS in physics and the AEA in economics) with the page charge pricing mechanism. While the economics of scholarly communication literature focuses its attention on modeling the journal as a public or private commodity or discussing how the serials crisis represents a mismatch between the type of object the journal is and the pricing mechanism used, I show that the serials crisis is also an event used by institutions (namely the research funding agency) to argue for the restructuring of the scholarly communication process (in this case, the use of different pricing mechanism) in order to pursue both their financial and non-financial goals. I assert that pricing mechanisms contain non-financial goals of institutions (namely a desire to

establish ownership claims) and that the neglect of these goals in the literature has led to a misunderstanding of the scholarly communication process. This account of the non-financial role of a financial mechanism such as the page charge, not only better informs discussion of proposed funding reforms, but also bolsters my claim that the discussion of the scholarly communication process was motivated by a much larger conversation in society over what type of objects research and scholarly communication are (whether they are public goods, private goods, or a little of both).

To give a more detailed account of the non-financial role that page charges play in a discipline's scholarly communication practices and traditions, these two chapters construct a comprehensive historical account of how the page charge mechanism was legitimized. With this account, I ascertain the role of this mechanism in the context of the larger set of publishing practices and traditions in a discipline outside of the obvious purpose of providing revenue. Complementing this, these chapters also review the research on the financial role that page charges played in a discipline's scholarly communication practices or traditions and the neoclassical economic justification that has been given to them.

2.5.3 Statement #3: In the Electronic Era it will be difficult to Locate the Scholarly Communication Object along the Public/Private Divide

I also posit that, in the electronic era of scholarly communication, the existing understanding of the public and private sources of research funding and ownership of research findings is not sufficient for understanding the motivation for certain actors

serving as advocates for a particular kind of change nor useful in prescribing how journals should be organized or financed. In chapter five I discuss how actors like the university and the government both structure and finance the scholarly communication process. In the past, these actors have been classified as public actors whose motivation was the betterment of the public welfare. In chapter five I focus on the use of author charge pricing mechanisms by the university and the government and argue that their motivation for using a new pricing mechanism to fund the scholarly communication process is anything but altruistic.

2.5.4 Statement #4: The Contested Ownership of the Intellectual Property in Scholarship has shaped Serials Crisis Narratives and is a Motivation for Actors seeking control over the Scholarly Communication Process

Finally, I posit that ownership over the intellectual property in the scholarly article is contested and that it is in the structuring and financing of the scholarly communication process where actors stake their potential claims. The value of owning the intellectual property in scholarship has changed as the legal definition of it and other objects of the research process has changed. Additionally, as the research process has become more privatized and a larger monetary value ascribed to the objects created in the process, scholars, publishers, and the research funding agency are each questioning who the owner of the intellectual property is. The result is that each of these actors is attempting to make explicit their ownership and control over the intellectual property in scholarship. One way in which these claims are made explicit is at the site of the

scholarly communication process. In fact, actors such as the research funding agency have discovered that staking out a claim over the intellectual property in scholarship at the site of the scholarly communication process (the copyright) is essential to protecting other intellectual property claims (such as the patent). Furthermore, actors such as the research funding agency have realized that by slightly altering the financing and organizational structure of the scholarly communication process, they could capture the copyright within the scholarly article and, possibly, spend less. Across the next three chapters, this desire by the research funding agency to own and control the intellectual property in scholarship becomes apparent. At the site of the scholarly communication process, the next three chapters will show that this desire to own and control the intellectual property takes the form of restructuring the way the scholarly communication process is financed. The result is that the author charge pricing mechanism is used to pursue both revealed financial goals such as paying for the process and unrevealed ownership goals such as being the owner of a scholarly article's copyright.

Focusing on the page charge pricing mechanism, I relax the four assumptions that have limited the economics of scholarly communication literature's discussion of the serials crisis. By showing that disciplines have very different scholarly communication processes, I relax the first assumption. By showing that a pricing mechanism did more than help an actor achieve cost efficiency, I relax the second assumption. By showing that the actors and motivations behind the resurgence of the page charge pricing mechanism in the electronic era are more complicated than permitted in the simplistic characterization of the university and the government as altruistic public actors, I relax

the third assumption. By showing that the desire to own the intellectual property in scholarship is one of the primary motivating influences for research funding agencies exerting influence over the scholarly communication process, I relax the fourth assumption. Through this analysis of the page charge pricing mechanism, a revised economics of scholarly communication research agenda emerges and an event like the serials crisis is understood as an attempt by actors, namely the research funding agency, to re-engineer the research and scholarly communication process to meet their financial and non-financial goals.

2.6 Conclusion

In this chapter I outlined the recurring use of crisis narratives to describe the scholarly communication process. In the economics of scholarly communication discussion of the latest crisis, I noted the existence of at least four different interpretations of the cause and at least as many different solutions. Reflecting on these narratives, I highlighted four assumptions employed in the economics of scholarly communication literature that encourage a misunderstanding of the serials crisis and utopian or dis-utopian visions of the electronic era: homogeneity of the scholarly communication process across disciplines, the modeling of the journal as a commodity exchanged in a marketplace setting, the belief in a stable boundary between the public and private domains over time, and the negligible value and uncontested ownership of the intellectual property within the scholarly article. I concluded this chapter by outlining a way in which these assumptions could be relaxed in order to revise our interpretation of the

serials crisis. I also showed how relaxing these assumptions could revise our expectations of the electronic era as well as indicate which tools, models, and metaphors should be incorporated in a revised economics of scholarly communication literature. As the remaining chapters work through the reality of the serials crisis event and the scholarly communication process through an analysis of the author charge pricing mechanism, I assert my overriding belief that the decisions about how the scholarly communication process is organized and financed, the types of quality control mechanisms used, the speed at which findings are released, the acceptance rate, and the entire size of the communication endeavor are all negotiated by scholars as well as the research funding agency.

CHAPTER 3

THE FORMATION AND ABANDONMENT OF THE AUTHOR CHARGE PRICING MECHANISM IN PHYSICS IN THE PRINT ERA

3.1 Introduction

The next two chapters show that very little research has been done within the neoclassical economics literature on how a particular kind of pricing mechanism is chosen, sustained, or abandoned for a commodity.⁵⁴ This holds particularly true when discussing the financing of the scholarly communication process. As I indicated in the previous chapter, most who have discussed the economics of the scholarly communication process have just assumed that the scholarly communication process is and has always been organized, funded, and utilized in a homogenous fashion across disciplines. More specifically, researchers in the economics of scholarly communication have assumed that the scholarly communication process is universally funded with a

⁵⁴ A search of the neoclassical economics literature through EconLit found only two instances where the choice of a pricing mechanism was discussed. The first was Walker (1998), a dissertation on the decision to use advertising revenue to fund broadcast television in the United States. The second was Levinson (2002), a book chapter on methods available to fund the road network in England. There is certainly more research on the choice of pricing mechanisms in the business literature. I have been unable to find any discussion of the circumstances that surround the abandonment of a pricing mechanism.

reader subscription pricing mechanism. When it is revealed to these same researchers that some disciplines such as physics fund their scholarly communication process with both reader and author charges, this is described as a specialized practice unique to those disciplines that have research heavily funded by government, industry, and military grants.⁵⁵ While a great deal of research has been conducted on why readers bear the entire financial burden of the scholarly communication process in most disciplines, very little is known about what conditions existed that made it possible to charge both authors and readers in some disciplines. In this chapter, I discuss the use of a page charge pricing mechanism in physics. In the next chapter, I will discuss the use of a page charge pricing mechanism in economics. The existence of such conditions across more than one discipline is important to understand for at least two reasons. First, an analysis of the choice of pricing mechanism reveals that multiple actors, besides the reader and author, had an interest in structuring the scholarly communication process in a specific way. Second, an analysis of the choice of pricing mechanism reveals that non-financial goals such as ownership and control were pursued through something as seemingly unrelated as a pricing mechanism. The revelation of these two facts provides a framework in the last chapter for understanding the motivation behind and consequences to proposals to revive the author charge pricing mechanism for use with electronic scholarly communication initiatives.

⁵⁵ Examples of author charges include page charges and submission fees. A page charge is asked of the author upon acceptance of the article and determined by the number of pages published. A submission fee is a flat fee asked either of all scholars who submit a manuscript or only those whose manuscript is accepted. While the page charge was the first type of author charge to be used, today it is more common for the author charge to take the form of a flat fee requested of authors with an accepted manuscript.

The goal of this chapter is to outline the consequences to and motivation behind the use of an author charge pricing mechanism in physics in the print era.⁵⁶ To tell this history of the use of the page charge pricing mechanism in physics, I reviewed the archival records of the American Physical Society (APS) and American Institute of Physics (AIP) held at the Center for the History of Physics in College Park, Maryland in August, 2004. As a background for both this chapter and the next, I begin by outlining the neoclassical economic justification behind the use of an author charge pricing mechanism to fund the scholarly communication process. It becomes apparent that neoclassical economic theory provides a justification of the author charge pricing mechanism based on a notion that the scholarly journal is a public good that is efficiently produced and distributed when authors as well as readers bear the financial burden of scholarly communication. I find however that this justification has several weaknesses. Namely that clearly identifiable public and private actors do not chose scholarly communication processes based on considerations of efficiency. One cannot argue, as the public goods neoclassical economic literature does, that the nature of the journal is that it contains public good qualities and from that, argue how scholarly communication ought be organized and funded. Scholarly communication processes and the actors involved in it are more complex in reality than this public goods story can accommodate. I posit that the choice of a pricing mechanism to fund a community's scholarly communication process is heavily influenced by the funding, legal, and socio-political environment. I explore this statement by showing the influence this environment had on the formation, implementation, and near abandonment of the page charge pricing

⁵⁶ The research in this chapter was supported by a grant-in-aid from the Friends for the Center for the History of Physics, American Institute of Physics.

mechanism in physics by the APS and AIP from 1930-1980. My summary of this archival research reveals that the author charge pricing mechanism had both revealed and unrevealed goals ascribed to it, that its implementation was negotiated by several actors, and that the pricing mechanism was sustained only as long as the scholarly society and research funding agency could be convinced that their goals were being met. I then conclude with some brief comments on the extensions that can be drawn to understand the motivation and consequences behind the use of the author charge pricing mechanism in the electronic era.

3.2 An Economic Justification of the Author Charge Pricing Mechanism

In the neoclassical economics of scholarly communication literature, the scholarly journal is modeled as a quasi-public and multi-product good demanded and supplied in a marketplace setting. The journal is understood as a good that benefits both the reader and the author (and the research funding agency that the reader and author are affiliated with). Efficient outcomes only emerge when all the parties that benefit from the process also finance the process. As a result, the argument is made that any market failures in the scholarly communication process can only be resolved when scholarly communities transition away from a complete reliance on the ‘reader pays’ financing model to one where both readers and authors pay.

In the economics of scholarly communication literature, the journal is modeled as an ‘interesting’ economic object to study because of its status as a quasi-public good (a rival good that is excludable). The consequence of being able to exclude those who do

not pay for the good is that whereas for a pure public good the optimal price charged of consumers is zero (because the marginal cost of an additional user is close to zero), pricing the journal as a quasi-public good requires the use of the Ramsey theorem. The Ramsey theorem on quasi-optimal pricing (1927) revealed the pattern of taxes that would yield the pareto optimal allocation of resources and satisfy a budget constraint. The Ramsey theorem showed that a zero price was not normally optimal in this kind of situation and outlined what the quasi optimal prices should be.⁵⁷ Ramsey found that the tax rate of a good should be set proportional to the inverse of the consumer's elasticity of demand in order to minimize the aggregate deadweight loss. In other words, those consumers with an inelastic demand should be taxed more heavily than those consumers with an elastic demand.

Baumol and Bradford (1970) used the Ramsey theorem in order to determine the set of optimal prices for a good with some public good quality that served multiple types of consumers. Baumol and Bradford found that marginal cost pricing would not permit the budget constraint to be satisfied in these situations and that the quasi-optimal difference between price and marginal cost for a particular output, i , using the Ramsey theorem is

$$p_i - C_i = \lambda(R_i - C_i)(0.1)$$

where λ is the Lagrangian multiplier, p_i is the price of good i , C_i the marginal cost of good i , and R_i the marginal revenue of good i . This equation showed that in those cases

⁵⁷ This pricing is quasi-optimal because it is the second-best solution possible given the revenue requirements.

where marginal cost pricing did not bring in enough revenue to satisfy the budget constraint (such as the case was for the quasi-public good that served multiple kinds of consumers), prices had to deviate from marginal costs. The deviations from marginal cost that satisfy (0.1) were those that met the budget constraint and minimized the misallocation of resources that would occur as the price deviated from marginal cost (which is similar to Ramsey's tax problem). In situations where cross elasticities of demand are zero, Baumol and Bradford derived the following:

$$\frac{(P_i - C_i)}{P_i} = \frac{k}{\epsilon} \quad (0.2)$$

where k is a second good and ϵ is the price elasticity of demand of good i . The interpretation of (0.2) was that quasi-optimality occurred when the percentage deviation of prices from marginal cost varied inversely with elasticity of demand. In other words, if prices were raised above marginal costs in order to satisfy the budget constraint, then the largest deviation in price should be placed on the good whose demand was more inelastic so as to minimize the deviation from the optimal output level. This equation also implied that having a zero price for a quasi-public good, such as the case when only readers pay for the journal, lead to inefficiencies.

An application of the general tax theorem from Ramsey and the pricing rule for quasi public goods that serve multiple kinds of consumers developed by Baumol and Bradford provided the intellectual framework for the only article in the economics of scholarly communication literature that justified the author charge pricing mechanism. In this article, Braunstein (1977) showed "that the imposition of page and submission

charges to authors of articles submitted to academic journals may lead to a more efficient allocation of resources in the dissemination of knowledge by journals than would occur in the absence of such charges.”⁵⁸ Braunstein claimed that the journal was a good that generated a bundle of outputs for authors and readers, each of whom have a unique demand function. As a result, it was not optimal to assign a price to only one of these outputs.

Braunstein noted that it was necessary to adopt the Ramsey approach to determining the optimal prices for these outputs because of the existence of economies of scale in the publishing industry. These economies of scale precluded the use of marginal cost pricing in order to satisfy the budget constraint. Publisher’s options for satisfying their budget constraint included charging a subscription price greater than marginal cost and equal to average cost, and obtaining revenue from other sources such as advertising, government subsidies, or a combination of any of these methods. Either subscription prices had to equal the average cost or another source of revenue had to be found. Charging a subscription price equal to the marginal cost translated into, not satisfying the budget constraint, but charging a subscription price equal to average cost meant that fewer copies of the journal were demanded. Braunstein concluded that only by changing the basic pricing mechanism by which journal production was financed could a subsidy from the government be avoided.

The journal, for Braunstein, was a multi-product good that provided exposure and an opportunity for career advancement to authors and knowledge to readers. Braunstein used the Bradford-Baumol pricing rule after concluding that the cross-elasticities of

⁵⁸ Braunstein (1977), 355.

demand for these two goods were close to zero.⁵⁹ For a two-output situation, Braunstein used the Ramsey theorem and rewrote formula (0.2) to express the Bradford-Baumol rule for quasi-optimality for multi-product goods when the cross-elasticity of demand for the products are zero as:

$$\frac{(P_1 - MC_1) / P_1}{(P_2 - MC_2) / P_2} = \frac{Q_b}{Q} \quad (0.3)$$

which, after cross-multiplication, became:

$$\frac{(P_1 - MC_1) Q_b}{P_1} = \frac{(P_2 - MC_2) Q}{P_2} \quad (0.4)$$

With a set of demand and cost functions, Braunstein calculated the increase needed in the page charge in order to lower the subscription price and keep revenue constant.

Braunstein presented the following equations as an example:

$$Q = 5500 - 50P_Q \quad (0.5)$$

$$X = 1500 - 10P_x \quad (0.6)$$

$$C = 50 + 15X + 9Q \quad (0.7)$$

where Q is the number of copies printed of each issue, X the number of pages published per year, P_Q the subscription rate, P_x the page charge, and C the total cost.

In the initial time period, Braunstein assumed a \$20 subscription rate and no page charge and calculated that 4500 copies of a 1500 page journal volume will be published at a total cost of \$63,000. As Q or X increases, the marginal cost remained constant while the average cost declined. The marginal cost of the number of copies printed $\frac{\partial C}{\partial Q}$ was

⁵⁹ In other words, that there is only a minimal interrelationship between the number and length of the articles submitted and published and the number of copies demanded.

9 while the marginal cost of the number of pages published $\frac{\partial C}{\partial X}$ was 15. With an assumption that elasticities were not significantly different at $P_Q = P_X = 20$, $\epsilon_Q = .22$ and $\epsilon_X = .15$.⁶⁰ Substituting this into formula (0.4), he obtained the following:

$$\frac{P_Q \cdot 9}{P_Q} \cdot .22 = \frac{P_X \cdot 15}{P_X} \cdot .15$$

With one equation and two unknowns, an additional equation was generated with the restriction that profit remains constant. The fixed profits equation, combined with the Ramsey equation, allowed him to solve for the two unknown quasi-optimal prices. After determining the profit at time period zero to be \$26,950 (revenue of \$90,000 and cost of \$63,050 from formulas (0.5), (0.6), and (0.7)), the following was derived:

$$P_Q(5500 - 50P_Q) + P_X(1500 - 10P_X) - 50 - 15(1500 - 10P_X) - 9(5500 - 50P_Q) = 26,950$$

P_Q was approximately \$13 while P_X was approximately \$20.50. In other words, lowering the subscription price from \$20 to \$13 required a page charge of \$20.50 in order to make profit constant and the publisher presumably indifferent between the price pairs. Braunstein concluded that in this example consumer welfare was maximized by the inclusion of a page charge pricing mechanism.

Braunstein's economic justification of the page charge was complemented by Baumol and Ordovery's (1977) discussion of what type of organization should supply the journal modeled as a quasi-public good. Baumol and Ordovery noted that once it was possible to exclude use of the public good there was no reason why it must then be supplied by the government. If supplied by a private firm, profit would be maximized

⁶⁰ With the general equation for price elasticity of demand being $\epsilon = \frac{P}{X} \left(\frac{dX}{dP} \right)$

when total revenue was maximized given that most of the costs were not dependent on usage volume. Graphically, the quantity supplied would be when the marginal revenue curve intersected the horizontal axis. Baumol and Ordovery admitted that while such a situation may yield prices that are considered high and may inhibit access, that this resource allocation may leave society no worse off than if zero prices were used. With regard to having the quasi-public good supplied by a private non-profit group (with the example given of the professional association that publishes a journal), Baumol and Ordovery noted that, unlike the private firm that sought only to maximize profit, that there were three different types of behavior: organizational quasi-optimization, physical volume maximization, and membership maximization.

The first type of behavior, organizational quasi-optimization, involved the adoption of a set of prices that considered the welfare of members of the organization while taking into account the organization's budget constraint. Baumol and Ordovery noted that the organization's motivation was to maximize the producer surplus (the profit of its members) while society's goal was maximize both producer and consumer surplus. Thus, the organization that prices its products to maximize the profits of its members could not be expected to also be charging socially optimal prices. The second type of behavior, physical volume maximization, occurred when the organization believed that society benefits most when they maximize usage of the product subject to a budget constraint. Baumol and Ordovery, after considering the varying weights placed on production, concluded that such behavior failed to be in accord with maximizing utility. Finally, with regard to membership maximization, Baumol and Ordovery found that the higher flat fee charged non-members might be even a stronger deterrent to use than

charging a slightly higher fee to members. Thus Baumol and Ordovery concluded that there were no welfare theoretic grounds that favored the production of the quasi public good such as the journal by one type of organization rather than another.

When Baumol and Ordovery's discussion of who should supply the journal is combined with Braunstein's discussion of the page charge, the following conclusions are reached: author charges are necessary given the cost structure of scholarly publishing; the charges to authors and readers should vary from the marginal cost to the degree of price inelasticity; and no single type of organization (public or private) should, by default, supply the quasi-public good. The economics of scholarly communication literature and the focus it places on the journal as a public good leads to the false belief that scholarly communication processes emerge naturally within a scholarly community and that these processes are similar across disciplines. This belief is especially evident when it comes to discussing how the scholarly communication process is funded. When economists, or most other scholars who borrow their metaphors, discuss the pricing mechanisms used to fund the scholarly communication process, the mechanism is interpreted as being chosen on the basis of only efficiency considerations by actors who can be clearly located within a public or private realm. More specifically, with regard to the author charge pricing mechanism, the scholarly journal is portrayed as a public good that ought to be supplied by public actors such as the federal government, university, or scholarly society and that technology and the nature of the journal commodity dictate that it ought to be paid for with an author charge pricing mechanism. The problem with this explanation of the author charge pricing mechanism however is that efficiency is not the only organizing principle for a discipline's scholarly communication process and that

there is no mention of the funding, legal, and social changes that have occurred within the research process. The scholarly communication process is something different than a marketplace of ideas, and the journal is something other than an exchangeable commodity. One cannot argue that the nature of the journal is that it contains public good qualities and from that, argue how scholarly communication ought to be organized and financed. This strain of thought has been used by legions of scholars, librarians, and government officials to argue that ‘public’ actors should organize the scholarly communication process and that it should be paid for with author and reader pricing mechanisms. This strain of thought however, as evident in the previous chapter, has also produced a flawed and incomplete understanding of the scholarly communication process, the serials crisis, and the electronic era of scholarly communication.

3.3 The Need for an Alternative Vision of the Author Charge Pricing Mechanism

The problem with the ‘public goods’ narrative of the previous section is that it assumes that the scholarly communication process is the same across disciplines and that the scholarly journal is intrinsically a public good that ought to be supplied by public actors. There is instead a unique scholarly communication crisis in each discipline due to the fact that each discipline has a unique scholarly communication process. Scholarly communication processes are unique to a discipline because the scholars and research patrons within each discipline have different communication wants and needs. As the communication process becomes understood as being organized and funded in a discipline-specific fashion by actors who are responding to larger social, political,

financial, and legal changes, it becomes clear that it is problematic to argue that scholarly journals are intrinsically and universally public goods that ought to be produced by public actors and financed through author charges.

The scholarly communication process can be seen as a tradition and mechanism that embodies and reflects the motivation of the actors that pay for the research, the existing intellectual property laws and perceptions of its value, the previous traditions, the wants and needs of the scholarly community, and the location and status of the discipline within the university setting. There is no universal scholarly communication process, this process is not wholly determined by the wants and needs of scholarly communities themselves, and this process serves roles other than facilitating communication within a scholarly community.

When the scholarly communication process is understood in this manner, the motivation behind the author charge pricing mechanism becomes potentially something more than efficiency, and the choice of a pricing mechanism to fund the process becomes potentially more contentious. In order to discuss pricing mechanisms as devices that are used by many kinds of actors to serve many needs and in order to more fully appreciate the consequences to funding the scholarly communication process in a particular way, I abandon the unrealistic and oversimplified public goods story told in the previous section. Instead, I capture the dramatic changes in the motivation and influence of the actors that funded and organized the research and scholarly communication process in a discipline and the changes in the legal and economic conditions of these processes. More specifically, I look at the scholarly communication process as it existed in physics from

1930-1980 and how an author charge pricing mechanism was used and then largely abandoned by the AIP and APS.

In the oft-seen public goods story that justified the use of author charges on the basis of efficiency grounds, a history of the author charge pricing mechanism would be of little use. That the author charge was used in the past would be worth mentioning if only to encourage scholarly communities to adopt this pricing mechanism and provide feelings of comfort and security to those who have made the transition already. However when there is a closer analysis of the nature of the scholarly communication process in a single discipline and the manifestation of the author charge pricing mechanism used to fund it, it is apparent that not only does the economic justification of the pricing mechanism change over time, but that also the ownership and control motivations of many actors became more evident in their support of this pricing mechanism. In the next section I discuss the scholarly communication process as it existed in physics from 1930-1980 and the reliance placed on an author charge pricing mechanism that changed over time. This section dispels the belief that scholarly communication is a universal type of object that logically should be funded with a particular type of pricing mechanism. It will become apparent in this chapter that, while the author charge pricing mechanism was introduced to accommodate growth of the literature and retire debt (that it served a financial role), this mechanism also took on a number of ownership and control roles. As the funding and organization of research changed, the scholarly communication process and the pricing mechanisms used to fund it changed as well in its form, justification, and its goals.

3.4 Physics and the Author Charge Pricing Mechanism – A Review of the Past

The use of an author charge pricing mechanism to subsidize a discipline's scholarly communication process is, by no means, a recent phenomenon. The earliest example of an author charge pricing mechanism being used was in the physics journals published by the American Physical Society (APS) and its umbrella organization, the American Institute of Physics (AIP). This chapter recounts the history of the use of the page charge pricing mechanism from its implementation in 1930 to the decision by the AIP in the late 1970s to reduce the dependence placed on author charge income and to partially replace author charge revenue with institutional subscription revenue.

In the 1920s, physics in America was facing two crises. First, and foremost, increased funding for research created a situation where there was an incredible amount of material to publish. The inability of commercial or non-commercial publishers to meet this demand meant that completed research was left to gather dust and unknowingly duplicated by others. At the same time, the physics discipline was under strain as researchers in specialized fields became more numerous and started scholarly societies to meet their unique needs. The result was a fragmentation that left the general physics community increasingly uninformed about the research activities of others. The APS was unable to resolve either of these crises.

The author charge pricing mechanism was devised by the Committee on the Financial Status of the Physical Review, a committee formed in the 1920s and consisting of K.T. Compton, A.W. Hull, A.L. Loomis, and G.B. Pegram. The goal of this committee was to find additional sources of income and ways to reduce expenses such that more could be published in the APS' flagship journal Physical Review (PR). The

hope was that the second problem of increased fragmentation in physics scholarly communication would then be resolved as PR expanded. Despite the fact that the initial focus of the committee was on how to reduce production expenses, the committee devoted most of its time to finding ways to increase revenue and control the growth of PR. Higher membership dues, non-member subscription prices, and more advertising were obvious ways to increase revenue. The Committee recommended that a permanent solution to the problems faced in the communication of physics research required the Society to take steps to encourage authors to write with brevity in mind and contribute to the cost of publication. One proposed way to achieve this was that the PR publish a stated number of pages without charge and that authors be required to pay the costs of pages that exceed this limit.⁶¹ On February 21, 1930, the committee recommended two ways by which to increase revenue and control the growth of the journal. The first was to increase the subscription price. The second was to institute a \$2 page charge on accepted articles with payment to be made by the author's research funding agency and to offer 100 free reprints in return.⁶² This second recommendation of instituting a page charge was chosen

... as a step toward general recognition of the principle that a part of the cost of publication of research is a legitimate part of the cost of research, being, in fact, the climax of the research. By the proposed plan, the cost of publication would be shared by the subscriber and the author – which seems both more equitable and more feasible than to charge the entire cost to either party alone.⁶³

⁶¹ APS, Subgroup I, Series II, Box 5, Folder 15

⁶² The offer of 100 free reprints was made so that institutions with established policies for paying reprint charges could pay the page charge.

⁶³ APS, Subgroup I, Series II, Box 5, Folder 18

With that recommendation, the use of an author charge pricing mechanism to fund a discipline's scholarly communication process first took form.

All that was sought initially by proponents of the page charge pricing mechanism was an acceptance by the actors in the physics scholarly communication process of the fact that there should be a sharing of the costs of publication between readers and authors. However, how this burden was shared was given little economic justification. Nowhere was there mention of the fact that the research funding institution should pay a page charge that approximates the fixed costs of publishing an article. Instead, there was a discussion of a page charge as a means to stabilize the financial position of PR and meet the revenue shortfall from subscribers. During the February 21, 1930 meeting discussing the amount of the page charge, it was mentioned that:

Calculation shows that, in order to completely stabilize the PR for an indefinite period in the future (as predicted by direct extrapolation of the course of events of the past seven years), the charge to the author would have to be between \$6 and \$7 per page. It is recognized that such a program could not at present be considered. However it is estimated that the more moderate proposed recommendation above will take care of the situation for at least two years, within which time new developments, together with the experience gained, will afford a more tenable basis on which to establish a permanent policy than is now available.

Note: The Committee recommends the adoption of [the page charge] in principle, allowing opportunity at the discretion of the Committee to make a small alternation, if necessary, in the future \$2 after the Editor has had opportunity to consult with the publishers in regard to the cost per page of 100 reprints. The present figure is the best estimate that can now be made, allowing for the desired profit to the PR of \$1 per page (which will yield approximately \$3000 additional income next year).⁶⁴

While charging authors and, in turn, their research funding agencies for publication was an ingenious solution and it appears all likely that the APS truly did 'invent' the page

⁶⁴ APS, Subgroup I, Series II, Box 5, Folder 18

charge pricing mechanism, it bears mentioning that a different variation of an author charge pricing mechanism was already being used by the American Mathematical Society (AMS).⁶⁵ However, there was no indication that members of the committee were aware of this practice. Unfortunately, there are few records that could explain what informed the committee's arrival at the page charge recommendation.⁶⁶ Between 1930 and 1931, \$4,760 in page charge invoices were honored and \$1,505 were not honored.⁶⁷ Those institutions that did not honor the page charge had their invoices paid on their behalf by Loomis.⁶⁸

It is quite clear that, in the beginning, the primary concern of the APS was to establish the idea that multiple parties ought to bear the financial burden of the scholarly communication process. Significantly less attention was paid to how much each party should pay and why. The Committee on the Financial Status of the PR reiterated this fact in a report dated January 4, 1934:

⁶⁵ In the AMS scheme, research institutions originally paid a flat fee as a supporter of the scholarly society's activities. Sometime in the late 1920s or early 1930s, the research funding agency was asked to pay an annual membership fee with the amount determined by the number of pages their scholars had published that year. There is nothing to indicate that the members of the committee were aware of the AMS plan when the APS page charge pricing mechanism was developed.

⁶⁶ My suspicion is that the records that could explain the origin of this recommendation would be in either the Records of the Massachusetts Institute of Technology, Office of the President, 1930-1959 for K.T. Compton's contribution to the discussion. Pegram's records that were held at the Neils Bohr library did not contain documents outlining the discussions of the Committee. I have been unable to locate any separate records within the AIP archive for Loomis or Hull. See Conant (2002) for more information on Loomis.

⁶⁷ It should be noted that there was no indication of whether the author or the research funding agency was honoring the charge. Although the original intention of the APS was that the research funding agency would honor the charge on behalf of the author, it appears that authors were in fact honoring the charge themselves. APS, Subgroup I, Series I, Box 3, Folder 1

⁶⁸ The reason why those articles where the page charge was not honored were underwritten was because of the belief that this would provide moral suasion to those institutions to implement formal policies to pay such charges in the future. During the two-year trial period, Loomis paid a total of \$2,554.17. APS, Subgroup I, Series II, Box 6, Folder 4

Either some other group must share the burden or else important research must go unpublished and hence lose a large part of its value....Who should be the partners to share the publication costs with the members? Without doubt these partners should be those parties who have the greatest direct interest in and benefit from the publication of research. This points at once to the institution, companies, and laboratories whose research is being published. Why should the individual members of the American Physical Society pay practically the entire cost of publishing the reports of investigations in XYZ university or ABC company? That university or company gains prestige and power from the publication. Without publication, its effort and expense spent in advancing knowledge would be relatively sterile. The American Physical Society is providing these institutions with a medium of publication far more effective than they could maintain individually for themselves. Why should not they shoulder an appreciable share of the cost of publication (which, after all, is probably less than 10% of the cost of the rest of the research)?

An institution may reply, 'Our funds for research are limited. To use part of them to pay a share of the cost of publication would reduce our research activity by just that amount. Therefore we cannot do it.' To which we may answer: 'But our journals, and those of other organizations, can no longer afford to publish the increasing output from your laboratories. We are therefore forced to close down on publishing your material. There is no alternative.' This situation is not hypothetical; it is a fact in practically all branches of science. The situation is desperate and is reaching a showdown. We see no alternative except for institutions to accept a reasonable share of publication cost as a part of the cost of research. Of course they will not do this gladly. Yet it is a fair and logical proposition, and to do otherwise would be for them to try to get something for nothing, -- an unethical producer especially when this something is got from the personal sacrifices of others. Consequently, we believe that some proper provision for partial payment of the costs of publication must be made as a regular part of the budget of any research program.⁶⁹

Again, the early justifications for imposing the page charge on authors focused on the claim that the research funding institution ought to pay something. No justification was given for how much the research funding institution should pay.

Shortly after the page charge was adopted by the APS, the AIP was formed to coordinate the publishing activities of the various scholarly societies in physics. With the

⁶⁹ Barton, Box 3, Folder 1

page charge having been in place for a year at the APS and John Tate, the Editor of PR, reporting on May 21, 1931 that 76% of the page charge invoices were being honored, the recommendation was made that all of the journals published by the AIP employ the charge. With this demonstrated success and the need to make the journals financially self-sufficient, the journal Physics and the Journal of Applied Physics instituted a page charge starting with the July, 1932 issue. Subsequently, the Review of Scientific Instruments and the Journal of the Optical Society instituted a page charge starting in October, 1932.

In June, 1935, H. Barton, Director of the AIP, reported on the operation of the page charge plan since 1932.⁷⁰ The primary questions Barton wanted to answer were:

1. How much income did page charge pricing mechanism generate for these journals?
2. To what extent has the notion that research funding agency pay a portion of the scholarly communication process been accepted?

With regard to the first question, over the three-year period a total of \$34,387 had been generated by the seven journals that had a page charge policy.⁷¹ With the total expenses of publication over the same period being \$250,000, the page charge income covered 14% of the publication expense. To highlight the significance of this income, Barton calculated that, excluding the fixed costs of publishing, this page charge income permitted 20-25% more pages to be published (3,000 to 4,000 more pages). With that, Barton added that page charge income was playing a significant role in the financing of

⁷⁰ APS, Subgroup I, Series II, Box 6, Folder 6

⁷¹ \$11,000 of this came from the Rockefeller Foundation. APS, Subgroup I, Series II, Box 6, Folder 6

the scholarly communication process. With regard to the second question of acceptance, Barton revealed the following:

TABLE 6

HONORING OF PAGE CHARGES
BY JOURNALS PUBLISHED
BY THE AMERICAN INSTITUTE OF PHYSICS
1933-1934

# of institutions that	Beginning of 1933	End of 1934
Honored charges	27	36
Partially honored charges	4	7
Declined to honor charges	23	9
Published nothing in one of the years	1	3
% of institutions which		
Honored in full	49.1	65.5
Honored in part	7.3	12.7
Honored in full or part	56.4	78.2

Source: APS, Subgroup I, Series II, Box 6, Folder 6

This table reveals that the number of research intensive institutions honoring the charge was increasing.⁷² Despite the fact that a higher percentage of page charge invoices were honored, Barton noted that most research published by authors affiliated with small colleges or receiving government research support did not honor their page charge invoices.

Throughout the 1930s the legitimacy of the page charge pricing mechanism was bolstered by the fact that those authors who were unable to pay their page charge invoice had it paid on their behalf by Alfred Loomis from 1930-1932 and then by the Rockefeller

⁷² On a side note, this table also reveals that authors from only about 50 different institutions are publishing articles in PR. APS, Subgroup I, Series II, Box 6, Folder 6

Foundation from 1933-1939. Throughout the late 1920s and early 1930s, as Chairman of the Committee on Finances of the PR, K.T. Compton consulted with the officers of the Rockefeller Foundation about supporting the scholarly communication process in physics. Besides the award of a few temporary grants, his efforts were generally unsuccessful. This was due to the fact that the Rockefeller Foundation had previously supported the scholarly communication process in biology and had come to the conclusion that the more money the Rockefeller Foundation gave, the more that seemed to be needed by biologists.⁷³ With the Foundation subsequently taking a definite stand against extending a regular subsidy to the scholarly communication process in any discipline, a justification would be needed by the AIP to prove to the Rockefeller Foundation that any financial assistance they needed for their scholarly communication process would be temporary.⁷⁴ On November 21, 1931, the Committee recommended that the

...Governing Board inform the Rockefeller Foundation of how this plan is working out for the Physical Review, and in view of the Rockefeller Foundation's own interest in developing a method of securing continuing, even though partial, support for scholarly publications, inquire as to whether or not the Rockefeller Foundation would be willing to underwrite for a definite term of years such a plan for all the physics journals...⁷⁵

The Governing Board of the AIP provided such information, and the Rockefeller Foundation agreed to financially underwrite the page charge with the hope that the practice of research funding agencies paying the page charge on behalf of the author

⁷³ An excellent text that reviews the influence of the Rockefeller Foundation in research in biology and the scholarly communication process is Appel (2000).

⁷⁴ Barton, Box 4, Folder 2

⁷⁵ APS, Subgroup I, Series II, Box 6, Folder 5

would be legitimized. To this end, the Rockefeller Foundation committed itself to the following underwriting limits:

1932-1933: \$6,000
1933-1934: \$5,000
1934-1935: \$4,000
1935-1936: \$3,000
1936-1937: \$2,000
1937-1938: \$1,000
1938-1939: \$1,000

The importance of Loomis' and the Rockefeller Foundation's underwriting of the page charge cannot be underestimated. This act of underwriting legitimized the page charge within the scholarly community and signaled to the AIP that the page charge was an acceptable financial contribution to ask of others.

Barton, at the conclusion of the 7-year underwriting period of the page charge by the Rockefeller Foundation in 1939, reported to the Rockefeller Foundation the following page charge honoring rates:⁷⁶

1932-1933: 65%
1933-1934: 75%
1934-1935: 74%
1935-1936: 87%
1936-1937: 93%
1937-1938: 87%
1938-1939: 88%

While Barton expected future difficulties given that the coming war would increase expenses and lead to foreign authors increasingly submitting manuscripts to American journals, he went on to report that the support of the Rockefeller Foundation had fostered the wider acceptance of the page charge among the actors in the scholarly communication process in physics. Barton concluded:

⁷⁶Barton, Box 89, Folder 4

In conclusion I have tried unsuccessfully to find words good enough to thank the Foundation, on behalf of the Institute, our Founder Societies, and the physicists who are served by our journals of research, for enabling us to develop this new source of income. Probably the best way to express our gratitude is to make the foundation know how much such an amount of added income means to us. In 1938, the income from the publication charge represented an increment of 16% to all other income available for publishing the seven journals which operate under the plan. As you know a part of the regular income pays for office costs, covers, wrappers and other items independent of text pages. This added income item thus represents a still larger percentage increment to the residue available for printing text pages. Without making an exhaustive cost analysis, I have estimated that 1100 of our large sized pages were provided in 1938 by publication charge income. This is an increment of approximately 20%.⁷⁷

Warren Weaver, Director of the National Sciences Division of the Rockefeller Foundation, responded:

Although the Rockefeller Foundation has at various times and in considerable amounts assisted in the publication of scholarly research, I think it would have to admit that very infrequently has it found an opportunity to contribute in a really constructive way, in the sense that, the contribution did more than temporarily alleviate a difficulty.⁷⁸

At the conclusion of the 1930s the notion that the research funding agency was partially financially responsible for the scholarly communication process had become more widely accepted. The page charge, throughout the 1930s, was set such that AIP's budget deficiencies could be satisfied. The number of additional pages that were published after excluding various fixed publishing expenses, as evidenced in the above letter to the Rockefeller Foundation, was the measure by which the financial impact of the page charge pricing mechanism was discussed.

Throughout the 1940s, the acceptance rate of the page charge remained close to 90% across all the AIP journals. With no decrease in the acceptance rate, no change in

⁷⁷ Barton, Box 89, Folder 4

⁷⁸ Barton, Box 89, Folder 4

the types of research funding agencies that were honoring it (corporations and research intensive institutions), and the amount charged relatively low, the AIP found it unnecessary to justify how the page charge amount was determined. In 1940 the AIP issued an “Explanation of General Policy in Making the Publication Charge.” It began as follows:

Periodicals for the publication of reports of new research are essential to the advance of any branch of science. To be most effective they should be complete without duplication, prompt without careless editing, and widely available at as low a cost as possible. With these essential qualities they not only convey specific information but they establish and stimulate the discipline they serve. They have economic value to authors and readers. They are a cooperative publishing enterprise in which any good paper can be published more cheaply than if published separately, more widely distributed to an interested group than if published privately or in local journals, and with all the prestige of the journals and of the society which issues it.⁷⁹

This broad statement however failed to justify the reasonableness of the amount charged to authors and their research funding agency.

By the 1950s, the page charge pricing mechanism was an established and accepted means of financing the scholarly communication process in physics. During this decade, a well-formulated economic justification of the amount of the page charge emerges and the mechanism became further legitimized when the federal government honored it. The decade began with Barton conducting an analysis of page charge acceptance for PR and finding that, while 88.6% of chargeable pages were honored, the AIP needed to be concerned with four items:

1. A similar page charge analysis of the other journals published by the AIP

⁷⁹ Barton, Box 8A, Folder 6

2. A continuing quarterly check of ‘will-not honor’ papers to reveal the effect of the doubling of the page charge rate
3. A follow-up of the circumstances surrounding why the page charge might not have been honored
4. Preparation of an explanation of the reasons why the page charge is a good idea and why \$8 is reasonable for distribution to all officials of research institutions who may wish to have such an explanation.⁸⁰

In 1952 or 1953, there emerged, for the first time, a justification for the page charge amount.⁸¹ In this statement of justification, the Secretary of the APS writes:

The levy of a page charge appears to be the fairest way of meeting such costs of publication as cannot be covered by dues and subscriptions when they last are maintained as reasonable rates. Costs of publication may be divided into two classes: ‘assembly costs’ (editing, type-setting, engraving, proof correcting) and ‘distribution costs’ (such as press-run, binding, covering, wrapping, postage, and maintenance of mailing lists). The former are roughly proportional to the size of the journal, while the latter depend relatively little on the number of pages. It would be ideal to match these two types of costs with two types of income, one roughly proportional to the size of the journal, the other roughly independent of size. Dues and subscription-rates are of the latter type, page charge is of the former type. With a page charge of \$8, we shall meet about one-half of the assembly costs.⁸²

This statement represented the first time that the page charge amount was connected to the first-copy costs of producing a journal.⁸³ This formal association of page charge income with first copy expenses came at a time when the AIP was trying desperately to

⁸⁰ Barton, Box 57, Folder 12

⁸¹ The document where this justification appears is in Barton, Box 57, Folder 12. Unfortunately, the document has no listed date. With the help of Jennifer Sullivan of the Neils Bohr Library, we were able to discern that it was written sometime in either 1952 or 1953 given the dates on the documents surrounding it.

⁸² Barton, Box 57, Folder 10

⁸³ Although it was outlined by the Managing Editor of PR on October 27, 1932 that there were two cost components to a journal, “one proportional to the amount of material to be set in type and the other to the number of copies printed,” and that there were two major sources of income, the subscriber and the institution, there was no association of these cost components to the income source. Barton, Box 2, Folder 2.

convince the government to allow the payment of page charges. In 1949, research papers from government labs (Naval Research Lab, Naval Ordnance Lab, and National Bureau of Standards) accounted for 27.4% of the total number of pages where the page charge was not honored.⁸⁴ An additional 28.3% of the non-honored pages came from researchers conducting Office of Naval Research (ONR) and Atomic Energy Commission (AEC) contracted work.⁸⁵ This economic justification of the page charge pricing mechanism also emerged at a time when the economics of science literature was modeling research using a production framework.

The efforts of the AIP to convince the federal government to honor the page charge began in 1949 when the AIP organized a conference around the theme of how to finance journals. At this conference, journal editors, officers of scholarly societies, and representatives of government agencies discussed the page charge pricing mechanism and the experiences of the AIP with using this mechanism. At the time, government officials were already considering the subsidization of the scholarly communication process in those disciplines where research was being sponsored. After the conference, the government's Interdepartmental Committee for Scientific Research and Development established a panel to decide how best to provide financial support for journals. After the Comptroller General of the United States in 1955 ruled that it was legal for government agencies to pay page charges, the panel accepted AIP's long-standing argument that publication costs were a legitimate research expense and recommended that government agencies pay these page charges if they were to not-for-profit journals where the same

⁸⁴ Barton, Box 57, Folder 12

⁸⁵ Barton, Box 57, Folder 12

charge was assessed to both governmental and non-governmental authors.⁸⁶ This decision led first to the Army, Navy, and Air Force in 1955 and 1956, each independently passing directives that permitted contractors to pay page charges under the same conditions. Other federal agencies passed similar directives such that, by the end of the decade, all research results published with government or government contract money permitted the page charge to be paid.

As the 1950s came to a close, optimism within the AIP and APS was high. As the 1960s began, every major research funding agency in physics had accepted the legitimacy of the pricing mechanism. In 1961, the Federal Council for Science and Technology accepted the responsibility for standardizing the government's payment of the page charge, and they stated four criteria that had to be satisfied before payment would be made:

1. The research papers report work supported by the government
2. The charges are levied impartially on all research papers published by the journal, whether by non-government or government authors
3. Payment of such charges is in no sense a condition for acceptance of manuscripts for the journal
4. The journals involved are not operated for profit⁸⁷

With the AIP and APS now having an explicit statement justifying the pricing mechanism, the expectation was that foreign and smaller research funding agencies would soon accept the legitimacy of the charge and that the page charge could be raised in the future to accommodate increased expenses. The growing acceptance of the page

⁸⁶ The uncertainty prior to the Comptroller's decision was whether government sponsored research had to be published by the Government Printing Office.

⁸⁷ Barton, Box 57, Folder 10

charge pricing mechanism by research funding agencies in physics was also noted by the scholarly societies in disciplines such as chemistry who were considering an adoption of a similar charge. These expectations however would prove to be unfulfilled.

In the early 1960s, the page charge honoring rate for APS journals was over 92% (an income flow that represented over 40% of the total publication cost).⁸⁸ Yet at the same time, the APS incurred significant deficits. The problem was not that the page charge mechanism was not accepted by the research funding institution. In fact, the page charge funding mechanism was so well established that the American Chemical Society had begun to employ a page charge pricing mechanism itself by 1963. Moreover, not only were research funding agencies willing to pay the page charge, but they were also willing to pay a voluntary \$10 abstract charge that was imposed as of January, 1963.⁸⁹ So, what was it that was contributing to this deficit for the APS?

Part of it was the phenomenal growth of PR. Even though most articles honored the page charge, deficits arose when page charge amounts were set assuming a set of pre-run expenses which were themselves estimated on the basis of a journal being a particular size. When production levels exceeded estimates, costs increased dramatically.⁹⁰ Not only did the page charge level not reflect the loss in efficiency as production levels reached the margins, but page charge income also had to be used for the unanticipated

⁸⁸ APS, Subgroup II, Series XV, Box 50

⁸⁹ The abstract charge had a justification that the publication process does not end with the physical production of a journal issue and that abstracting and indexing of articles is needed to ensure that the results of research are widely disseminated and utilized.

⁹⁰ APS, Subgroup II, Series XV, Box 50

increase in variable costs because more pages than originally budgeted were published.⁹¹ Despite all of these financial problems, the growth in the size of PR was so great that the APS decided in April of 1963 to issue the journal weekly with two alternating sections.⁹²

Although splitting the journal and issuing it more frequently reduced the size of each issue and removed the threat of some technical problems (at one point, the publisher of PR, Lancaster Press, was within 15 pages of its physical limitations of binding pages), the growth of the literature was unabated. With the growth rate of PR decreasing between 1964 and 1965 as a result of editors strictly enforcing their page budgets, a perilous financial situation persisted despite the increase in both the member and non-member subscription rates in 1964. And despite the diligent efforts of the Treasurer and Editors to balance the budget, the Treasurer admitted that this all depended on there being no decline in the honoring of the page charge.

As a result of this last point, throughout 1964 a plea was made by both the President and Treasurer of the APS to research funding agencies that their continued honoring of the page charge was critical.⁹³ In October, 1964, the President and Treasurer of the APS reported to the Federal Council for Science and Technology that their investigation of instances when the research funding agency was not honoring the page charge revealed that often it was because the institution had not yet established a set of procedures to pay it. In almost every instance, the problem was quickly resolved.

⁹¹ The page budget was 10,000 pages for PR in 1963. It turned out that PR would publish 11,442 pages that year. APS, Subgroup II, Series XV, Box 50

⁹² APS, Subgroup II, Series XV, Box 50

⁹³ APS, Subgroup II, Series XV, Box 50

However this was only the case for domestic institutions.⁹⁴ The President and Treasurer of the APS reported that their discussion with foreign institutions revealed that they either did not understand the different manner by which American physics journals were financed or, in the case of the British, did not agree with the method by which the journals were funded.⁹⁵ The Treasurer calculated this subsidy to foreign authors for the first three quarters of 1964 to be \$52,000, with the UK authors imposing the largest burden (nearly 1/3).⁹⁶ However, it was decided that the APS could do little else than continually make the case that page charge income was important and perhaps apply to the Ford Foundation to have the page charges of foreign authors underwritten.

By the October, 1964 Treasurer Report, mention of financial problems had all but disappeared. While PR incurred an estimated deficit of \$113,075 in 1963, it earned an estimated profit of \$16,000 in 1964. APS itself went from an indebtedness of \$171,000 to AIP in 1963 to completely paying off this debt and having \$45,000 in a checking account and \$50,000 in T-Bills.⁹⁷ Clearly something had changed. By limiting the growth rate of the journals, improving the page charge honoring rate among domestic research funding institutions, and increasing the page charge and subscription rate, the financial situation of the APS had improved. This situation continued through 1965 with the APS running a surplus of \$245,000 and PR turning a profit of \$89,715.⁹⁸ With the

⁹⁴ APS, Subgroup II, Series XV, Box 50

⁹⁵ In 1964, the British journal Nature stated its opposition to the page charge and urged authors not to honor them.

⁹⁶ APS, Subgroup II, Series XV, Box 50

⁹⁷ APS, Subgroup II, Series XV, Box 50

⁹⁸ APS, Subgroup II, Series XV, Box 50

page charge being widely accepted up through 1966 across all AIP journals (82.62% acceptance in 1965 and 80.48% acceptance in 1966) and an increase in the subscription rate not being accompanied by a decrease in the number of subscribers, the AIP appeared to have few financial concerns.⁹⁹ Although there was mention in the January, 1967 Treasurer's report that the government was considering a proposal that would equate the page charge to pre-run costs, the Treasurer determined that at most the page charge was \$6 too high and that reducing the page charge by this amount would not have a significant financial impact.¹⁰⁰

In the late 1960s it became apparent that significant changes were starting to occur in the research and scholarly communication process in physics. With much of the research in physics since WWII having been funded by the federal government, the government's decision in the late 1960s to reduce its support had a significant impact. The AIP and APS responded to this change by altering their page charge collection procedures and seeking revenue from other sources. At the same time as these research funding changes were occurring, significant changes were also occurring with respect to the understanding of the intellectual property in a scholarly article. This intellectual property was becoming potentially more valuable as electronic methods of distribution were formed and publishers realized that there was significant demand for delivering individual articles.

In the late 1960s and early 1970s, the changing implementation and justification of the page charge pricing mechanism reflected the changing financial circumstances of the physics research and communication process. In the mid-1970s, the changing

⁹⁹ APS, Subgroup II, Series XV, Box 50

¹⁰⁰ APS, Subgroup II, Series XV, Box 50

implementation and justification of the page charge financial mechanism also reflected the changing intellectual property considerations of the physics research and communication process. The most dramatic of the changes to the page charge financial mechanism occurred in concert with the series of changes in the financing of research. The impact of these financial changes were particularly severe in the 1970s when they were combined with the legal and economic changes with respect to the intellectual property in each article. These changes together created a situation where the AIP and APS dramatically reduced their reliance on income from the page charge pricing mechanism.

The most obvious sign that these financial changes were occurring was when the APS proposed stronger controls over the honoring of the page charge. On August 6, 1968, the Executive Secretary of the APS, W.W. Havens, wrote to the Executive Committee:

Tightening scientific budgets and multiple authorships of papers from several institutions has made page charges difficult to collect. New mechanisms for improving collection of page charges must be investigated...Publishing of an article where the authors' institution or the author does not honor the page charge is a real cost to the Society and should be recognized as such. I propose that some mechanism be introduced before an article is published to make provision for the page charge either by the receipt of a purchase order from the author's institution or a specific authorization of funds for this publication by the Society.¹⁰¹

What was sought was a procedure that would keep the page charge voluntary (thus satisfying the requirement imposed by many research funding agencies including the federal government) and ensure that payment had no influence on acceptance of the

¹⁰¹ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 5

article yet would also encourage authors and the research funding agency to pay the charge.

Since this situation was not unique to physics, the APS solicited information as to what steps were being taken by other scholarly societies whose publications relied on revenue from authors. When the APS approached the American Nuclear Society (ANS) on the subject of the honoring of author charges in the face of reduced research funding in October, 1968, the APS was informed of the ANS' 'get tough' approach. Melvin Downes, Business Manager of the APS, was told that while the editor of Nuclear Science and Engineering, an ANS publication, followed the government policy that no paper was ever rejected because the page charge was not honored, that the secretary of the Nuclear Society, which collects the page charge, "expects to be paid."¹⁰² As a result, there was no decline in the honoring of the page charge at the ANS, however more threats had to be made when there was non-payment.¹⁰³

One threat, proposed by W.W. Havens, was to immediately publish a manuscript when the page charge was honored and to delay the publication of articles by authors that did not honor the page charge until finances permitted. Havens, on September 11, 1968, sought advice as to whether such a proposal was legal and wrote to the law firm of Davies, Hardy, Loeb & Ives the following:

I think the legal question which has to be answered is, 'Would the page charge still be regarded as a voluntary contribution if papers for which the

¹⁰² APS, Subgroup II, Series V, Subseries C, Box 21, Folder 9

¹⁰³ These threats included stating over the phone a refusal to accept future papers if the page charge was not honored or informing authors that he would take up the matter with the research funding institution. APS, Subgroup II, Series V, Subseries C, Box 21, Folder 9

page charge is paid are treated differently anywhere along the line than papers for which the page charge is not paid?’¹⁰⁴

The concern, of course, was that, if the page charge was no longer considered voluntary, many research funding agencies (most notably the federal government) would cease to honor the page charge. A lawyer of the firm, Robert Lawther, responded on September 26, 1968:

I do not believe that the payments which are made by authors and institutions, and which you have been used to calling ‘page charges’ lose their character as voluntary contributions purely because you may find that articles are delayed in publication when the contribution is not made.¹⁰⁵

Comparing the act of the APS imposing a voluntary page charge on authors to non-profit organizations that raise money by buying all the tickets to a theatre and then offering the tickets to the public in exchange for a contribution, Lawther wrote “I have seen no cases in which it has been maintained that contributions made under such circumstances lose their character either with respect to the recipient institution or the paying contributor.”¹⁰⁶ Lawther emphasized that any relationship between the contribution and the publication be avoided and that the implementation of this delay proposal could be carried out by designating “some sort of budget or allocation consonant with your available funds so that in each issue a certain number of page could be devoted to articles for which the page charges had been declined.”¹⁰⁷ As a response to this legal advice, on November 26, 1968, the APS implemented a policy whereby the number of pages published in PR in 1969 was determined by page charge income. Authors, at the time of acceptance, were

¹⁰⁴ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹⁰⁵ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹⁰⁶ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹⁰⁷ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

issued a form that was to be signed by the author's research sponsor and indicated whether the subsequently issued page charge invoice would be honored. Those authors unable to direct a page charge subsidy to the APS would have the publication of their article delayed.¹⁰⁸

The situation after 1969 became one where technically the page charge was voluntary; but, in the hearts and minds of scholars and research funding agencies within the physics community, had become mandatory with the two-track publication system. Lincoln Wolfenstein, a physics professor at Carnegie Mellon, expressed his displeasure with this two-track publication system to the editor of Physics Today on February 10, 1969, writing that:

A scholarly scientific journal is, by definition, I believe, one in which all decisions concerning publication are based strictly on the merit of the article subject to reasonable limitations on length. A journal which treats articles differently depending on the affluence of the writer or his backers can no longer be considered an independent scholarly journal but rather some kind of advertising medium. In particular, this decision implies that the journal is designed to serve the author or his backers rather than the readers.¹⁰⁹

Not only did this two-track publication system generate ill-will among academics, but the more aggressive methods of collection generated additional resentment. When an author ignored an invoice sent out by PR for \$214, the Treasurer of the AIP admonished the author and wrote:

Second and third notices and collection letters have been sent, as noted on the enclosed invoice copy....The discourteous and unbusiness-like attitude of completely ignoring our repeated communications is a discredit to your institution and a dis-service to the American Physical Society.¹¹⁰

¹⁰⁸ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹⁰⁹ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹¹⁰ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

It is important to note that this letter was also carbon-copied to six top officials of the AIP and APS. Certainly in academia this act discredited the reputation of both the author and his or her research funding institution. This was not an isolated incident. One author, accused of 'reneging' on the payment of a page charge, had a letter indicating this also sent to the chair of his department. W.W. Havens indicated to the author that he wrote this letter to the chair of his department with the hope that the chair would know the procedures that needed to be followed to have the page charge paid.¹¹¹ The author however resented this act so much that he notified W.W. Havens that he wished to resign as a fellow of the APS in protest.¹¹²

Not only were physics researchers growing discontented with the more rigorous collection of the page charge pricing mechanism, but major research funding agencies were becoming displeased as well. In order to maintain the level of page charge income, the AIP on April 18, 1969 wrote a letter to the NSF requesting a page charge underwriting grant for foreign authors.¹¹³ H. Williams Koch, the Director of AIP, wrote that the non-honoring of page charges by foreign authors was threatening the ability of the AIP to disseminate both domestic and international research results. If such a grant was not made, either foreign or both foreign and domestic subscription rates would have to increase (with the consequence being that dissemination of the journal would be reduced). Burton Adkinson, Head of the Office of the Science Information Service of the

¹¹¹ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹¹² APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹¹³ In 1968, foreign authors failed to honor 5,662 pages which translated into lost page charge income of \$339,768. APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

NSF, responded on May 6, 1969 that the NSF had a long-standing policy of not supporting journal publication unless they published government supported research projects or resolved a journal's short-term financial problems.¹¹⁴ Adkinson wrote:

It seems to us that the problem you face is a more fundamental one than you have stated, and it related to the underlying philosophy of your publication program for physics information. That is, in terms of costs and benefits to the U.S. physics community, how much is the community willing to pay for the effort required to include the papers of foreign authors in their respective journals, especially when this creates a significant economic burden on U.S. physicists? It would seem that, if the U.S. physics community continues to feel it has an obligation to provide for the publication of foreign generated research articles...and that it is beneficial to have such information appear in U.S. journals, the community must also accept the economic responsibility which that effort would require.¹¹⁵

The NSF's negative reaction to expanding their support of the page charge to foreign authors came at the same time as the AEC informed the APS of its displeasure with the present page charge system.

On May 13, 1969, R.K. Wakerling, a member of the AEC Technical Information Panel, wrote to Melvin Gottlieb, Chairman of the APS Publication Committee, that:

I believe that it was agreed by most members of the [Technical Information] Panel that the sponsor of research should bear a part of the expense of publishing the results, but that the publication support should be more equitable among the journals. We also concluded that means other than page charges should be considered.¹¹⁶

More specifically, in the letter to Gottlieb, Wakerling concluded that APS page charges were too high because subscribers did not bear enough of the financial burden when they only paid the variable output costs. Wakerling wrote:

¹¹⁴ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹¹⁵ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹¹⁶ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

In the case of the Physical Review, the input costs are more than double the output costs. I believe this is an inequitable cost division that subsidizes the subscribers (and APS members) at the expense of the authors (or usually the research sponsors).¹¹⁷

Wakerling, in the same letter, noted that in 1968 the AEC spent over \$1,000,000 on page charges and reprints, that this expenditure was not sustainable over the long-run, and predicted that government investigations of this considerable expenditure were looming.

The letter to Gottlieb also included a draft of a report the Technical Information Division of the AEC prepared on November 20, 1968. The central concern of the AEC expressed in the report was that journals had very different practices with regard to their financing. The consequence of these different funding practices was that the AEC, as well as other research funding agencies, extended more financial support to those journals that had a page charge than those that did not. The report echoed the findings from a previous report conducted by the Biological Sciences Communication Project at George Washington University and financed by the NSF. This earlier report concluded that the financing of journals varied widely. However, the AEC believed that the NSF-sponsored report did not go far enough. Wakerling wrote:

Unfortunately the NSF report is neither sufficiently complete nor penetrating for use as the basis for any far-reaching decisions on publication charges. It doesn't really question the basic operations of the page charge system. The recommendations are disappointing. We are essentially asked to accept things as they are and to educate others to do the same. Of course, any move on the part of government agencies supporting scientific research to change present practices may well raise the cry of interference with the private enterprise and the societies, but an overruling consideration is our obligation to assure that public funds are prudently spent. A true private enterprise situation in which one can encourage open competition to bring down costs and increase the quality of services doesn't exist in this field of publication. The Technical Information Panel therefore recommends that the AEC take immediate

¹¹⁷ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

steps to develop a workable plan for handling journal publication support that may serve as a model for a broader government-wide plan, rather than waiting longer for something to come from the NSF...¹¹⁸

Wakerling called for ten areas of investigation in his report. These areas included:

1. The collection of data on the costs and sources of income for journals
2. The creation of a range of reasonable journal production costs
3. Whether it was reasonable to ask the research funding institution to bear all of the pre-run costs
4. Whether support should be uniform for all journals
5. Methods, besides the page charge, by which the research funding institution could support journals
6. If the page charge was chosen, what the consequences would be if the charge were mandatory
7. How the subsidy should be distributed
8. What can be done when authors cannot pay the page charge
9. How all contributions can be treated alike whether the page charge was honored or not
10. Whether the mechanics of publication should be separated from other society functions.

What we see in this letter and report was not only the AEC protesting the method by which AIP and APS journals were financed, but also disagreement with the NSF's decision to continue supporting the page charge financial mechanism.

Gottlieb replied to Wakerling on May 23, 1969 that the Publication Committee of the APS was troubled with some aspects of the page charge pricing mechanism as well.

Gottlieb wrote:

¹¹⁸ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

The decision to base page charges and subscription charges on pre-run and runoff costs, respective, is one made some years ago and certainly needs to be thought through again, in view of the way that page charges have been going up.¹¹⁹

This response evidenced a guarded admission by an official of the APS that page charges were too high and that the economic justification behind the page charge pricing mechanism needed to be reassessed.

Gottlieb's suggestion that the page charge financial mechanism be reassessed, however, was not universally shared within APS. Goudsmit, editor-in-chief of the PR and PRL, on August 11, 1969 wrote to Gottlieb:

I do not Wakerling's letter, nor his attitude. He does not seem to like the research workers and his function should be to help them. He asks where the page charge money should come from. The answer is simple. It comes from the same source as travel money, money to buy oscilloscopes, computer time, preprint distribution, chemicals, etc. In a large organization it must be possible to budget for page charges in the same manner as for the other items. The research worker must be made aware that it is handled in the same way as his travel budget.¹²⁰

Ultimately, Goudsmit's commitment to the page charge pricing mechanism was reflected in the AIP and APS continued enforcement of policies that increased the honoring of the page charge. As the 1960s came to a close, the legitimacy and justification of the page charge pricing mechanism was under considerable attack by authors and research funding agencies alike. Although the honoring rate of the page charge remained high throughout the decade, officials within the AIP and APS found that they had to work harder to encourage authors to voluntarily honor it. This task was made all the more difficult as research funding agencies such as the federal government curtailed their support of research in physics. The 1970s would be the final decade where the AIP and APS would

¹¹⁹ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 8

¹²⁰ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 10

heavily rely on the page charge pricing mechanism. During these final years, not only would the economic justification behind the page charge change, but there would also emerge an attempt by research funding agencies and the AIP and APS to use the page charge pricing mechanism to establish ownership and control over the intellectual property contained in the scholarly article.

The justification of the page charge financial mechanism and the revealed financial role it served changed dramatically in the 1970s as the result of increased competition from commercial publishers and eased regulations regarding the subscription prices scholarly societies could charge members and non-members. Commercial publishers, from a very early stage, were able to finance the publication of large amounts of specialized research by charging institutional subscribers a higher price. However, in taking advantage of the less expensive second class mailing rate, scholarly societies were required by postal regulations to establish a non-member (institutional) subscription rate that was no more than double the member subscription rate. With the page charge financial mechanism serving the role of subsidizing the fixed costs of publication and asking of members to pay for a subscription that covered the variable costs, the non-member subscription rate had to be kept low as well. The 1969 Tax Reform Act eliminated this postal regulation and, with that, the APS, along with the other scholarly societies of the AIP, immediately raised the non-member subscription rate. As a result, the 1970s became a period of time when scholarly societies tested out the price elasticity of demand of non-member subscribers. To the surprise of many within the AIP and APS, the demand of non-members was found to be highly inelastic. With the non-member subscription rate low relative to the prices charged by other publishers, the APS realized

they could dramatically increase the rate charged non-members and not suffer any significant loss in the number of subscribers. This income could, in turn, compensate for the expected decrease in page charge income.

With library subscription revenue viewed as potentially more lucrative, the economic justification of the page charge financial mechanism was changed. This was made evident on April 27, 1974 when Goudsmit wrote to W.W. Havens that

...I get the impression that the role of the page charge may be dangerously misunderstood by relevant officials in the National Science Foundation. They probably believe that page charges aim at making subscription rates low for individuals (members), so that everyone can have his own journal. This may have been true thirty years ago, but does not apply any longer. We now aim at the widest possible library distribution (non-members).¹²¹

Goudsmit outlined seven roles to the page charge in 1974 and many of roles pertained to the wider library circulation and lower non-member subscription rates that page charges made possible. For Goudsmit, the page charge was desirable because it prevented what he termed “the excessive proliferation of splinter journals.”¹²² This advertising of the page charge mechanism as a device in service to the library subscriber coincided with the increases being made to the non-member subscription rate and the emergence of commercial titles that were aggressively competing with scholarly society published journal titles for scarce science library funds.

Between 1930 and the early 1970s, the page charge was characterized as beneficial because it permitted the scholarly society to keep the individual subscriber rate low and circulation wide. However, as the importance of library revenue increased, it became necessary to shift the understanding of the page charge pricing mechanism from

¹²¹ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 13

¹²² APS, Subgroup II, Series V, Subseries C, Box 21, Folder 13

a device that benefits individual academic subscribers to a device that benefits institutional subscribers. While the design and justification of the page charge pricing mechanism changed to accommodate the increased importance of institutional subscription revenue, the design and justification of the page charge pricing mechanism also changed to accommodate changes in intellectual property law.

Perhaps one of the most significant changes to the scholarly communication process in many disciplines in the United States was the passage of the 1976 Copyright Act. Prior to the passage of the act, most publishers maintained loose control over copyright to articles.¹²³ Prior to the passage of the 1976 Copyright Act, publishers were beginning to realize that the electronic era of scholarly communication had the potential to be financially lucrative. Other actors such as the author and the research funding agency were realizing the same thing. However, prior to the 1976 Copyright Act, the research funding agency faced the problem that the formal act of publication was the only way to establish a copyright. Thus, research funding agencies felt they had no choice but to relinquish control of the article to the publisher in order to validate the research and create the copyright in the first place. The original publisher of a scholarly article, prior to 1976, published a statement that the transfer of copyright to the publisher was implicit in the process of submitting a manuscript, having the manuscript refereed, and published. Given that the research funding agency was heavily subsidizing an article's publication with pricing mechanisms such as the page charge, after 1976 publishers seeking to reprint a scholarly article in an edited monograph argued that the original publisher of the scholarly article possibly might not own the copyright to the article after all. Thus,

¹²³ The notable exception to this was the American Psychological Association which did maintain stricter controls and required authors to transfer ownership of copyright.

briefly before and immediately after the 1976 Copyright Act, there was a grab for the copyright to the scholarly article, with research funding agencies subtly trying to transform the page charge pricing mechanism into a means by which ownership over the intellectual property could be established. Three events occurred in the mid-1970s that indicated that, prior to the enactment of the 1976 Copyright Act in 1978, the page charge pricing mechanism was used by both the scholarly society and the research funding agency to capture control and ownership over the increasingly valuable intellectual property within the scholarly article.

The first event that indicated a pursuit of ownership and control over the intellectual property in scholarly articles in physics through the page charge pricing mechanism occurred in 1974. The honoring of the page charge had always been seen as a way for institutions to increase their credibility and prestige. Along with this increase in credibility and prestige, ownership lines were implicitly drawn between the author, the research, and the research funding agency. In the 1970s, these ownership lines were made more explicit with the page charge pricing mechanism. Evidence of this first emerges in a letter on December 4, 1974 from W.W. Havens in a letter to J. Burton.

Havens wrote:

The publication of a single article in one of the physics journals for which page charges are not paid is a direct subsidy to the author or his or her institutions, and I think it should be treated as such....There is now no review of those papers to be published for which page charges cannot be paid. Those with sufficient nerve say they cannot pay the page charge unless they are mandatory, and I think some aspects of the system are grossly unfair.

If we believe that payment of page charges is a legitimate research cost, and that the author's institution should pay it, then I think those who can't pay should be required to apply for a grant with the same approval for a

research contract grant. We should then publish the list of grants the APS and AIP has made for publication of research articles.¹²⁴

Havens expressed a concern that authors and institutions were recklessly not honoring the page charge and also the idea that the scholarly society was performing a service for the author, research funding institution, and the scholarly community as a whole by publishing an article with non-honored page charges. The proposed list of grants of authors and research funding agencies that did not honor the page charge served two roles. First, the list served as a form of negative advertising aimed at those research funding agencies who do not financially support the publication of research results. Second, the list of grants established claims that the AIP and APS potentially had more control and ownership rights over those articles that did not honor the page charge.

In a memo from Havens to Burton on October 6, 1975, there emerged another example of the APS' interest in controlling and owning articles that did not honor the page charge. In this memo, Havens informed Burton of a recent incident where a publisher had produced a book that contained articles reprinted without permission from the Journal of the Optical Society of America. When the Optical Society of America (OSA) contacted the publisher about a possible infringement of copyright, the publisher responded that neither the author nor the research funding institution had assigned copyrights to the OSA. Since the OSA had not invested any money in the development of the material, they had no right to its exclusive use. Consulting with an attorney, the OSA discovered that the argument carried some weight, especially when the page charge was honored. Havens wrote to Burton:

¹²⁴ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 14

I made a suggestion at the time that if the page charge were not paid, then the Society or Institute could claim that it had invested money in developing the material the author had submitted into a publishable form and could then require the author or his institution to sign over copyrights....In general I don't believe that the copyrights on PR and PRL articles are, on the average, worth very much. I also think that when the author's institution pays the page charge, the American Physical Society has very little justification for exercising its copyrights. The situation is different when page charges are not paid. The author and his institution usually place considerably more value on a particular article in PR than most other people do and therefore might think they are giving something up if they are required to assign the copyright to the Society or to the Institute.¹²⁵

Although Burton's explicit interest was to provide another incentive for institutions to honor the page charge, what was noteworthy was his use of acquiring copyrights as a threat to convince the research funding agency to honor the page charge.¹²⁶

The use of the page charge as a device for establishing ownership rights was made apparent again in a memo to the AIP Publication Board on March 23, 1976. The memo began:

We have had two examples recently where AIP's Reprint – and – Publication Charge Section has been unable to collect page charges, even though the Publication Charge form was received here with a duly authorized signature indicating acceptance of the obligation to pay. In both cases the reason for refusal to pay, as given by someone in the disbursing agency who merely follows instructions and regulations, was that the statement acknowledging support did not appear in the printed version of the article. Apparently, not only must this statement be printed, but it must be printed in exactly the required form, otherwise they won't pay.¹²⁷

¹²⁵ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 14

¹²⁶ The AIP's interest in copyrights is reiterated during an AIP meeting on March 23-24, 1981. In the minutes of the meeting it is recorded "H.W. Koch discussed copyright questions and the need to maintain control." APS, Subgroup II, Series V, Subseries C, Box 21, Folder 14

¹²⁷ APS, Subgroup II, Series V, Subseries C, Box 21, Folder 13

This quote revealed that an increasing number of research funding institutions honored the page charge, not out of some altruistic feeling that they had a responsibility to partially finance the scholarly communication process, but rather out of a belief that published articles were a possible means by which the research funding institution could establish an ownership claim over the research. When an acknowledgement did not appear exactly, the power, prestige, and the legitimacy of the funding institution's ownership claims over the intellectual property within the scholarly article were reduced. Each of these three events revealed that the page charge in the mid-1970s was increasingly seen as serving a non-financial role. It was likely that there were numerous other documents outlining the increased interest of the AIP and APS in controlling the copyright to the article.¹²⁸

According to Patterson and Lindberg (1991), the 1976 Copyright Act instituted four major changes in intellectual property law: abolition of common law copyright, the creation of an electronic copyright, codification of fair-use policies, and a change in the concept of copyright protection. This last change in the concept of copyright protection was perhaps the most dramatic. Previously, the copyright protected the work itself and extended a right of exclusive publication; by contrast, the 1976 Copyright Act applied the copyright protection to the contents of that work itself, and the act established the existence of the copyright at the firm moment the idea is written down.

Once the 1976 Copyright Act became law, publishers across the board tightened their control over the copyright. The 1976 Copyright Act was advertised as making it

¹²⁸ After conducting my archival work and working through the collected materials to tell this history, I realized that there were two boxes of materials that I did not peruse. They were: APS, Subgroup II, Series IV, Boxes 35 and 36. These boxes are labeled "1976-85 Copyright." On a subsequent visit to the archive, I will peruse these materials.

easier for authors to secure and maintain their copyright. In many respects, the removal of the registration requirement as well as vesting the copyright in the writing itself rather than the work where it appears did just that. While the 1976 Copyright Act made copyright more valuable by vesting it in statutory law rather than common law and potentially made this right more valuable, it also created a situation where authors were placed under considerable pressure by the publisher and later by the research funding agency to transfer these rights. After the passage of the 1976 Copyright Act, and before its implementation in 1978, J.A. Krumhansl, Chairman of the AIP Publishing Policy Committee, wrote in an AIP editorial in September 1977 the following:

In 1978 a new copyright law becomes effective, and one of the results is that AIP and most member-society journals will be asking authors for transfer of copyright on each article....This new law provides long-needed protection for authors of popular works, composers and the like. However our journals will need the copyright to continue the broad dissemination of physics. Thus a transfer-of-copyright agreement will be required with manuscript submission...In summary, although this new situation complicates our lives somewhat, it is not only essential to the well-being of the journals, but also is a distinct advantage to authors desiring wide distribution of their work, to transfer copyright so that we may continue to disseminate physics broadly and promptly.¹²⁹

Thus, while the 1976 Copyright Act extended greater intellectual property rights to authors, these same authors then formally transferred these now explicit rights to publishers in order to publish their manuscripts and earn professional rewards. While publishers such as the AIP argued that this transfer benefited authors by reducing the need for the publisher to individually contact authors for every reprint request, one cannot help but notice that the publisher (even the not-for-profit publisher) benefited financially

¹²⁹ Krumhansl (1977), 104.

from this transfer as well. The AIP, for instance, argued the following in 1977, justifying the transfer of copyright:

According to William H. Koch, Director of the AIP, when an author transfers his copyright to a scientific society publisher such as AIP, he is transferring his rights to his *collective* colleagues – the same people who have participated in the development of standards for peer view and, in general, influence the way in which AIP journals are published.

The chartered purpose of AIP is the advancement and diffusion of the knowledge of physics, which is accomplished primarily through book and journal publication, translation of foreign journals and republication (reprints, microforms, and computer tapes). Without the transfer of copyright from the authors, explained Koch, reproduction and distribution of material would be greatly inhibited...¹³⁰

Thus, publishers requested transfer of copyright, arguing that authors benefited because distribution was maximized. Nowhere in this initial argument for the transfer of copyright do we see mention that publishers, the AIP included, benefited from the transfer of copyright. The AIP, along with other publishers, while requesting a transfer of copyright from the authors, also pushed librarians to compensate publishers for photocopying through the newly created Copyright Clearance Center. By 1982, the AIP made it clear that it intended to capture the royalty revenue that came from their ownership of copyright. In an editorial in Physics Today on September 1982, Harold David of the AIP wrote:

The new copyright law requires the Copyright Office to report to Congress every five years on whether the library photocopying provisions of the law have achieved ‘the proper balance...between the rights of the creators of copyrighted works and the needs of the users of such works.’ For the scientific community this issue boils down to how publishers of scientific material can be appropriately compensated by those who photocopy their material to help support the cost of disseminating scientific information....

¹³⁰ AIP (1977), 85-86.

It would appear that the copyright law needs revisions to clarify ambiguities in the specific area of library photocopying.

The reader might well ask what the fuss is all about – is it worth all this squabbling over who gets a few nickels and dimes? Indeed, copying fees currently represent only a minor source of publishers' income. But in the future this may change. As we get deeper into the age of the Information Revolution – in which this nation's economic growth will increasingly depend on the production and processing of information – there will be heightened concern over the rights of ownership of information. We can already see this trend in recent litigation and the decision of the Supreme Court to review the rights of the consumer to record programs off the air. Similarly there has been renewed concern about more adequate protection for patent holders. In scientific publishing, with the advent of routine facsimile transmission and even more widespread photocopying, the concern is that, as these 'electronic' modes of dissemination significantly begin to replace the traditional journal subscription, the stability of the scientific journal system could be seriously threatened, unless the rights of scientific publishers to income from these new modes are clearly established.¹³¹

While the 1976 Copyright Act extended to authors greater initial copyright ownership, scholarly society and commercial publishers used the same law to not only justify that authors transfer this now explicit property claim but also to create a structure that would transform a worthless piece of property into something more valuable.

Once it was obvious to publishers and research funding agencies alike that the 1976 Copyright Act gave publishers a clear upper hand in possessing the intellectual property in an article, the page charge pricing mechanism lost this recently acquired non-financial role. That the publisher emerged as the victor in this fight for control over the intellectual property in a scholarly article through the 1976 Copyright Act makes it apparent that those who contributed most heavily to the debate over the restructuring of intellectual property law in the United States were those industries that relied on the most

¹³¹ Davis (1982), 144.

on copyright royalty payments for revenue – publishing, music, and computer software.

Patterson and Lindberg (1991) reiterated this point when they wrote:

...Copyright law has historically been, and continues to be, shaped largely by copyright entrepreneurs....The entire history of copyright demonstrates the influence of these entrepreneurs, but it was never greater than in the shaping of the 1976 Copyright Act.¹³²

Using the 1976 Copyright Act to eliminate the non-financial role of the page charge, the AIP and APS argued that this pricing mechanism had but one leg left to stand on. This final leg, the financial role, was eliminated in 1979.

In 1979, there was a growing realization that relying on the page charge to finance a significant portion of the scholarly communication process in physics was unsustainable. Despite the fact that 70% of all the articles that appeared in AIP journals were a result of government work, the AIP and APS singled themselves out to be the only publisher to have such a charge.¹³³ These worries were revealed in a report written July 24, 1979 by A.W. Kenneth Metzner for the APS Publication Committee. Although the report was hindered by a lack of data, it revealed that the page charge honoring rate for all AIP journals was 82%, and that revenue from the publication charge represented 38% of total income. It also revealed that for many journals the page charge was slightly lower than ‘true front end costs.’¹³⁴ The report also emphasized the increased importance on non-member subscription income and the growing ratio between the price charged members and non-members. The remainder of the report devoted itself to the question, “What if there were no page charges?” It asked this question because of the

¹³² Patterson and Lindberg (1991), 142.

¹³³ APS, Subgroup II, Series XV, Box 51

¹³⁴ APS, Subgroup II, Series XV, Box 51

identification of twelve events working against the funding of the scholarly

communication process through the page charge. Some of these events were that:

1. "Some estimates indicate that roughly 50% of all government money expended on publication charges goes to physics, with another 25% to chemistry, and the remaining 25% spread over all other subjects. Why is this so? Whatever the reasons, it could be politically risky."¹³⁵
2. "The American Chemical Society appears to have decided to phase out page charges."¹³⁶
3. "Many foreign government agencies particularly in the UK, have explicit rules against page charges. This makes it very difficult for scientists supported by such agencies to publish in US journals with page charges, and works against international cooperation and in favor of parochialism in journals."¹³⁷
4. "Most developing or underdeveloped countries lack the foreign exchange to pay page charges for their few scientists. Thus they cannot publish in the widely disseminated US non-profit journals and the free flow of basic research information across national boundaries is inhibited."¹³⁸
5. "Page charges, the delays of the two-track system, and the desire to avoid both, have been cited as excuses for starting new journals. Even when not cited, one can assume that they played a prominent role in the planning of new journals."¹³⁹

The report concluded that the AIP and APS could reduce or eliminate the page charge by increasing the non-member subscription rate. The report estimated that, if page charges were immediately eliminated, AIP journals would have to increase their 1980 non-member subscription rates by 70%.¹⁴⁰ The report admitted that a price increase of this

¹³⁵ APS, Subgroup II, Series XV, Box 51

¹³⁶ APS, Subgroup II, Series XV, Box 51

¹³⁷ APS, Subgroup II, Series XV, Box 51

¹³⁸ APS, Subgroup II, Series XV, Box 51

¹³⁹ APS, Subgroup II, Series XV, Box 51

¹⁴⁰ APS, Subgroup II, Series XV, Box 51

order would lead to some cancellation of subscriptions, and these cancellations would, in turn, result in even higher prices. The report noted that despite the anticipated increase in journal subscription prices, the journals published by the AIP and APS would still be a bargain when compared to the prices for those journals published commercially.¹⁴¹ Thus, the belief was that page charge income from the research funding institution filtered through the author could be wholly replaced by subscription revenue from the research funding institution filtered through the librarian. This replacement of page charge income with non-member subscription revenue offered the additional advantage of eliminating the competition. Metzner wrote:

It has been pointed out that, if AIP and its member societies were to abolish page charges, because of the prestige and importance of their journals, the resulting price increases and pressures on library budgets, would drive out the expensive commercial journals first.¹⁴²

Although the report discussed the methods by which the page charge could be reduced by reducing production costs, transitioning to electronic methods and requiring from authors camera-ready copy, the only lasting financial solution was replacing page charge income with non-member subscription income.

This memo by Metzner served as the first step in the dramatic restructuring of the revenue flows to the scholarly societies of the AIP. Between 1980 and 1984, PR went from a situation where 2/3 of income came from the page charge in 1980 to a situation where it amounted to less than 20% of income in 1984.¹⁴³ This programmed reduction of the page charge came out of recommendations from the Cohen Report. Comprised of

¹⁴¹ APS, Subgroup II, Series XV, Box 51

¹⁴² APS, Subgroup II, Series XV, Box 51

¹⁴³ APS, Subgroup II, Series XV, Box 52

Cohen, Burton, Bederson, Barschall, and Wattenberg, The Cohen Subcommittee on Pricing was formed in 1979 in reaction to the Metzner report, and on February 10, 1981 the Subcommittee recommended that:

1. Member subscription rates be kept approximately equal to the variable cost so as to permit wide circulation
2. The APS reduce but not eliminate page charges
3. That the page charge income be replaced by a 30% to 50% across the board increase in non-member subscription prices.

Notes from their process of deliberation revealed that the toughest decision faced by the subcommittee was not whether or not to increase the non-member subscription rate – for it was already widely known that the demand for AIP and APS journals by research libraries was inelastic. Instead the toughest decision was whether page charges should be reduced or eliminated. Maintaining the page charge but reducing its amount preserved the legitimacy of a subsidy that the APS and AIP had worked so hard over several decades to establish. This move also decreased the amount by which the non-member subscription rate would have to increase. Eliminating the page charge entirely, on the other hand, would have reduced the burden on authors, increased satisfaction of the authors with the society, enhanced international participation, and enhanced the competitive position of AIP and APS journals among authors. Given that there was a lot of uncertainty regarding these consequences of shifting the financial burden from authors to librarians, the AIP and APS decided not to eliminate the page charge in case that pricing mechanism would need to be relied upon again in the future.

The Cohen Subcommittee on Pricing report suggested changes that radically and permanently altered the financing of scholarly society physics journals in the United States. The report served as an admission of the AIP and APS that, while the page charge was justified and served the greater good, reductions in government funding, the rejection of the voluntary funding mechanism by several prominent domestic research funding institutions, the rejection of the page charge abroad, and the reliance of every other publisher on library subscription income had made the page charge an unsustainable financial mechanism. While the two-track delay system postponed recognition of this, by the late 1970s the AIP and APS realized that few cared about the benefits provided by the page charge. The AIP and APS also realized that it was in the best interest of the scholarly societies to fund their publishing activities with institutional subscriptions, just as every other publisher was doing. While the page charge continues to exist to this day, in AIP journals it does so in a reduced form. Whereas, in 1977, page charges and abstract charges constituted 48% of total income for the AIP, by 1987 this had fallen to 12%. Whereas non-member subscriptions were 39% of total income for the AIP in 1977, by 1987 non-member subscriptions constituted 70% of total income. With this act, the page charge pricing mechanism was, for the most part, abandoned in physics.

Thus the 1980s represented a decade when the AIP and APS dramatically reduced its dependence on page charge income which came from the research funding agency and was directed by the author and replaced it with non-member subscription income which also came from the research funding agency and was directed by the librarian. While it is certainly the case that one reason why the AIP and APS shifted away from the page charge pricing mechanism and towards institutional subscriptions was the realization that

the latter pricing mechanism generated significantly more revenue and was less controversial this is only one reason among many others. Other reasons why the APS and AIP transitioned to institutional subscriptions in the 1980s included the research funding agency's unwillingness to subsidize the scholarly communication process differently for those articles published by scholarly societies and those published commercially, the belief by the AIP and APS that raising their non-subscription rates would force budget constrained librarians to cancel the more expensive and less influential commercially published titles (after which presumably the AIP and APS would resurrect the page charge), and, as I argue in this chapter, a reorganization of the organizational and legal framework of the scholarly communication process such that the use of a page charge pricing mechanism was no longer consistent with it. This last reason is particularly important to keep in mind as one considers the possibilities of a revised economics of scholarly communication literature. In the revised economics of scholarly communication literature there needs to be an understanding of pricing mechanisms being implemented and sustained over time as the result of a negotiation process by several actors. The pricing mechanism agreed upon is not necessarily the pricing mechanism that makes the scholarly communication process effective or maximizes revenue for the publisher. For it is not the case that the organizational and financial structure of the scholarly communication process is solely organized around principles of efficiency or profit maximization. Rather this chapter shows that the pricing mechanism that comes to be used to finance the scholarly communication process is a pricing mechanism agreed to by several actors each of whom have a variety of goals and

is a pricing mechanism that is consistent with the other agreed upon organizational and financial aspects of that discipline's scholarly communication process.

3.5 A Prelude to Assessing the Re-Emergence of the Author Charge Pricing Mechanism in the Electronic Era – Lessons from History

In the previous section it became apparent that pricing mechanisms change over time, that actors other than readers and authors determine the type of pricing mechanism used, and that rarely is a pricing mechanism chosen solely on the basis of efficiency or revenue maximization considerations. In the case of physics, it was found that scholars (in their role as both authors and readers), universities, grant agencies, libraries, and publishers each had distinct needs and goals that they pursued through the funding and organization of the scholarly communication process. From the 1930s to the mid-1960s, each of these parties agreed upon the use of a page charge levied on authors and paid by the research funding agency. Agreeing to pay the charge, the research funding agency was able to impose conditions on the charge (that it be voluntary, used by non-commercial publishers, and that support be acknowledged). Universities and libraries found the arrangement worked to their advantage as well. For the university, the page charge supported scholarly communication process in physics and created a situation where there was sufficient outlet for publication (and opportunity to assess the productivity of scholars). For the library, the page charge supported scholarly communication process in physics and created a situation where subscription rates were kept low. Throughout this period of time, the economic justification and understanding

of the page charge changed, but all parties remained committed to it (as evidenced by its near universal domestic honoring rate). However, things changed in the 1960s as the federal government, the largest research funding agency in physics, reduced its support of the page charge pricing mechanism. Just as the AIP and APS, as the primary publishers, reacted to this change and provided more dis-incentives to not honor the page charge, the publisher category became wider as the commercial publisher entered the scene and offered a publishing outlet financed with higher institutional subscription rates. Authors turned to these new publishing outlets, and the research funding agency or university did little to dissuade this exodus from the scholarly society publisher and page charge pricing mechanism. The research funding agency wanted to end this publication subsidy, and the university wanted to maintain sufficient publication for the scholars they employed, whose productivity they must assess. Perhaps the only reluctant party was the library. The librarian's clout however was limited. The AIP and APS responded by reconfiguring the implementation and justification of the page charge and by arguing that it kept library subscription rates low. The research funding agency would only agree to keep this subsidy if there was a prospect that the pricing mechanism could be used to capture the increasingly valuable ownership and control claims over the intellectual property in a scholarly article. This possible non-financial role of the page charge however was eliminated with the 1976 Copyright Act where publishers were able to capture ownership and control of the scholarly article.

The decision of how to fund the scholarly communication process was not a matter of simply finding the pricing mechanism that carried the economic qualities that matched efficiently with the innate qualities of the journal; rather the pricing mechanism

was debated amongst several actors, each of whom had different aspirations and levels of influence. From 1930 to the mid-1960s, each of these parties agreed to the use of a page charge pricing mechanism. While economic efficiency was a concern for these actors, it was by no means the only concern. This multitude of goals sought through the use of the page charge pricing mechanism was especially evident from 1965-1980.

3.6 Conclusion

In this chapter it was apparent that one goal of the actors involved in the organization of scholarly communication practices was cost effectiveness. This goal was revealed and was hardly surprising. Neoclassical economics enters the conversation at this point as being able justify why authors, in addition to readers, should fund the scholarly communication process. Recounting the history of the author charge, I revealed that the neoclassical economic justification applied to the author charge evolved, over time, in response to the needs of the actor financially subsidizing the entire process – the research funding agency. The research funding agency clearly desired a cost effective scholarly communication process, but the question remained as to why one type of pricing mechanism was chosen at particular points in time, and why these decisions differed across disciplines. Neoclassical economics seemed to suggest that using author charges and reader charges was a universal solution over time and across disciplines. But why did the research funding agency selectively rely on author charges? The answer lay with respect to the pursuit of unrevealed goals by actors such as ownership and control.

Scholarly communication is an enterprise that embodies the goals of specific actors rather than a universal process organized around efficiency. This present chapter, in reviewing both the economic justification and the history of the author charge pricing mechanism, illustrated that pricing mechanisms are advocated for, implemented, sustained, and abandoned by actors who possess revealed goals of economic efficiency and cost-effectiveness but who also have unrevealed goals of controlling and owning certain aspects of the scholarly communication process and the objected created within it. Thus when the ‘public goods’ story is told to explain the implementation, sustainability, and consequences to an author charge pricing mechanism, we only receive one part of the story.

CHAPTER 4

THE SCHOLARLY COMMUNICATION PROCESS IN ECONOMICS AND THE PAGE CHARGE PRICING MECHANISM

4.1 Introduction:

In the previous chapter I reviewed the economics of scholarly communication research on the practice of asking authors and their research funding agency to bear a portion of the financial burden of the scholarly communication process, and I discussed the conditions and circumstances that prompted the implementation of the page charge pricing mechanism in physics in the 1930s and the reduced dependence placed on it in the early 1980s. This historical narrative showed that for roughly fifty years the page charge pricing mechanism in physics was negotiated by several actors and manipulated so as to achieve other goals (such as owning the intellectual property contained in research articles). The page charge subsidy was only sustainable in physics under a particular research funding and intellectual property regime. The subsidy for the scholarly communication process in physics provided by research funding agencies transitioned from the page charge to allowances made to research libraries to pay for higher priced institutional subscriptions when some research funding agencies became frustrated with providing a subsidy for some journals and not others. The transition away

from the page charge pricing mechanism also occurred when the intellectual property terrain changed dramatically, and when commercial publishers offered the publication outlets needed and desired by scholars and research funding agencies and gained a competitive advantage over more established non-commercial publishers by not imposing a page charge (thus appearing cheaper to actors other than research librarians).

In the present chapter, I discuss the efforts made by the American Economic Association (AEA) to collect a page charge publication subsidy from authors and their research funding agencies. To describe these efforts, I reviewed the records of the AEA held in the Rare Book, Manuscript, and Special Collections Library at Duke University in Durham, North Carolina in July 2005.¹⁴⁴ As this chapter suggests, what is noteworthy is the divergence between theory and practice for the economists. Formal research by economists on author charge pricing mechanisms like the page charge started in the late 1960s, a time when there was an emphasis placed on the public good aspects of research and scholarly communication. Just as economists were arguing that a page charge pricing mechanism was an efficient and optimal way to pay for a good that benefits both authors and readers and was produced in an environment where there were significant economies of scale and marginal costs were negligible, the scholarly communication process in economics was entirely financed with reader subscriptions. However in the late 1970s, just as physics and chemistry were abandoning the page charge pricing mechanism in response to a changing research funding and intellectual property terrain, the AEA implemented a page charge pricing mechanism. In this chapter, I will show that

¹⁴⁴ The Provost of Duke University and the Department of Economics at Duke University provided financial support for this research.

not only was the page charge pricing mechanism in economics administered differently than in physics, but it also had a very different financial role and impact.

4.2 The Funding of Research and the Scholarly Communication Process in Economics

The story of the page charge pricing mechanism in economics begins just as the scholarly societies in physics realized that the page charge pricing mechanism was no longer sustainable. The funding for research in economics in the late 1960s, just as in physics, underwent dramatic changes. There were changes not only in the amount of money available for research but also in its source. In physics, these were changes that led to the decision in the mid to late 1970s to shift the funding of the scholarly communication process away from author fees and towards subscription fees from institutions. In economics, the AEA in the 1970s made the decision to supplement revenue from memberships and subscriptions with author fees such as the submission fee in 1971 and the page charge pricing mechanism in 1975. In this section I provide an overview of who the dominant research funding agencies in economics were, what their interest was in economics, and what type of funding and organizational structure they sought for journals in economics from 1950 to 1980. In the following section I describe how these changes led to the decision by the AEA to implement author fees like the submission fee and the page charge in the 1970s.

Although data on the amount of research funding by philanthropic foundations and the government is notoriously sparse, DeLorme and Woods (1979) sought to identify

who the major sponsors were of research in economics from 1950 to 1977 by recording the non-university agencies that were acknowledged for their financial support in the American Economic Review (AER), the Journal of Political Economy (JPE), and the Quarterly Journal of Economics (QJE).¹⁴⁵ DeLorme and Woods reported the following results:

¹⁴⁵ In the 1970s the acknowledgement of financial support was required by journals such as the AER. This requirement was out of a fear that an economist's recommendations could be influenced by their source of research funding and that full disclosure was the only way to eliminate this possibility. Because of the timing of this requirement, it is possible that the percentage of grant supported pages increased only because disclosure was necessary. The increase attributable solely to the requirement however is likely low as major research funding agencies have had long-standing policies that required disclosure. Furthermore, it is to a scholar's advantage to cite research support as it often increases their standing and prestige.

TABLE 7

NUMBER OF SCHOLARLY ARTICLES
 ACKNOWLEDGING NON-UNIVERSITY RESEARCH SUPPORT
 IN THE AER, JPE, AND QJE
 1950-1977

	1950-1959	1960-1969	1970-1977
AER Articles	12	35.8	36.5
JPE Articles	13.7	28.5	36.3
QJE Articles	16.1	29.2	33.5
Total Grant Supported Pages	1892	5642	7594
Total Article Pages	13724	17854	21171
% Grant Supported	13.8	31.6	35.9

Source: DeLorme and Woods (1979)

This table reveals that while there had been relatively mild growth in the total number of pages published in these journals, there was quite a dramatic increase in the total number of pages supported by non-university grant money. DeLorme and Woods also found that governmental grants were increasingly cited as the source of non-university research support between 1950 and 1977:

TABLE 8
 PERCENTAGE OF ARTICLES
 RECEIVING GRANT SUPPORT FROM PUBLIC AND PRIVATE SOURCES
 IN THE AER, JPE, AND QJE
 1950-1977

Grant Source	1950-1959	1960-1969	1970-1977
Federal government	13.4%	40.9%	60.7%
Private	86.6%	58.1%	35.6%
State, local, and foreign government	0	1.0%	3.7%

Source: DeLorme and Woods (1979)

This table revealed that while the 1950s was a time when most research published in these three economics journals was supported with grants from private research funding agencies, by the 1970s the citation of federal government support became more common. Finally, DeLorme and Woods noted that there were the following changes within these categories of government and private support:

TABLE 9
 PERCENTAGE OF PUBLISHED PAGES
 ACKNOWLEDGING A SPECIFIC RESEARCH FUNDING AGENCY
 IN THE AER, JPE, AND QJE
 1950-1977

1950-1959		1960-1969		1970-1977	
Sponsor	% Share of Grant Supported Pages	Sponsor	% Share of Grant Supported Pages	Sponsor	% Share of Grant Supported Pages
Social Science Research Council	16.9	NSF	28.9	NSF	40.5
Ford	16.5	Ford	28.0	Ford	10.5
Rockefeller	8.6	Rockefeller	7.1	Rockefeller	4.6
Merrill	6.1	Social Science Research Council	5.1	HEW	4.3
Office of Naval Research	5.5	AID	4.0	Department of Labor	4.1
Guggenheim	5.0	Brookings	2.1	NBER	3.3
RAND	4.1	NBER	1.5	Canada Council	2.2
Earhart	2.9	Carnegie	1.5	Social Science Research Council	1.8
Fulbright	1.8	Office of Naval Research	1.2	AID	1.5
American Institute of Management	1.4	Lilly	1.1	Walgreen	1.0
Total above	68.8	Total above	80.5	Total above	78.5
Total grant supported pages	1892	Total grant supported pages	5642	Total grant supported pages	7594

Source: DeLorme and Woods (1979)

The above table reveals that, after World War II, philanthropic organizations like the Social Science Research Council, Ford Foundation and Rockefeller Foundation sponsored over 1/3 of the research in economics that was subsequently published in AER, JPE, or QJE. On the other hand, funding from the federal government from agencies such as the Office of Naval Research barely measured 10% of the total number of grant supported pages. In the 1960s, research funding in economics from the federal government dramatically increased. The NSF alone funded 25% of the grant supported pages in AER, JPE, and QJE during the 1960s. By the 1970s, support from the NSF exceeded 40%.

The influence the Rockefeller Foundation, Carnegie Corporation, Ford Foundation, and NSF had on the scholarly communication process in economics (as well as most other disciplines) has been under-appreciated up to this point. Only recently have economists even begun to explore the idea that research funding agencies had a vested interest in a particular kind of economic research being produced. Rutherford (2005), for one, found that changes in the organizational structure and the type of research conducted at the National Bureau of Economic Research (NBER) could be explained by the varying degrees of influence exerted by those philanthropic foundations that funded the NBER. Rutherford wrote that:

There is no suggestion here that any foundation ever directly interfered with specific research activity or with the reported research findings of the NBER, but it is quite clear that the foundations had interests in particular types of economic research, and sought to have an effect not only on the exact role of the NBER in the conduct of economic research, but its overall direction, its organization, and, at times, its leadership. Thus, the foundations were 'far from being inactive distributors of funds.'¹⁴⁶

¹⁴⁶ Rutherford (2005), 1-2.

Just as Rutherford claimed that philanthropic foundations had an interest in particular kinds of economic research and pursued their interests by shaping the structure and priorities of the NBER, I claim that research funding agencies also had an interest in funding and organizing the publication of research in a particular way.

Philanthropic foundations like Carnegie, Ford, and Rockefeller dominated the landscape in the post World War II period, using their financial and organizational influence to encourage the AEA to engage in specific kinds of activities such as translations and publish journals like the AER and Journal of Economic Literature (JEL). As a result, the AER contained certain kinds of materials like foreign book reviews, survey articles, and indexes of economic journals with an emphasis on foreign publications. Beginning in the late 1960s, when the NSF became the dominant research funding agency, the AEA was experiencing a dramatic growth in the number of submitted manuscripts. Because the NSF as a research funding agency was not as interested in micromanaging the research and subsequent publication process as the philanthropic foundations previously were, the AEA found itself having to more actively manage the process. The difficulties the AEA encountered while managing the process were magnified when universities and the government heavily invested in training economists who were themselves judged on the basis of their publishing activity and ability to secure outside grants.

The AEA received a significant number of manuscripts in the late 1960s and early 1970s as economists finished their doctoral education and published in order to secure tenure. These same scholars, who tried to define their discipline as akin to those in the physical sciences, increasingly made demands for grant money on the NSF because of its

dominance in the physical sciences and presumed generosity. The AEA, however, faced the problem of how to restructure their organization to accommodate the heightened demands made on it for publishing research and providing other professional services. The AEA moved slowly to adjust the financing and organization of its publications to the change in research funding sources from the late 1960s to the early 1970s. This failure to react for several years was worsened by the fact that the AEA only embraced the NSF as a legitimate sponsor of research in economics and as an actor financially responsible for publication of research in economics in the 1970s when it imposed page charges. The 1970s, ironically enough, was also the period of time when the NSF was reducing its research funding support.

4.3 Economics and the Author Charge Pricing Mechanism – A Review of the Past

In physics it was revealed that the page charge pricing mechanism emerged out of a dire financial situation faced by the APS. The same held true in economics. Between 1944 and 1958, the AEA had an operating deficit for 17 of those years (the exception years being 1949-1951). This deficit was caused as the AEA expanded the size of the AER and offered more services to members without increasing dues. Dues were not increased out of a belief that the AEA needed to establish itself as a generalist association in a discipline that was rapidly specializing and, subsequently, that the best way to encourage membership was to keep dues low. By the end of the 1950s, the Committee on Association Deficit addressed the significant deficit spending practices of the AEA. The committee found that, whereas from 1944 to 1947 income from dues and

subscriptions covered 90% of the publication costs, since 1947 income from dues had subscriptions covered only 80% of the publication costs. The committee concluded that the practice of offering “more services to more people at fixed prices” was unsustainable over the long-run, and they subsequently made five recommendations:

1. Deferring expenses for the cost of publishing the directory over several years
2. Reducing office expenses and possibly eliminating the Papers & Proceedings issue of the AER
3. Selling more advertising space, selling the mailing list more frequently, and capturing revenue from those that wish to republish materials that appear in the AER
4. Engaging in more active and frequent membership drives
5. Using accumulated reserves only to meet emergency expenses

While there were also suggestions made to increase dues, charge authors for publication costs, and eliminate or reduce the size of the Papers & Proceedings issue, none of these were made into a formal recommendation.

In the 1960s, there were repeated pleas made for higher membership dues and subscription prices. As was the case in the past, the Executive Committee of the AEA denied these requests in order to increase membership and subscriber numbers.

However, in the 1970s there were several events that led to a restructuring of the finances of the AEA – a restructuring that included the imposition of a submission fee and page charge. First, the deficits of the AEA were significant and drew down the net worth to nearly zero.¹⁴⁷ Second, the heightened financial needs of the AEA coincided with the Executive Committee of the AEA’s realization in 1975 that both the elasticity of demand

¹⁴⁷ From 1968 to 1972, the accumulated deficits of the AEA totaled \$394,299.

for membership to the AEA and institutional subscriptions to the AER were inelastic.¹⁴⁸ Besides the dire financial situation and the realization that reader fees such as membership dues and institutional subscription prices could be increased without suffering a severe loss in members of subscribers, economists who were already researching the research process had begun to also research the scholarly communication process. Economists such as Yoram Barzel, Sanford Berg, and Michael Lovell began researching the efficiency of the scholarly communication process in the early 1970s, and they quickly identified several areas in the scholarly communication process where restructuring was necessary.¹⁴⁹ Their research, which appeared in the publications of the AEA, emerged at a time when the scholarly journal communication process in economics was widely considered to be cost inefficient and in need of restructuring. These authors each modeled the scholarly journal as a quasi-public good that ought to be supplied by a scholarly society that practices marginal cost pricing and receives a subsidy from the public. With scholarly societies in economics, such as the AEA, employing average cost pricing policies, financing their journals without a subsidy from the public, not economizing production costs, and not centralizing their operations, these economists saw their own scholarly communication process in a state of crisis and in need of reform.

Reforms such as reducing costs through heightened cooperation with other scholarly societies in economics were suggested after scholars like Berg studied scholarly communication practices in other disciplines including physics, chemistry, and

¹⁴⁸ Between 1970 and 1974, the Treasurer reported that the dues had more than doubled but that membership numbers had only declined by 10%. This inelasticity of demand was surprisingly unexpected given the fact that economists were well aware of the necessity of the AER and being listed in the member directory.

¹⁴⁹ Barzel (1971), Berg (1973), and Lovell (1973)

psychology. Berg's 1970 dissertation at Yale, "Structure, Behavior, and Performance in the Scientific Journal Market," was under the direction of William Brainard with Merton Peck and William Nordhaus serving as committee members. Berg's thesis used a series of regressions to estimate the demand for journals in chemistry, psychology, and economics. These regressions were used to evaluate the performance of the scientific journal market and to evaluate how pricing and page policies and the entry of new journal titles created a situation that diverged from or met the marginal and total conditions for economic efficiency. Berg's thesis found that the production of journals generated significant, positive externalities, and he recommended that journal production be undertaken by scholarly societies. The formation of a cartel of publishers in a discipline was an important step for reaching efficiency because once an inefficient journal was established; purchasers were reluctant to play a role in its removal with market forces. Such cartels, for Berg, were also able to secure and efficiently allocate a subsidy from outside organizations which were necessary when a scholarly society practiced marginal cost pricing. Berg wrote:

A cartel, like the ACS and AIP, may also be able to obtain funds from industry and government to support the communication program for the discipline. Although it cannot prevent entry, a cartel can channel the emergent needs of the discipline into cooperative rather than competitive endeavors. Furthermore, it can play an important role in providing services which complement the journal program of the cooperating groups. Abstracting and review services require substantial resources, yet they make the stock and flow of information more readily available to the research community.¹⁵⁰

Berg recommended that the AEA emulate the anti-competitive publishing practices of the AIP and ACS so as "to prevent the proliferation of small societies and continuation of

¹⁵⁰ Berg (1970), 94-95.

inefficient pricing policies.”¹⁵¹ Berg commented that one manifestation of the serials crisis in economics was the fragmentation of the journal titles, scholarly societies, and publishers. He claimed that such fragmentation was produced by the AEA’s decision not to permit the formation of divisions or special interest groups who could associate themselves with the society. Lacking such an affiliation, scholars conducting specialized research and their patrons turned to commercial publishers for a publishing outlet.

Berg’s JEL article, which appeared later, lacked the extensive regressions and demanded functions for various journals that were contained in his thesis. Instead, he focused on how to restructure the scholarly communication process in economics. In the article Berg noted that much more attention should be given to determining whether the scholarly journal communication process in economics was efficient. Berg conceded the point that “...economic efficiency is only one criterion for evaluating the performance of the journal market,” that “openness to new methodologies and responsiveness to new ideas are necessary to keep science from being self-enclosed and self-validating,” and that

...the societies in economics might well look to other disciplines for more efficient organizational patterns. Economic considerations are important in the functioning of communication channels: we can have both efficiency and diversity – but without the former, obtaining the latter is made difficult.¹⁵²

Berg noted that the development of the scholarly journal communication process in economics had been haphazard up to this point. He also noted that, because of non-market influences in its production, distribution, and utilization, too many journals in

¹⁵¹ Berg (1970), 95.

¹⁵² Berg (1971), 798.

economics exist. This situation led Berg to conclude that “[s]ome attention should be given to the question as to whether new entry, the coverage of these journals, and their prices are efficient from the standpoint of meeting the communication needs of Economics” and that other disciplines were devoting more resources toward examining the efficiency of their scholarly communication system.¹⁵³ In the article, Berg discussed briefly the steps toward efficiency taken in other disciplines, including chemistry, physics, and psychology. In these disciplines, the scholarly societies organized themselves as umbrella organizations that centralized their publication activities. These organizations allowed the scholarly society to achieve cost efficiency, meet the needs of scholars by providing a wealth of information services rather than just journals, collect a publication subsidy from the research funding agency, and prevent the fragmentation of titles that has plagued disciplines such as biology and economics. In addition to recommending that scholarly societies in economics merge their publication activities, Berg also suggested that scholarly societies make use of author fees like the submission fee and page charge.

Berg recommended that research funding agencies provide a publication subsidy that was directed by authors. Berg argued that the receipt of this non-subscription revenue by publishers would, in most cases, improve both allocative and innovative efficiency. Berg noted that the recommendation of strengthening the page charge system was reiterated in the National Academy’s “Report of the Task Group on the Economic of Primary Publication” in 1970. However, Berg disagreed with the group’s recommendation that page charge funds be provided automatically to journals so as to

¹⁵³ Berg (1971), 800.

avoid a situation where authors made submission decisions on the basis of whether or not the journal had a page charge policy. Berg argued that the automatic receipt of this subsidy would hinder the competitive forces that caused journals in those disciplines that were more fragmented to restructure. However, Berg agreed with the report's recommendation that recipients of page charges be subjected to a monitoring process whereby they submit an annual statement to the NSF's Office of Science Information Services (or a similar organization) that delineated various cost and revenue items. Such a report not only provided information that government agencies could use to pressure scholarly societies to behave more efficiently if their costs were out of line, but the reports also provided a wealth of data that could be used to further refine the models that estimate the demand and social welfare from the production of journals.

Berg was not alone in recommending that journals in economics impose author fees. In fact, one of the staunchest supporters of the use of the page charge pricing mechanism in economics was Robert Ferber. Known for his work in marketing and survey research at the University of Illinois at Urbana-Champaign, in 1970 Ferber advocated the use of the page charge in economics beyond the Journal of the American Statistical Association (JASA), which he edited. At the Annual Luncheon Meeting of Editors on December 28, 1970, Rendigs Fels in his role as Secretary-Treasurer of the AEA (a position he held from 1970-1975) suggested to the other 33 editors of economics journals in attendance that Ferber discuss the page charge pricing mechanism after Fels had received a questionnaire from him about the page charge on October 13, 1970.¹⁵⁴ The questionnaire contained the following questions:

¹⁵⁴ Box 949, Folder 2. Fels also suggested that Borts discuss the submission fee and Berg discuss cooperative behavior.

1. Do you charge authors on a per-page basis for publishing articles?

If no, do you have another method of recovering costs?

2. How great is the page charge levied?

\$10 \$15 \$20 \$25 Other

3. Is the page charge

voluntary required

The questionnaire was part of a larger investigation by Ferber about “how to offset the rising cost of printing the Journal.”¹⁵⁵ Although Ferber originally conducted the survey on the use of the page charge pricing mechanism so as to revise the policies of JASA, John Lehman, the Secretary-Treasurer and Executive Director of the American Statistical Association, circulated Ferber’s report to every editor of an economics journal on January 21, 1971.¹⁵⁶

In the report, Ferber wrote that the inspiration was that “the possibility of imposing page charges to partially offset higher printing costs had been discussed for some time among ASA officers, but little information appeared to be available on the prevalence of this practice and how it was administered.”¹⁵⁷ Ferber sent questionnaires to 93 journals in the mathematical, physical, and biological sciences and the more quantitative of the social sciences (economics, psychology, and sociology). The editors of 66 journals completed the survey with 28 of the editors (42%) reporting that they imposed a page charge.¹⁵⁸ Ferber reported the following results:¹⁵⁹

¹⁵⁵ Box 972, Folder 18. Ferber also asks editors in the questionnaire to send a copy of their reprint form as the Journal was also reconsidering its reprint pricing policy.

¹⁵⁶ Box 972, Folder 18.

¹⁵⁷ Box 972, Folder 18.

¹⁵⁸ There was no follow-up with those editors that did not complete the survey.

TABLE 10

PAGE CHARGE SURVEY
 CONDUCTED BY ROBERT FERBER
 IN THE PHYSICAL, BIOLOGICAL, AND SOCIAL SCIENCES
 1970

Page Charge	Required	Voluntary
\$12 or less	1	1
\$13-\$22	3	2
\$23-\$32	2	5
\$33-\$42	0	8
\$43-\$52	1	1
\$53 or more	3	1
Total	10	18

Source: Box 972, Folder 18

Of the 38 editors reporting that they did not impose a page charge, 14 employed no methods for recovering costs other than reader subscriptions while the remaining 24 editors reporting that they attempted to recover costs by charging for excess tables and illustrations, imposing a page charge for articles exceeding a page limit, selling advertising space, and charging publishers for permission to reprint an article. In the report, Ferber briefly discussed the different administration of the page charge in voluntary and mandatory systems. Ferber also remarked that journals that use alternatives to the page charge found the revenue flow insufficient, and that, of the

¹⁵⁹ Box 972, Folder 18.

journals that had page charge policies, the majority – 74% – had high typesetting expenses. On the basis of these findings, the ASA in December 1970 instituted a \$20 page charge. Payment of this charge granted the author 100 free reprints.

As Ferber wrote this report, Fels made Ferber aware of the National Academies report on page charges in a letter dated September 30, 1970.¹⁶⁰ While Fels appears in the letter to be well informed about the page charge pricing mechanism and an advocate of it (essentially telling Ferber that the mechanism was ‘a way to get a subsidy from the federal government and that if other associations [were] doing it, why shouldn’t we’), mention of the page charge within the AEA Executive Committee did not occur again until 1974.¹⁶¹ Despite this four year hiatus in mention the page charge, the AER imposed a \$10 submission fee in 1972, at the request of the Managing Editor of the AER, George Borts. Borts argued during the Executive Committee meeting and communicated to readers in an announcement published in September 1971 that the fee would provide an incentive for authors to submit materials only when they were in their final form and ready for publication. The submission fee would also provide a source of income that could be used by the editor for the screening of submissions. In the years after the submission fee was instituted, the number of submissions fell. However, as evidenced in the minutes of the meetings in 1972, 1973, and 1974, Borts was insistent with members of the Executive Committee that the submission fee was necessary to maintain high review standards and reduce the amount of time a paper was under review. Along with

¹⁶⁰ Box 972, Folder 18.

¹⁶¹ Box 972, Folder 18.

the implementation of the submission fee (a mechanism which is employed by the AEA to this day), the AEA also experimented with a page charge mechanism.¹⁶²

The first official mention of the page charge pricing mechanism within the higher administration of the AEA occurred at the November 15, 1974 Budget Committee Meeting.¹⁶³ On November 7, Fels prepared a memo for the committee that contained, for the first time, financial projections for the next five years.¹⁶⁴ Fels wrote to the committee that the projected deficit for 1975 was \$200,000, and he remarked that the "...budget is out of balance and needs to be brought under control." More disturbing to Fels was the fact that the net worth of the AEA was no more than 1/4 of annual expenditures (expenditures which total ~\$800,000) and that a significant decline in the stock market or increase in prices could create a deficit that would eliminate the entire net worth. Fels concluded that annual surpluses of at least \$100,000 were needed in 1976 and the following three years after that in order to reach the target established by the Budget Committee in 1971 where net worth would equal to 1/2 of annual expenditures. To create such a surplus, Fels explored possible ways to increase revenue and decrease expenditures. Fels argued that there were no services that could be eliminated and that there were no obvious ways to increase efficiency and decrease expenditures. As for increasing revenue, Fels recommended increases in membership dues and institutional subscription rates and that the membership dues schedule be made progressive. Another

¹⁶² In 1978, J. Richard Jones at Memphis State University wrote to Borts asking him to complete a questionnaire that would be used in a report he was writing on the use of the submission fee by journals. No copy of the final report from Jones was found. Box 131, Folder 4.

¹⁶³ Box 126, Folder 12. The committee consisted of Joseph Pechman, Irma Adelman, Andrew Brimmer, R.A. Gordon, and Walter Heller.

¹⁶⁴ Previously budget projections were made for only the following year.

suggested way to increase revenue identified by Fels was the implementation of a page charge. Fels wrote:

A page charge for the American Economic Review is a possible way of raising revenue. Such a charge has been adopted by a number of professional journals, including the Journal of the American Statistical Association. It is usually passed on by the author to the agency supporting his research. It need not be mandatory; i.e. paying it need not be a condition of publishing a manuscript. I recommend instituting a page charge of \$25 per page. It would add perhaps \$15,000 to \$20,000 to revenues.¹⁶⁵

On November 18, 1974, Fels wrote to Borts that the Budget Committee had rejected the proposed page charge.¹⁶⁶ Borts used this information in his Report of the Managing Editor of 1974 presented at the Annual Meeting on December 29, 1974 and subsequently published in the May 1975 issue of the AER to downplay the importance of the page charge pricing mechanism to his fellow economists:

Charges to Authors

Continued increases in costs of printing are a matter of concern because they are eventually reflected in higher membership dues. Other ways to reduce printing costs require a direct levy on the author or prospective author. Some journals have used a page charge to reduce the share of the cost falling on the readers. This practice would appear most practicable in those fields where research receives outside financial support and the page charge ultimately comes out of a research contract or grant. Research support in economics may be not be sufficiently widespread to allow page charges. But it should not be ruled out for future consideration. Another type of levy on the author is the submission fee. At the moment, the *Review* charges a ten-dollar fee. The proceeds are used to pay for manuscript screening. This was described in my annual report for the year 1971. Other journals in economics also use submission fees, and some

¹⁶⁵ Box 126, Folder 12

¹⁶⁶ The Budget Committee did agree to increase the submission charge from \$10 to \$20 although this was less than what Fels recommended (\$25). There exists no minutes of the Budget Committee meeting. In fact, Fels remarked to Borts that the proceedings were so informal that even the AER budget was not explicitly approved. Box 125, Folder 12.

may devote the proceeds to production costs. This practice could become more widespread in the future.¹⁶⁷

However, Borts' prediction that a page charge would not work well in economics was of little consequence a few months later when, at the March 14, 1975 Executive Committee meeting, Fels reported that the budget deficit would be larger than was expected at the November 1974 meeting (\$155,000 rather than \$143,000). Fels also reported that net worth was actually negative (from \$162,000 at the end of 1973 to -\$10,000 at the end of 1974).¹⁶⁸ In a two page memo to the Executive Committee dated March 12, 1975, Fels described to economists what the page charge was.¹⁶⁹ Fels began the memo by quoting the page charge notice that appeared in JASA. Fels continued, writing that:

The federal government for about a decade has subsidized professional journals through the device of page charges. The rules of the game could have been devised only by a bureaucrat with a Rube Goldberg turn of mind. The rules of the game require that payment of page charges not be a prerequisite to publication; on the other hand, all authors must be billed. This means that the bills must let the authors know clearly and plainly (as the JASA notice does) that they should feel no conscience qualms if they don't pay. In fact, the only one with an obligation to pay is the federal government, which regards page charges as a legitimate item in the budgets for research grants.

Although journals in the physical sciences have made good use of page charges, economists (except for Robert Ferber) have been too confused by the rules of the game to adopt them. My recommendation that they be adopted by the American Economic Review was rejected last November by the Budget Committee. It seems to me that there is only one sound objection to page charges, namely, that authors will misunderstand the game and either submit their manuscripts elsewhere or pay the charges out of their own pockets. In view of the current financial position of the American Economic Association, foregoing the largesse of the federal

¹⁶⁷ Borts (1975a), 478.

¹⁶⁸ Box 981, Folder 1.

¹⁶⁹ Box 981, Folder 1.

government is a luxury that the Association can no longer afford. I recommend institution of a page charge of \$25.¹⁷⁰

The Executive Committee passed the measure recommended by Fels, and in the June 1975 issue of the AER the page charge pricing mechanism was announced to members as a way to increase revenue – one can imagine the surprise of economists who read of the imposition of the charge and had also read Borts' statement published the month before that a page charge would generate little revenue.¹⁷¹ The page charge was disclosed in the following way to members as part of a series of four changes (with the others being a discontinuance of free reprints, a higher submission fee charged to members who are not members of the AEA, and a postage surcharge for foreign subscriptions):

d.) A page charge for articles, shorter papers, notes, comments, and replies published in the *American Economic Review* and in the *Journal of Economic Literature*. The page charge is payable by the institution or granting agency supporting the research. Payment of this charge is not a prerequisite for publication, nor are authors expected to pay these charges themselves. The charge will be twenty-five dollars (\$25) per printed page, and will go into effect with manuscripts accepted after July 1, 1975.¹⁷²

Immediately after the page charge pricing mechanism was implemented, it became apparent that economists were not only confused about the mechanism, but that officials at the AEA were uncertain how to administer it. A month before the policy was announced, Carolyn Bell, as a member of both the Executive Committee and CSWEP,

¹⁷⁰ Box 981, Folder 1.

¹⁷¹ The economic arguments made by Berg five years earlier about the efficiency gains to using a page charge pricing mechanism had little influence in convincing members of the Executive Committee to implement the page charge. In an email, Berg wrote to me that:

My own work was unrelated to any AEA initiative to institute page charges. I certainly reported on how other disciplines used this mechanism to cover fixed costs and predicted its application in Economics. The idea was in the wind, and leaders in the discipline found it applicable. I doubt whether my own work had any impact on the implementation of page charges.

¹⁷² Borts (1975b), 529.

informed women that the page charge was not meant to dissuade women from submitting manuscripts to the AER.¹⁷³ Shortly after the page charge was implemented, Borts and Fels received only one letter protesting the page charge.¹⁷⁴ On July 1, 1975, William Donnelly wrote to Borts (and carbon copied Fels and R.A. Gordon) the following statement:

...I believe that imposing a 'page charge' ...will not serve the ends and the goals toward which the AEA was established. Although I share concern about the financial problems of the Association, it appears to me that there is recourse to a number of other remedies for these which would seem to be less damaging to the open exchange of ideas. It is also my opinion that the full membership should have a voice in decisions on these matters.

The present course of action has a detrimental effect on young economists, those economists associated with small colleges or non-academic institutions, and also serves to discriminate against minorities and women. Therefore, I am withdrawing my membership in the AEA, effective immediately and request that the balance of my dues for the current membership year be refunded promptly. If the Association changes its current publication policy, I will then re-evaluate my decision on membership.¹⁷⁵

Borts replied to Donnelly on July 3 that he suspected Donnelly misunderstood the page charge because payments were not a prerequisite for publication and payments were not expected from the individual but rather from the research funding agency. Stating that it was inconceivable that the charges discriminated against minorities, women, or scholars

¹⁷³ Box 125, Folder 12.

¹⁷⁴ That the AEA received only one letter protesting the page charge seems highly unlikely given the volume of letters protesting the charge received by the APS during the 1970s protesting a pricing mechanism that had existed in that discipline for over 40 years at that time.

¹⁷⁵ Box 131, Folder 1.

at smaller institutions, Borts wrote that he was sorry to lose Donnelly's membership and hoped that he would reconsider.¹⁷⁶ On August 5, Fels wrote to Donnelly that:

The new policy simply takes advantage of the willingness of the federal government to subsidize scholarly journals indirectly....The American Economic Association cannot afford to pass up this source of revenue any longer. The Executive Committee would be derelict in its duty to its members otherwise.

The basic idea of the page charge is simple and fair. If any author has a source of funds for the page charge, he pays it. If not, he doesn't. The author who does not pay is not penalized in any way.

The only real objection to the new policy is the kind of misunderstanding it leads to, such as yours.¹⁷⁷

In Donnelly's defense, it should be noted that economists were not given much information about what a page charge exactly was. In 1977, Borts made a promise to the Executive Committee to publish a statement in the AER that would remind authors of their obligation to pay such charges if they received research funding. However, an inspection of AER and JEL covering 1978, 1979, and 1980 revealed no such published reminders.

After the page charge pricing mechanism was implemented, Borts was assigned the responsibility of administering the charge. Many authors who were unaware of the existence of a page charge received an acceptance letter from Borts that included the following standard line: "I would also like to remind you that the Review has established Page Charges for papers accepted after July 1, 1975."¹⁷⁸ With this acceptance letter,

¹⁷⁶ The reply Borts wrote to Donnelly was also carbon-copied to Fels and Gordon.

¹⁷⁷ Box 123, Folder 4

¹⁷⁸ Box 133, Folder 9

Borts included an enclosure describing the page charge.¹⁷⁹ Only when authors received their galley proofs were they then told what the total page charges would be. Donald Parsons, a professor at Ohio State University, expressed dissatisfaction with these administrative procedures. On May 18, 1977, he wrote to Borts predicting that, because the delays in the publishing process in economics were so long and the length of financial support so short, he was not the only economist whose funding had expired by the time the page charge bill was sent.¹⁸⁰ By issuing such a bill based on the expected number of pages at the time of acceptance, Parsons argued that the collection percentage would increase substantially.¹⁸¹

Besides receiving the page charge bill after funding had expired, some authors, who acknowledged in their AER article the typically limited support they received from institutions for travel expenses or a reduced teaching load, were presented with a page charge bill that they then directed to the institution that had granted them the research support. After acknowledging in their AER article limited financial support for travel expenses, two co-authors, were asked by Borts why they cited financial assistance in their acknowledgements from a research funding agency but did not direct the page charge bill to them. In a letter to Borts dated January 20, 1976, these authors explained in great detail the type of financial support they had received and commented further that:

If we cannot acknowledge their limited but helpful assistance without making them liable for your page charges I guess we will have to delete the acknowledgement. I will be sorry to do this but less sorry than to tell

¹⁷⁹ No copy of this enclosure was found but I suspect that it was simply a copy of the statement announcing the page charge that was published in the June 1975 issue of the AER. Box 131, Folder 1

¹⁸⁰ Box 131, Folder 3

¹⁸¹ Borts replied to Parsons on May 26 that he would implement his suggestion in a modified fashion. However an extensive search revealed no such revisions being made. Box 131, Folder 3

them that their willingness to help us when we had no travel funds implied a further commitment of which neither the authors nor the Institute were aware of at the time.¹⁸²

On February 1, Borts replied to the co-authors that the acknowledgement could remain intact and that this episode reflected the fact that "...the introduction of page charges will go through some growing pains until they become accepted in economists' research budgets."¹⁸³ There are several interesting lessons to be drawn from this incident. First, this incident revealed that Borts used the acknowledgements, which were originally designed to make readers aware of potential conflicts of interest, in order to issue page charge invoices. Second, that Borts himself enforced payment. By contrast, in disciplines such as physics, the enforcement of the payment of page charges was the task of a business manager or administrative assistant. This is a particularly important distinction. In both physics and economics, the payment of the page charge was said to be truly independent from the decision of whether to publish the article. And while I have no doubt whatsoever that both the scholarly societies of the AIP and the AEA were committed to this policy and preserving the identification of scholarly journals as intellectually superior to vanity presses, one cannot help but think that many rejected authors believed in conspiracy theories of the AER acceptance process where payment was necessary for publication. Again, in no way do I think this theory is true and I have seen no documents to suggest otherwise. However it is clear that the decision of the AEA to assign Borts the responsibility to administer the page charge pricing mechanism was ill-advised and only fueled the 'pay to publish' conspiracy theory. Furthermore, Borts freely admits that he was unenthusiastic with imposing page charges on authors.

¹⁸² Box 131, Folder 12

¹⁸³ Box 131, Folder 2

While Borts faithfully executed the policies written by the AEA Executive Committee, it was unreasonable for AEA Executive Committee members to expect much success from a page charge pricing mechanism when the person administering it was unconvinced that it was needed. Third, this incident signaled that Borts believed that research funding agencies in economics would just have to adjust their practices and that the adjustment process was not his responsibility. This is in contrast to the situation in physics where the AIP and APS actively sought to inform and convince research funding agencies of the necessity of the page charge pricing mechanism.

This last point was made more apparent when the Director of Research at the Maurice Falk Institute for Economic Research in Israel, Nadav Halevi, wrote to Borts on January 4, 1978 requesting an institutional exemption from such charges. Rather than inform Halevi of the justification of the page charge or solicit ideas for alternative methods to fund the scholarly communication process, Borts replied curtly that “It is not possible for me to grant institutional exceptions to this policy, for every institution is short of money (with the possible exception of the central bank), and the exception would soon prove to be the rule.”¹⁸⁴ Again, Borts simply expected that research funding agencies would change their practices, and he did not perceive his role as one of convincing research funding agencies of the reasons why they should subsidize the scholarly communication process in economics in this manner.

This lack of attention Borts extended to informing other research funding agencies of their need to honor the page charge was complemented by his lack of effort in advertising the use of the page charge pricing mechanism to other journal publishers. On

¹⁸⁴ Box 131, Folder 4

July 3, 1975, Willard Lockwood, Director of Wesleyan University Press, wrote to Borts inquiring about the impact of the page charge. Lockwood, who referred to the page charge pricing mechanism as a “daring and iconoclastic idea,” was told by Borts that the page charge had only recently been imposed and that he should write again in one year.¹⁸⁵ Interestingly, Borts also revealed to Lockwood in the letter that the page charge of \$25 per page was nowhere near the total printing and mailing costs of \$150 per page.¹⁸⁶ Nearly one year later, June 23, 1976, Lockwood asked Borts again whether “the imposition of the page charge has had a deleterious effect on the quantity or quality of the material submitted to you.”¹⁸⁷ Borts’ four line reply on July 15, 1976 was that the page charge had no effect on the quantity or quality of material submitted to the Review.¹⁸⁸

Borts’ lackluster enthusiasm for the page charge was apparent when the editor of The Journal of Economic History, Rondo Cameron, asked on September 22, 1977 for copies of the forms that the AER sent to authors regarding payment of the page charge and solicited suggestions on how best to administer it.¹⁸⁹ Given that the page charge pricing mechanism was only sustainable if several journals imposed it, one would expect Borts to have devoted significant time and effort not only to Cameron’s request but also

¹⁸⁵ Box 131, Folder 1

¹⁸⁶ While Borts may have been providing these numbers only as broad reference points, what is interesting here is that Borts gave the total cost per page rather than just the fixed cost per page. Box 131, Folder 1

¹⁸⁷ Box 131, Folder 2

¹⁸⁸ Borts’ short reply that the page charge was not impacting the quality or quantity of the submissions was the same he gave to the Executive Committee when some asked that the page charge be abandoned. In reality, it is unknown if the page charge alone had an impact on the number or quality of submissions. Submissions had been decreasing for many years from their peak of 813 in 1971 such that by in 1976 only 695 submissions had been made. It is likely that Borts would have described this decline as due to other forces. Box 131, Folder 2

¹⁸⁹ Box 131, Folder 3

to encouraging other journals in economics to impose page charges just as Ferber did with JASA. Instead, Borts never even personally responded to the letter, and instead he simply directed his secretary to forward the form letter used to Cameron.¹⁹⁰

That Borts and Fels did little to promote the page charge was likely a consequence of the mediocre revenue flow the page charge pricing mechanism generated for the AEA. Again, Fels in 1974 expected annual revenue from the page charge to approach \$20,000.¹⁹¹ In its financial figures which are published annually, the AEA, never once revealed the revenue flows from page charges in the way it did for submission charges as a separate line item in both the Treasurer or Managing Editor reports. In fact, the only way I found the page charge revenue flow was by obtaining the accounting ledgers from the 1970s and 1980s. What I found was that, whereas the required submission fee in the 1970s generated up to \$10,000 annually for the AEA and over \$20,000 annually in the 1980s, the page charge generated significantly less. From the ledger account for page charges, the following annual totals exist:¹⁹²

¹⁹⁰ Box 131, Folder 3

¹⁹¹ These were expectations likely based on Fels' perusal of the research funding agencies whose support was acknowledged in the AER.

¹⁹² Box 1051

TABLE 11

ANNUAL PAGE CHARGE REVENUE
 EARNED BY THE AMERICAN ECONOMIC ASSOCIATION
 FOR THE JOURNAL AMERICAN ECONOMIC REVIEW
 1976-1986

Year	Amount
1976	\$1,450
1977	\$5,412.50
1978	\$4,925
1979	\$5,262.50
1980	\$5,100
1981	\$4,950
1982	\$1,903
1983	\$475
1984	\$1,500
1985	\$2,112
1986	\$200

Source: Box 1051

Clearly the revenue was nowhere near the expectations Fels had in 1974 of \$15,000 to \$20,000 annually.

Disappointingly, the archives revealed no correspondence whatsoever about the page charge in the 1980s, including the circumstances surrounding the AEA's apparent abandonment of the page charge in 1986.¹⁹³ While the page charge pricing mechanism failed to meet expectations of Fels, the AEA stumbled upon more lucrative sources of revenue by implementing a progressive dues structure and licensing out their index of the

¹⁹³ While other ledger accounts such as the submission fee extend beyond 1986, the page charge account stops at that date. Given the low amounts collected in 1985 and 1986, I suspect the AEA had decided to phase out the charge. No announcement of such a decision was found in the archive or in the pages of the AEA published journals.

economic literature to third parties. Despite being wrong about the revenue the page charge pricing mechanism would generate for the AEA, Fels' expectations that membership demand was inelastic and that few high-income members would misrepresent their self-reported income held true. Whereas revenue from memberships under the old dues structure for the six months ending June 30, 1975 totaled \$176,000, revenue from memberships under the progressive dues structure for the six months ending June 30, 1976 totaled \$212,000.¹⁹⁴ It was the financial success of progressive dues that shifted the focus of the AEA away from the page charge. The progressive membership dues imposed on scholars remains to this day. The increased membership dues were complemented, starting in the 1970s, by revenue from royalty payments. The AEA in the 1970s originally had taken very little initiative in transitioning the scholarly communication process in economics to electronic methods and was content to license out the data files used to create the JEL out to Dialog Information Services. Even with the realization that these royalty payments could be significant, as is shown in the next section, the AEA continues to contract out the work to other parties.

Overall, unlike the situation in physics, the AEA appeared not to exert much effort to sustaining the page charge once other sources of revenue were identified. The page charge pricing mechanism in economics seemed to have had only Borts and Fels as its supporters (and not very enthusiastic ones at that) and in fact, the time frame wherein the page charge pricing mechanism existed, 1975-1986, quite nearly and perhaps not coincidentally coincided with Fels' tenure as Treasurer of the AEA from 1976-1987.

¹⁹⁴ This progressive dues structure in the ensuing decades would continue to generate significant income for the AEA. Beil and Laband (1996) found in 1994 that two of every three AEA members earning the highest income bracket pay the highest membership rate. Beil and Laband commented that the only other scholarly society of economists with income-based dues was the Association for Evolutionary Economics.

4.4 Extensions to the Present:

After describing the way in which economists organized their scholarly communication process up to the 1970s, in this section I will show how economists more recently have suggested changes to their scholarly communication process. As I noted in chapter one, economists discussing the economics of economics journals became over the past ten years more adamant in their belief that the scholarly society was a public actor that produced and distributed a journal which generates significant positive externalities. This latest manifestation of the serials crisis was described by the majority of economists as being caused by commercial publishers who earned significant profits publishing and distributing journals while contributing fewer positive externalities to society (measured by pages and citations) as compared to scholarly society published journals. Just as Berg in 1971 engaged in an economic analysis of scholarly communication processes across disciplines in order to recommend changes to the scholarly communication process in economics, Theodore Bergstrom does the same thing today. Bergstrom's website contains extensive cost effectiveness data across disciplines, and his 2001 article in JEP recommended that economists, in their role as authors, editors, and referees, boycott commercially published journals.¹⁹⁵ Similar to Berg, Bergstrom argued that there were too many journals being published and that because there was a lack of market forces, inefficiencies persisted. While Berg wrote at a time when the influence of the commercial publisher was considerably less, he still noted in his JEL article that commercial publishers were a part of the problem of the size and cost of the literature. By Bergstrom's time, the commercial publisher's influence was extensively greater and

¹⁹⁵ Ted Bergstrom's site is <http://www.econ.ucsb.edu/~tedb/Journals/jpricing.html>

was identified as the central culprit in a debilitating crisis. One of Bergstrom's central goals in his paper was to communicate cost information to scholars who were largely unaware of the subscription prices paid by librarians. With such information in hand, Bergstrom believed that economists would act like rational economic actors and reorganize their scholarly communication process such that it favored not-for-profit publishers.

Economists, besides suggesting structural changes to the scholarly communication process in economics, were also actively involved in revising how it should be financed. In 1993, the Executive Committee of the AEA was asked by William Bowen, an economist and President of the Mellon Foundation, for permission to scan images of AEA publications and make them available to subscribers.¹⁹⁶ This project, known as JSTOR, permitted economies of scale to be realized by institutional subscribers and required no direct investment by the AEA. Bowen approached the Executive Committee on March 17, 1995 with the question of how JSTOR should be paid for by institutional subscribers. Bowen's discussion was summarized in the minutes of the meeting as follows:

The Andrew W. Mellon Foundation, in the person of William Bowen, had approached the Association about linking the electronic file of back issues (the JSTOR project) to an electronic publication of current issues. The scholarly community would benefit enormously from having convenient access to a single, searchable file of all issues of a journal, from the earliest ones to the most recent. The key question would be pricing. Bowen inquired whether the Association would be interested in talking with the Foundation about one or more experimental pricing models which might be both fair to the Association and, at the same time, 'socially responsible.' The ensuing discussion indicated that the Executive Committee 'viewed with favor' the idea, but the devil was in the details.

¹⁹⁶ An excellent history of the vision, trials, and negotiations engaged in by the Mellon Foundation with JSTOR is Schonfeld (2003).

Substantial concern was expressed about the impact of the scheme on membership in the association, not just on its revenues. The Executive Committee had no desire to have the Association become a not-for-profit Elsevier. The Secretary and the Committee on Electronic Publications would explore the possibilities for collaboration with the Mellon Foundation with these concerns in mind. Neither was empowered to extend the existing JSTOR arrangement.¹⁹⁷

This quote revealed not only the significant influence philanthropic foundations like the Mellon Foundation had on the structuring and financing of journals in the early stages of the electronic era of scholarly communication, but it also revealed the hands-off approach the AEA adopted with respect to restructuring the scholarly communication process, including how it should be financed.

In 1997, Hal Varian published an article in the JEP titled “The AEA’s Electronic Publishing Plans: A Progress Report.” In this report, Varian drew upon his experiences as a member of the AEA Publishing Committee and discussed the nature of the problems of producing and distributing journals in the print era and the possible methods of production and distribution in the electronic era. Varian described the task of this committee in the following way:

The goal is to differentiate the product so that library users have high-quality access to the journals – but not *so* high a quality that members choose to opt out of membership and access the library subscription. We are also happy to work with other intermediaries who provide on-line services to libraries. However, we intend to make sure that the key features that we choose to differentiate the individual and library subscriptions are not circumvented by third-party suppliers. Suppose, for example, that we decided that the member subscriptions would not have this feature. Third-party suppliers of AEA content might well decide to compete by providing this feature. (Even nonprofit firms compete!) If so, the value of the hypertext links is reduced as a self-selection device.

The trick in maintaining economic viability for the association will be in finding ways to provide high value to both the individual subscribers and

¹⁹⁷ Hinshaw (1996), 470.

the libraries while still maintaining subscribers in both segments of the market.¹⁹⁸

Despite the participation of economists such as Bergstrom and Varian in the debate over how the scholarly communication process should be financed in the electronic era, the AEA did little to initiate change itself. Having not received any formal advice from the AEA as to how best to charge for scholarship such that it actually served scholars, Bowen implemented a pricing mechanism for JSTOR wherein a license fee was charged to an institution based on its size. Rather than take an active role in working with the Mellon Foundation to structure and finance JSTOR in a particular way, the AEA was content to do little more than establish the appropriate “moving wall” of access to AEA publications through JSTOR such that there was a continued value to membership to the AEA (in other words, the AEA was more concerned about protecting their own publications rather than being a part of a revolutionary change in the scholarly communication process in economics).

This section showed that, despite the historical nature of the previous section, the AEA’s lack of participation in structuring the organization and financing of the scholarly communication process is not a historical artifact. Not only did this section and the previous section show that the research funding agencies had an interest in structuring and financing the scholarly communication process in economics, just as they do in physics both in the print and electronic era, but also that the AEA, as a society, micromanages the scholarly communication process less than the AIP or APS in both the print and electronic era.

¹⁹⁸ Varian (1997), 101.

This section and the previous section also highlighted the fact that in the negotiation over how the scholarly communication process should be structured there is a conflict between the few like Berg and Bergstrom who advocate a restructuring of the process with the goal of removing market failures and creating efficiencies and those like Borts who seem to be hesitant to having efficient and market principles reorganizing the process. Ultimately in economics, like most other disciplines, the scholarly communication process was not organized around efficiency principles. In other words, economists, in viewing their scholarly communication process as a marketplace of ideas, have come to accept the existence of market failures. In fact, many economists, at least in terms of the page charge pricing mechanism, seem to have no problem with the inherent contradictions in their notion of the scholarly communication process as a marketplace of ideas, the presence of market failures, the decision not to correct these failures in their own discipline, but the recommendation that other discipline's alter their scholarly communication process so as to remove market failures.

4.5 Concluding Remarks:

This chapter showed that both in the past as well as in the present that the economics of scholarly communication literature underestimated the significant role of the research funding agency in organizing and financing the scholarly journal. This influence was exerted at the site of the scholarly society with rapid changes in the amount of influence or a change in the actors that exerted the influence known as a serials crisis. In the 1970s, when the influence of philanthropic foundations was reduced and replaced

by the NSF, the AEA struggled to meet the changing needs and motivations of the agencies funding research in economics. This chapter showed that the scholarly communication process, even in a discipline like economics, was not entirely efficient and that actors such as the research funding agency played a significant role in structuring the process in a particular way. When funding regimes changed, the scholarly communication process changed. As we saw in the last section, much the same story can be told about the reactions of the AEA to this most recent manifestation of the serials crisis. Putting the previous chapter and this chapter together, there emerges an understanding of the scholarly society, journal, and serials crisis very different from the economics of science and economics of scholarly communication literatures. Not only is the site of the scholarly society, object of the journal, and event of the serials crisis differentiated across disciplines, but there is also a significant role attributed to the research funding agency which possesses a vision that the research and scholarly communication processes in a discipline be organized and financed in a specific way.

CHAPTER 5

THE JUSTIFICATION AND POTENTIAL CONSEQUENCES TO THE AUTHOR

CHARGE PRICING MECHANISM IN THE ELECTRONIC ERA

5.1 Introduction

Rather than casting around for an exotic new business model, one alternative might be to return to a more old-fashioned way of doing things. Unlike journals produced by big publishers, which rely on subscription revenue, those published by learned societies traditionally operate on a “page charge” or “author fee” principle. Essentially, authors submit their papers for peer review, and agree to pay a fee if their paper is accepted for publication...It would be ironic indeed if the future of scientific publishing turned out to be a return to its past.¹⁹⁹

If we move beyond the false generalization that the journals which were published in the print era by scholarly societies across the disciplinary landscape used an author charge pricing mechanism to fund their journals, the above quote outlines a popularly cited solution for financing the scholarly communication process in the electronic era. In chapter two, we saw that one interpretation of the serials crisis was that the event was caused by the commercial publisher’s insistence on using a reader subscription pricing mechanism. More specifically, in the print era the librarian financed the bulk of the scholarly communication process through institutional subscriptions. The institutional subscription rate was high, in part, because there were relatively few subscribers

¹⁹⁹ The Economist (2000)

interested in each journal's highly specialized content. With librarians bearing most of the financial burden and, yet, facing declines in their acquisition budgets, individual libraries sacrificed some subscriptions commitments in order to maintain other commitments. The consequence of these cuts was that the subscription price increased as the number of subscribers declined (due to the fact that the average fixed costs borne by each remaining library subscriber increased). The result was a serials crisis. From this understanding of the cause of the serials crisis problem there emerge two possible solutions, each entailing the use of a new pricing mechanism.

One possible solution based on this interpretation of the serials crisis is to have all research libraries purchase access to a complete database of journals thus spreading out the substantial fixed costs of producing each journal title over a greater number of parties and removing the free-rider problem. The price charged each research library for access to the database of journals would vary according to the number of researchers and/or the level of research conducted (in other words, some form of price discrimination would be practiced). This solution is embodied in the development of bundles of journal titles that are charged for with the site license pricing mechanism. Advocated for by many commercial publishers, this solution has met stiff resistance from librarians for two reasons.²⁰⁰ First, librarians are skeptical that the publisher would not increase the price substantially once scholars committed to using and citing a particular publisher's set of journals. Second, librarians are reluctant to transition from a scholarly communication process based on ownership of article to one based on leased access.

²⁰⁰ Frazier (2001).

Alluded to in the above quote, another pricing mechanism said to resolve the serials crisis is the author charge. The author charge is described as a pricing mechanism that made it possible to have the author (or their research funding agency) bear a portion of the fixed costs in exchange for the prestige and career advancement that publishing an article often generates for an author. The author charge is set to cover the costs of the review process and the fixed costs of preparing materials for publication while the reader needs only to pay for the variable costs. In the electronic era, these variable costs are described as being close to zero. As a result, it is possible for the reader to receive access for free in an author charge financed scholarly communication process. This financing solution is viewed as particularly well adapted to the electronic era where it is difficult to enforce the copying restrictions and to implement the access controls that are necessary if revenue came from readers. As evidenced from the above quote, the author charge is also desirable because the mechanism has an established record of enabling cost-effective access to scholarship.

In discussing the potential consequences to the use of these pricing mechanisms, the site license is portrayed as an attempt by the commercial publisher to perpetuate their dominant role in the scholarly communication process. The author charge, on the other hand, is portrayed as a pricing mechanism that allows rival public electronic scholarly communication initiatives, which seek to unseat the dominance of the commercial publishers, financially viable. Very few positive consequences are ever told of the widespread use of the site license some of which include increased access to readers and a sharing of costs across a greater number of institutions (the removal of the free rider problem). Very few of the negative consequences are ever told of the widespread use of

the author charge some of which include a feeling among academics that peer-reviewed journals become vanity publications where authors must pay to publish and a stronger ownership and control claim over the intellectual property in the scholarly article by the actor that directly finances the publication of the article. This chapter discusses the latter of these potential negative consequences to the widespread use of an author charge pricing mechanism in the electronic era.

This chapter reviews the justification behind and consequences to an author charge financed scholarly communication process in the electronic era. This chapter begins by recounting the popular interpretations of the consequences ascribed presently to the author charge – namely that the charge ‘liberates’ the ownership of scholarship from commercial publishers, generates efficiencies that make access to readers wider, and reduces the overall financial burden the scholarly communication process poses. This interpretation of the consequences of the author charge in the electronic era, I argue, is incomplete. In order to fully account for the consequences to using an author charge, I ask how an actor benefits or suffers as a result of this a transition to an author charge pricing mechanism. I highlight the fact that, while using the author charge makes non-commercial scholarly communication initiatives financially viable and efficient, the consequences are potentially wider because it is not clear who owns the intellectual property within the scholarship. While the popular accounts of the author charge portray the ownership of scholarship as remaining with the scholar, present intellectual property laws in the United States seem to suggest that the party that pays for the publication of a scholarly article also owns the intellectual property within the scholarly article. Thus, while transitioning to an ‘author pays’ model benefits the research funding agency in that

the process became more efficient, this need not be the only motivation or even the most important reason why research funding agencies are encouraging such a transition. I hypothesize that the heightened desire by actors such as the university to establish an ownership claim over the intellectual property within scholarship is another crucial motivating factor behind the implementation of an author charge pricing mechanism.

5.2 Liberation of the Scholarly Communication Process through the Author Charge

Implementing an author charge pricing mechanism like the page charge is a popularly cited prescription for reforming the scholarly communication process, a process widely considered to be in a crisis. The author charge is described as a pricing mechanism that makes financially sustainable those electronic products that extend access to readers free of charge and as a pricing mechanism that potentially reduces the overall financial burden of the scholarly communication process borne by the research funding agency. The removal of the commercial publisher through the author charge is the primary objective of most author charge financed electronic scholarly communication initiatives.

Like many other librarians and university administrators, Yale University librarian, Scott Bennett, and John Hopkins University librarian, Nina Matheson, believed that the crippling power that commercial publishers had over many scholarly communities emanated from the publishers' control over the intellectual property in scholarship. Bennett and Matheson (2001) wrote:

Because many academics do not view articles they write as valuable commodities, they readily accede to publishers' demands that they assign

the copyright on the articles to the publisher. Such practices ‘make a contribution’ to scholarship, but also support the commercial arrangements that now control scholarly communication and fuel the much-discussed ‘crisis’ in publishing journals in science, technology, and medical fields....Explicitly or implicitly, universities allow researchers to make any use they wish of their work. Scholars routinely use that freedom to give their copyrights to journal publishers. Researchers disregard the economic value of their articles in return for the freedom to place them in the most prestigious journals possible....Journal publishers want the copyrights of articles they publish, because copyrights result in royalty income. Legal restrictions on reproducing copyrighted material also help insure subscription income. The royalty and subscription income pays the editorial costs, production and distribution costs, and capital costs, including the expense of publishing commercially unsuccessful titles. University libraries are a principle source of subscription income for scholarly publishers. It is ironic that by subscribing to journals, libraries in effect buy back the scholarship that university faculty members have created and given away. Because publishers hold the copyrights of the material that libraries need, libraries have little choice except to pay rapidly rising subscription prices or not subscribe at all.²⁰¹

The belief espoused by Bennett and Matheson, and reiterated by most others who serve as advocates for the author charge pricing mechanism, is that the serials crisis emerged because publishers restricted access to those who could pay for it. While publishers claim that they have to charge for access because the costs of peer and editorial reviews are substantial, scholars and librarians have questioned the magnitude of these costs given that most review services are provided free of charge. Stallman (2001) wrote:

The cost of editing for a typical paper is between 1% to 3% of the cost of funding the research to produce it. Such a small percentage of the cost can hardly justify obstructing the use of results. Instead, the costs of editing could be recovered, for example, through page charges to the authors, who can pass these on to the research sponsors. The sponsors should not mind, given that they currently pay for publication in a more cumbersome way through overhead fees for the university library’s subscription to the journal. By changing the economic model to charge editing costs to the research sponsor, we can eliminate the apparent need to restrict access.²⁰²

²⁰¹ Bennett and Matheson (2001), A2

²⁰² Stallman (2001)

The author charge is advertised by scholars and librarians as a way to make non-commercial electronic scholarly communication initiatives financially sustainable and to achieve the goal of cost effective broad dissemination of scholarship by shifting control of the copyright for an article away from the commercial publisher and towards public actors such as the university.

This idea of using the author charge pricing mechanism to fund non-commercial electronic scholarly communication initiatives was first discussed at the start of the mid-1990s. The discussion began when Stevan Harnad, an early supporter of individuals and institutions self-archiving their scholarship and making it freely available, read a listserv posting from Thomas Walker, the editor of a journal for the Florida Entomological Society. Harnad, an academic psychologist, had been trying to solve the problem of how to pay the significant fixed costs imposed by these archives. While one-time grants had paid for these repositories for many years, this mode of payment was by no means sustainable over the long-term. Creating long-term financial stability was essential if authors and readers were to ever confidently submit materials to or cite articles contained within these archives. Harnad's solution emerged when Walker reported on a listserv discussion group that, when the Florida Entomological Society's journal was paper-based, a small page charge covered the fixed costs while subscribers covered the variable costs.²⁰³ Walker reported that when the journal became an electronic, the page charge covered the fixed costs and the author, in return, received an electronic file that could then be made available to others for free. Harnad, unaware of the concept of the page

²⁰³ <http://www.ecs.soton.ac.uk/~harnad/Hypermail/Theschat/0019.html>

charge, immediately became interested. His inquisitive response to Walker's reference to the page charge was:

Very interesting. How much is the current page charge, and who pays it (the author, presumably)? And how does it relate to subscription revenue? And what are the contingency plans for the paper incarnation if/when the demand for the paper version dries up and people only use the free electronic version. Do you have an estimate of what the author page charges will be for that purely electronic incarnation? These are all friendly questions. I applaud what you're doing, especially your recognition that it is more sensible to recover the costs of the electronic version from the author than from the reader/subscriber. I am just very interested in knowing how you envision the rest of the transition scenario going: Are there any unstable points out there, and if so, can anything be done to stabilise them and smooth the transition? I think with your approach there is more hope than with the usual paper publishers' approach of going hybrid on the subscription model (pay a bit more for the electronic version and get both paper and electronic subscription, pay a bit less and get electronic-only, but no free access to non-subscribers wither way).²⁰⁴

Walker's responses to these questions caused Harnad to later embrace the idea of using author charges to finance electronic repositories. Interestingly, Harnad would later write that the author charge only made sense in the electronic era:

There is no strong rationale for authors' being willing to pay page charges for paper journal publication, where the distribution is so poor and inefficient and where costs can be recovered from subscription revenue. It ONLY becomes an incentive to an author to pay page charges (as I have long argued) when (1) the cost is within reach and (2) it means free, global, permanent, easy access to all (i.e., in the electronic rather than the paper medium).²⁰⁵

Despite his enthusiasm for financing do-it-yourself archives with author charges, Harnad, for the most part, had little luck in bringing about actual change. Instead, the later 1990s was a period of time where commercial publishers introduced comprehensive electronic archives of journals. This was also a period when commercial publishers complemented

²⁰⁴ Walker and Harnad (1995)

²⁰⁵ Walker and Harnad (1995)

paper subscription revenue with electronic license revenue. The additional financial burden of paying for the same material twice exacted its financial toll, and those electing to receive only the electronic version complained that they were still paying 70% of the cost of perpetual print ownership for limited electronic leased access. Consequently, there were calls in both Europe and the United States for government investigations and the formation of non-commercial electronic publishing houses. It was within the past two years that Harnad's idea of using the author charge to fund non-commercial electronic scholarly communication initiatives has been revived.

In a report they commissioned entitled "Economic Analysis of Scientific Research Publishing," the Wellcome Trust (the largest research funding agency besides the government in the United Kingdom in the medical sciences) in 2003 concluded that the serials crisis was an inefficiency problem and that efficient outcomes only emerged when all the parties that participate in the scholarly communication process paid for the process. With that finding, the Trust recommended that research funding agencies:

...support different ways of funding publications, particularly electronic page charges, through research grants. Such an action would involve including some provision in research grants to enable academic staff to pay for publication of their work. This would give more power to the not-for-profit sector in enabling them to move to a system of page charges without risking their survival, and increase the power of academics in enabling them to seek publication outside the commercially controlled conventional journals. It might also prompt commercial publishers to consider setting up (or transferring to) journals based on page charges. Journals of this kind are free to the reader and thus potentially transform the economics of the scientific journals market.²⁰⁶

Although the report admitted that the complexity of the journal market meant that any structural change would have to be over the long-term, the widespread use of author

²⁰⁶ Wellcome Trust (2003), 31.

charges was described as only having positive consequences and that funding organizations, “as suppliers of funds for research and as trusted institutions,” could have a significant impact in bringing about such change. The Wellcome Trust was not alone in making this recommendation.

In a guide written by members of a consulting group of the Scholarly Publishing and Academic Resources Coalition (SPARC), the Open Society Institute outlined how a publisher of an existing subscription-based journal in any discipline could convert their journal to a journal that provided access to readers for free. The reader subscription pricing mechanism was critiqued for restricting access to scholarship. Reader subscription revenue was described as increasingly undesirable for publishers because the potential for revenue growth was low given the increasing market power of libraries as they formed consortia. Thus, all parties were described as benefiting from an author charge financed scholarly communication process.

Instead of relying completely on reader subscription revenue, the guide outlined how publishers could meet expenses in other ways that were appropriate to the publisher’s mission and structure of their publishing organization. The guide called on publishers to replace subscription revenue with a mix of self-generated income and internal and external subsidy components. Possible components included income from affinity relationships (advertising and funding), income from providing related value-added products and services, grants, and contributions from authors and institutions. However, the guide noted that article submission and publication charges were among the most frequently supported sources of revenue. In terms of establishing how much the fee should be, the guide advised that it should:

...reflect a combination of the publisher's pre-press processing costs, the publisher's policies as to which submissions will incur a charge, the number (scale) of submissions, and the extent to which the author charges will offset actual expenses....The latter will depend on the publisher's cost structure (and hence the level of the fee) and perhaps on the receptivity to such fees in the journal's field.²⁰⁷

The guide noted that in the print era the practice of imposing a submission charge was not universal across disciplines. It was this observation that led to the following note of caution:

For journals in disciplines for which there has been a long-standing practice, page charges provide a logical model to extend to digital Open Access publishing. However, authors in disciplines without an established page-charge tradition may resist the practice....Publishers should be aware of their authors' attitudes towards the practice in order to better anticipate and overcome any objections.²⁰⁸

The report concluded discussion of the use of the author charge with the following restatement of the economic justification of imposing the fee:

Article processing fees are based on the premise that authors and their host institutions are the most direct beneficiaries of publication in a scholarly journal. Also, in contrast to the current subscription-based models, the funds available to support publication scale with the amount of material seeking publication. Research has found that the demand for academic journals (at least in the US and UK models) comes primarily from the authors themselves, motivated by the role publication in prestigious journals play in professional advancement. Article processing charges thus distribute a journal's publication costs across those individuals and institutions that benefit most directly from a paper's publication.²⁰⁹

The guide provided a solid justification and upbeat outlook to the use of the author charge pricing mechanism. The only expressed drawbacks to the charge was the reluctance of scholars and their research funding agency to pay the charge in some

²⁰⁷ Crow and Goldstein (2003), 15-16

²⁰⁸ Crow and Goldstein (2003), 16-17

²⁰⁹ Crow and Goldstein (2003), 17

disciplines and the concern that some scholarship may not be published because of financial constraints, unless sufficient safeguards were in place to ensure that all authors had an opportunity to publish.

The British government in 2004 also investigated whether the financing of the scholarly communication process should occur via an author charge pricing mechanism. This is especially noteworthy given the fact that the University States government has not investigated the issue since 1970. The House of Commons' Select Committee on Science and Technology on December 10, 2003 initiated an inquiry as to "whether the market for scientific publications was working well; how trends in journal pricing affected libraries and other users; the impact that new publishing trends would have on the scientific process; and what provisions were in place to support a secure national archive."²¹⁰ The inquiry served as a follow-up to the 2002 UK Office of Fair Trading report that concluded that while the market for scientific, technical, and medical journals at that time contained flaws, corrections to the market may be required in the future. This 2003 inquiry also served as the government's attempt to determine whether open-access was the proper avenue for scholarly communication in the future. This report looked at seven major issues from the government's perspective as the largest research funding agency in the UK across all disciplines; the accessibility of research, the cost of journals, the journal buying practices by librarians and the journal selection practices by academics, the desirability of institutional repositories, the consequences of transitioning to an author charge pricing mechanism, whether the government should build digital archives of

²¹⁰ House of Commons (2004), introduction

materials, and the impact any of these changes would have on the integrity of the publishing process.

The section of the committee's report titled "Should the Author Pay?" is revealing in several ways. The section begins with the following admission and stated goal:

To a certain extent we found that the eagerness of parties either to promote or condemn the system of author payments hampered a more sophisticated discussion of the issues involved. For the Government either to endorse or dismiss the new publishing model would be too simplistic. Without any Government action, some authors are already choosing to publish in journals that use author payments to recover costs. Author-pays publishing is a phenomenon that has already arrived: it is for the Government and others to decide how best to respond.²¹¹

At first glance, the nature of the expert testimony provided for this section of the report is unsurprising. Commercial publishers testified that the author charges necessary to finance the scholarly communication process would need to be prohibitively high, that the integrity of the peer review process would be compromised with the act of authors submitting payment for publication, and that the author charge pricing mechanism would put authors from the developing world at a disadvantage. Established scholarly society publishers also expressed concern that making journals free of charge to readers would lead to declines in learned society memberships and that the other activities of the scholarly society currently subsidized by journal subscription revenue such as conferences would have to be curtailed in an author-financed scholarly communication process. Startup publishers that make use of the author charge pricing mechanism such as BioMed Central and PLoS, not surprisingly, defended their use of the author charge pricing mechanism, dismissed the claims made by the commercial publishers, and suggested that the government provide subsidies to scholarly societies to replace lost

²¹¹ House of Commons (2004), Section 7, paragraph 143

publication revenue. The report explored the impact an author charge financed scholarly communication process would have on access, peer review, and the impact on the research process and concluded that:

The arguments for the author-pays publishing model are in many ways attractive despite some difficulties which require resolution, and we believe that its implementation would yield many benefits for the global research community. The endeavours of author-pays publishers such as PLoS and BioMed Central to widen access to scientific publications are admirable and they are to be commended for the vigour with which they have pursued their aims. We have recommended that funds be made available from Research Council budgets for those authors that wish to do so to publish in journals that impose publication charges.

We are satisfied that the implementation of an author-pays publishing model would not compromise peer review at the higher end of the market because it would not be in the interests of the publishers concerned to allow this to happen. We do, however, have concerns about free-riders and the potential impact of the new publishing model on learned societies. For this reason, we have recommended that the Government conduct a study and facilitate further experiments to ascertain what the likely impact of the author-pays publishing model will be. We hope that, subject to the resolution of these problems, the conditions can be created so that the author-pays model and other new publishing models can be allowed to flourish, to demonstrate whether or not they are sustainable and to confer their anticipated benefits. This aspiration should be viewed in the context of the current situation, which, as we have explained, is unsatisfactory. We have recommended that Government prepare for change in the formulation of a comprehensive strategy.²¹²

Despite making this conclusion, the report was careful to make mention of the fact that

If the UK were to adopt a policy in favour of author-pays publishing, it would be at a financial disadvantage unless others acted in the same way. By acting alone, the UK would assume the full costs of publication for all its publicly-funded researchers. The resulting articles would be exported abroad where they could be read free of charge. This would increase the impact of UK research. Yet UK scientists also need access to global research. Thus the UK would still have to pay for subscriptions to journal articles originating abroad....(B)y paying both to publish and to read articles, the UK would be investing greater sums in the publishing process than is currently the case. The UK would put itself at a financial

²¹² House of Commons (2004), Section 7, paragraphs 190-191

disadvantage internationally if it were to act alone in mandating publicly-funded researchers to publish in author-pays journals.²¹³

The UK government, for the most part, is alone in investigating from the perspective of the research funding agency the merits of an author-financed scholarly communication process. While the UK government is not alone in paying author charges, major research funding agencies in the US such as the NSF and NIH pay author charges in a fashion no different than they have for the past several decades.²¹⁴

The research funding agencies in both the US and UK generally support the payment of author charges today. There is a notable deficiency however in the House of Commons' report of the author charge pricing mechanism – the impact transitioning the financing of the scholarly communication process from reader pays to author pays would have on the ownership status of the intellectual property present in scholarly articles. This deficiency is not unique to the UK discussion of the consequences of the author charge pricing mechanism. In the US discussion of the consequences of the use of an author charge pricing mechanism, not once are the potential intellectual property ownership ramifications discussed.

The intellectual property environments in these countries are, of course, different. The most significant of these differences is that the whereas UK and European intellectual property laws contain a notion of moral rights in addition to copyrights, US copyright law contains only a protection of the economic interests of the creator via the copyright. The UK government's official description of moral rights is that “In contrast

²¹³ House of Commons (2004), Section 7, paragraph 189

²¹⁴ It is interesting to note that the UK government as late as the 1960s was vehemently opposed to paying page charges in physics.

to economic rights under copyright, moral rights are concerned with protecting the personality and reputation of authors.”²¹⁵ Thus the UK as well as the European terrain is designed to protect both the economic rights of creators using copyright laws and the rights of individuals to preserve their affiliation and identity with the objects they create. Authors must choose to assert their moral rights (unlike copyrights which come into existence automatically) and moral rights can never be assigned (even if the copyright has been transferred). Despite the fact that US intellectual property law lacks moral rights, US, UK, and European intellectual property law have similar ‘work-for-hire’ clauses. These clauses effectively prevent a creator from claiming the copyright or the moral right (if one exists in that country) to objects they create in the course of fulfilling their employment duties. This is a significant and near universal exception clause in nearly every developed country’s intellectual property environment – the creator of the intellectual property is different from the owner of the intellectual property in an employment environment. In most cases, the employer is the owner when they direct and oversee the creation of the product by an employee who is paid to create the work and when the employer has invested significant financial resources in the object’s creation.

While actors such as the university administrator portray the author charge as a means of financing non-commercial scholarly communication initiatives, I posit that the pursuit of cost efficiency is not the only motivation. It is instead more likely, given the increased value attributed to a scholarly article’s copyright and the increased capacity within the university to manage it, that there is a desire to increase ownership and control claims over scholarship. If this motivation does in fact exist, the consequences to the use

²¹⁵ http://www.intellectual-property.gov.uk/faq/copyright/moral_rights.htm

of the author charge pricing mechanism are likely to be different than was portrayed in the literature and reviewed in the previous sections. While I will focus on the US intellectual property environment, extensions can be drawn to the UK and European intellectual property environments as well.

I hypothesize that, while a concern for cost efficiency and wider reader access has influenced the resurrection of the author charge, the narratives calling for a resurrection of the author charge pricing mechanism also indicate that several actors, namely the university and research funding agency, sense a renewed opportunity and reward in pursuing ownership and control rights over the copyright to scholarly articles. To put this hypothesis in the context of this thesis, chapter two showed how the narratives of the cause of the serials crisis were organized around a series of “blame games” where one party was cited as the causal agent of the crisis and the resolution of the serials crisis was said to come when the influence of that agent over the scholarly communication process was reduced. As we saw in the previous section, this was no different when it came to discussing how to pay for the scholarly communication process. The previous two chapters illustrated the fact that many actors had an interest in shaping the nature of the communication process in a discipline as well as the fact that part of this negotiation process over the organization of the scholarly communication process in a discipline involved the decision of how to pay for it. The pricing mechanism chosen reflected a decision of not only who should bear the financial burden for the scholarly communication process but also who should direct the money. These decisions, in turn, determined who owned, managed, and controlled the intellectual property in each article and who was the actor primarily responsible for organizing and funding scholarly

communication initiatives. In most cases, this actor was the research funding agency. In the previous two chapters it was apparent that the research funding agency had an interest in owning and controlling the intellectual property to an article and possessed a significant degree of influence when it came to designing the technology and dictating the organizational structure of scholarly communication initiatives. The research funding agency in some disciplines such as physics decided for several decades that their goals were best be pursued, given the surrounding legal, political, economic, and social environment, with an author charge pricing mechanism. This decision led to the present chapter where I claim that managers within the research funding agency such as the university administrator, sensing an opportunity to reassert ownership and control over the scholarly communication process in many disciplines, are using the serials crisis to claim they are acting in the best interests of scholarly communities when in fact their motives are quite different.

In the next section I will outline the changes that have occurred with respect to the structure of the university and the understanding of who owns the intellectual property within scholarship. I argue that these are changes that have motivated university administrators to serve as advocates for the author charge pricing mechanism. Prior to the page charge, commercial publishers owned and controlled the intellectual property contained within scholarly articles. Referring to the university's motivation for the use of the author charge, in section four I show that the negative consequence to the use of the author charge, control of the intellectual property by the university who has an interest in profiting from it and controlling its distribution, is real and leaves scholarly communities in no better a situation, if not worse, than they are already in.

5.3 Changes in the Funding and Intellectual Property Terrain and the Re-Emergence of the Author Charge Pricing Mechanism

There are two sets of changes that explain the motivation behind the re-emergence of the author charge pricing mechanism; changes in the capabilities and organizational design of the academy, and changes in the understanding of who owns the intellectual property in scholarship. The goals and organizational design of the academy changed, in part, because the source and level of research funding changed. This change in research funding, characterized as reduced support from the government and a shift in support from the physical sciences and engineering to biomedicine, was documented in Martino (1992) and Mirowski and Sent (2002). In a report titled, “Changes in Federal and Non-Federal Support for Academic Research and Development over the Past Three Decades,” the National Science Foundation noted that, while the federal government still provided the majority of academic research and development funding overall (58% in 2000), this share has declined steadily since the 1970s (68% in 1972).²¹⁶ The same decline occurred with support from state and local government (10% in 1972 to 7% in 2000).²¹⁷ At the same time, institutional and industry support has increased (from 12% in 1972 to 20% in 2000 and from 3% in 1972 to 7% in 2000 respectively).²¹⁸ These declines and increases

²¹⁶ Rapoport (2002), 1

²¹⁷ Rapoport (2002), 2

²¹⁸ Rapoport (2002), 3-4

in support were not spread equally across disciplines. The NSF report found that the most significant declines in the federal share of support, in both absolute and relative terms, was in the social sciences (from 57% in 1973 to 38% in 2000) and engineering (71% in 1973 to 56% in 2000). The report also found that the smallest decline was in the computer sciences (from 70% in 1973 to 66% in 2000).²¹⁹ The report concluded by noting that these same trends held across non-federal sources of support.

The same set of social, political, legal, and economic changes outlined in Mirowski and Sent (2002) that influenced the way research was funded also encouraged a re-organization and realignment of the university where much of this research was conducted. Slaughter and Leslie (1997) and Slaughter and Rhodes (2004) noted that this reorganization of the academy could be characterized as an emergence of academic capitalism. A re-organization process marked the rise of academic capitalism. Academic capitalism is marked by an accumulation of managerial capacity within the academy and an emphasis placed on the development of profitable activities. Slaughter and Rhodes (2004) wrote:

We see the academic capitalist knowledge/learning regime as characterized by the development of new networks of actors who develop organizations that span and blur the boundaries between public and private sectors. We have come to see colleges and universities (and academic managers, professors, and other professionals within them) as actors initiating academic capitalism, not just as players being 'capitalized.'²²⁰

Academic capitalism is itself simultaneously shaped by and the motivating force behind the second change to encourage a re-emergence of the author charge pricing mechanism

²¹⁹ Rapoport (2002), 4

²²⁰ Slaughter and Rhodes (2004), 11-12

– a change in the legal interpretation of who owned the intellectual property within scholarship.

In chapter three I noted that the passage of the 1976 Copyright Act represented a significant change in the intellectual property terrain in the United States. This Act embodied the increased interest over the ownership and control of the copyright. With this law, the intellectual property content within scholarship was given an explicit owner and set of boundaries. The copyright came into existence once the owner was designated as the author or artist (except in the case of an employee conducting work that was requested or required by an employer). Chapter three found that authors, in turn, transferred these now explicit rights to publishers. In essence, publishers benefited the most from the passage of the 1976 Copyright Act because they could force on authors the transfer of a now explicitly defined piece of property. The fact that the 1976 Copyright Act specified that the author or artist was the original owner of the copyright in a creative work did not mean that the ownership is not contested today. In fact, the same socio-political and economic changes – changes which encouraged the change in the source, the amount of research funding, and in the organization and motivation of the university – has led to increased contention over the consequences and applicability of the work-for-hire clause of the 1976 Copyright Act (whether scholars are employees who write articles as a response to the demands of the university who is understood as the academic’s employer). If it is the case that the work-for-hire clause applies to academics it could be argued that the university owns the intellectual property in scholarship. This is troubling because it has been assumed for hundreds of years that scholars owned the works they created. More specific to copyright law, it has been assumed that there exists a scholar

exception to the work-for-hire clause. If there is no exception to the work-for-hire clause, the consequences to the use of the author charge pricing mechanism would then extend beyond efficiency.

The work-for-hire clause first emerged in the 1909 Copyright Act as a response to the concerns of publishers of encyclopedias who faced the logistical nightmare of having to keep track of every contributing author for the purposes of renewing a copyright, reusing material, or granting permission for duplication. In *Williams v. Weisser* (1969), a Federal Appeals court ruled that the work-for-hire clause did not extend to professors or their delivered of lectures and that the scholar exception to this clause, although implicit, was necessary to prevent disorder.²²¹ This has come to be known as the scholar exception to the work-for-hire clause. The 1976 revision to the 1909 Copyright Act retained the work-for-hire clause originally contained in the 1909 act.²²² Initially, this clause led to some confusion among the lower federal courts in applying it to scholars and librarians because the terms ‘employee’ and ‘employer’ were undefined.

For instance, in *Weinstein v. University of Illinois* (1987), Weinstein sued his two co-authors and the university because one of his co-authors had revised the article, published it, and listed Weinstein’s name last rather than first.²²³ Weinstein argued that the co-authors and the university had wrongfully distorted his work and stolen credit for it by listing his name last. The federal district court originally ruled that Weinstein’s

²²¹ *Williams v Weisser*, 273 Cal App 2d 726 (1969)

²²² In the 1976 Copyright Act the work-for-hire provision stated that when a work was prepared by an employee within the scope of employment that “...the employer or other persons for whom the work was prepared for is considered the author... and unless the parties have expressly agreed otherwise in a written instrument signed by them, owns all the rights comprised in the copyright.” Packard (2002), 278.

²²³ *Weinstein v. University of Illinois*, 811F. 2d 1091. 7th Cir. (1987)

article was a work-for-hire and thus owned by the University of Illinois, which could do to the article whatever it wanted. This ruling was made possible by the court's interpretation of the university's copyright policy, which specified that scholarship created by a professor was considered a specific requirement for employment. However, the 7th Circuit Court of Appeals ruled that articles were not a requirement of duty of a scholar's job and that the university's copyright policy formally recognized the tradition that professors own the intellectual property in creative works (that there exists a scholar exception to the work-for-hire clause).

Further evidence that a scholar exception exists for the work-for-hire clause in the 1976 Copyright Act was found in the ruling of *Hays v. Sony Corporation of America* (1988).²²⁴ In this case, two high school teachers sued Sony for infringing upon the copyright to a manual they had written explaining how to use their school's word processors. Although the Seventh Circuit Court dismissed the case on the grounds that it had not been properly brought before it (the plaintiffs cited the Illinois common law of copyright which had been abolished by the 1976 Copyright Act), Judge Posner took this opportunity to comment on the scholar exception to the work-for-hire clause of the 1976 Copyright Act. Judge Posner wrote:

Until 1976, the statutory term 'work made for hire' was not defined, and some courts had adopted a 'teacher exception' whereby academic writing was presumed not to be work made for hire. The authority for this conclusion was in fact scanty, ...but it was scanty not because the merit of the exception was doubted, but because, on the contrary, virtually no one questioned that the academic author was entitled to copyright his writings. Although college and university teachers do academic writing as part of their employment responsibilities and use their employer's paper, copier, secretarial staff and (often) computer facilities in that writing, the universal assumption and practice was that (in the absence of an explicit

²²⁴ *Hays v. Sony Corporation of America*, 847F 2d 412 7th Cir. (1988)

agreement as to who had the right to the copyright) the right to the copyright such writing belonged to the teacher rather than to the college or university.²²⁵

Although Posner's comments have been frequently cited as evidence that scholars, rather than the university, owned the copyright to their creative works, these comments did not carry any binding authority due to the fact that the case had already been dismissed.

The Supreme Court, in *Community for Creative Non-Violence v. Reid* (1989), attempted to define the terms employee and employer and, in so doing, established some consistent rules as to whether scholars were employees and universities were employers.²²⁶ In *Community for Creative Non-Violence v. Reid*, a sculptor argued that the copyright to a statue he created belonged to him because he created the work as an independent contractor. Community for Creative Non-Violence argued that they owned the copyright to the statue because they commissioned the work. The District Court had ruled the statue a work-for-hire and that Community for Creative Non-Violence was the owner of the copyright to the statue. The Court of Appeals reversed the decision and argued instead that Community for Creative Non-Violence and Reid jointly owned the copyright. The Supreme Court affirmed the Appeals Court and ruled that whenever Congress failed to define the term 'employee' or 'employer,' one must refer to the common-law agency doctrine which defined employees and employers in terms of the master-servant relationship between the two parties. What this ruling meant was that whether a work was prepared in the course of employment, and therefore considered to be a work-for-hire product was determined by the degree to which the employer controlled the manner and the means by which the work was produced (such as whether

²²⁵ Packard (2002), 286.

²²⁶ *Community for Creative Non-Violence v. Reid*, 490 U.S. 730 (1989)

the work was something the person was hired for, whether the work was conducted substantially with the employer's resources, and whether the employee's motivation in creating the work was to serve the employer). The court ruled that the presence of any one of these single factors did not alone determine whether a master-servant relationship existed.

The issue of whether scholars were employees or not and subject to the work-for-hire clause remained unresolved with the *Community for Creative Non-Violence v. Reid* in 1989. It bears mentioning however that in *University of Colorado Foundation v. American Cyanamid* (1995) the court found that a research article was a work-for-hire in a situation where the professor and the university cooperated in the litigation.²²⁷ This ruling, the only case post- *Community for Creative Non-Violence v. Reid*, left Packard (2002) to conclude the following:

Most educators assume that copyright law guarantees them the copyright to their articles and courses. Actually no such guarantee exists. In fact, the letter of the law implies the opposite – that faculty writings should belong to universities under copyright law's work-for-hire provision.²²⁸

Despite this finding, many scholars remain confident that that they own the intellectual property in their scholarship because of institutional copyright policies.

Robert Gorman, Professor of Law at the University of Pennsylvania and former President of the American Association of University Professors, identified the two reasons why institutional copyright policies identified scholars as owners of the copyright to their creative works: case law and principles of academic freedom. Gorman (1998) wrote:

²²⁷ *University of Colorado Foundation v. American Cyanamid*, 880 f. Supp. 1387 (D. Colo. 1995)

²²⁸ Packard (2002), 277.

...many universities, my own included, have through the years conspicuously promulgated formal policies declaring that the university shall own – or jointly own – faculty works that are ‘prepared with the substantial use of university materials or facilities’ or some such formula. Of course, all academics routinely do just that – we use, in some combination, university office supplies, computers, library books and journals, and the services of a university secretary or research assistant. Yet universities have wisely been hesitant to press their rights under these formal policies – both because of the anticipated uproar from faculty and because of the serious doubt that such policies are legally enforceable. ...University ownership of scholarly works and teaching notes and materials produced by faculty members would profoundly contradict the assumptions and practices of the academic community. Almost all of the few court decisions handed down on this matter clearly state that traditional practices control and that faculty authors own copyright in their works....To treat faculty writings as works made for hire would affront, in the most fundamental way, the tents of academic freedom.²²⁹

As I have already shown, the first reason – support of a scholar exception to the work-for-hire clause in case law – is questionable. The second reason – that scholar ownership of the copyright to research articles was essential to protect academic freedom – is dubious as well. Upon reviewing the case law surrounding academic freedom Packard (2002), concluded that relying on notions of academic freedom to bolster faculty claims to the intellectual property in scholarship was also unsustainable. Packard wrote:

...although the Supreme Court and lower courts have shown support for the notion of academic freedom in university, their support is largely focused on the need of universities to be free of government control, rather than professor’s needs for freedom of expression. Court notions of academic freedom appear to be primarily institutional, rather than individual in nature.²³⁰

Furthermore, Packard noted that the few cases that supported academic freedom for individual professors pertained to high school teachers and not university professors. Having rejected the two reasons cited by Gorman as to why institutional copyright

²²⁹ Gorman (1998), 15-16.

²³⁰ Packard (2002), 289.

policies allocated to scholars ownership over their traditional scholarly works, Packard believed that “...in lieu of specific legal protection for academic work, faculty are left to turn to their university copyright policies for copyright protection from their employers.”²³¹ It is the issuance of institutional copyright policies that is the only remaining source of legal recourse for scholars seeking ownership over the intellectual property in traditional scholarly works such as scholarly articles.

Universities and other research funding agencies since the 1950s have established themselves as owners of patents. When the first institutional copyright policies emerged in the 1960s, scholars were identified as the owners of the copyright to the less valuable of their creative works (articles, lectures, and course materials). By contrast, the university reserved for itself ownership of the copyright to software. This transference of the copyright to scholars is under severe question however when there is a consideration of the trends identified in the previous section where universities have transformed themselves in line with the principles of academic capitalism. Academic capitalism represents a time when universities begin to realize the potential profit in online distance education courses and set up institutional repositories of the scholarship created by their scholars. Consequently, there is a growing realization that the copyright to these materials is more valuable than is traditionally understood to be the case and that ownership over the copyright remains open to debate.

Overall, institutions seek greater control over intellectual property, as evidenced by the increasing restrictiveness of an institution’s patent and copyright policy over time. Slaughter and Rhodes (2004) noted that, while many of these policies mentioned the

²³¹ Packard (2002), 293.

public mission of these institutions and the societal benefits that research created, the focus of these policies was on ensuring that the proper incentives existed for creators and that an adequate return on research investments was paid to the institution. None of these policies were designed to actualize and to make explicit a status quo wherein the scholar was considered the owner of that which they create. Rather, each policy claimed ownership over at least some aspect of a scholar's production. More specific to copyright policies, Lape (1992) and Packard (2002) found that institutional patent and copyright policies had, over time, widened the scope of their control by applying it to a wider set of individuals (faculty, adjuncts, staff, researchers, and students), and increasingly used 'work for hire,' and 'within the scope of employment' language so as to establish ownership and control over a broader set of objects produced by scholars.

Packard agreed that most academics had in their favor the fact that institutional copyright policies have traditionally waived any rights to copyright over scholarly articles or class materials. The question is whether the university will continue to honor this tradition, given the potential profits to be had in digital scholarship and distance education. An enhanced capacity within the university to manage copyrights that scholars have traditionally transferred to publishers also makes it less likely that universities will abandon ownership over the copyright to scholarly articles and class materials. To answer this question, Packard updated a study of the institutional copyright policies at seventy Research I universities that had originally been conducted by Lape (1992). Lape found that, in 1991, eleven of the seventy universities had no formal copyright policies and that five had one only in draft form. Ten years later, Packard found that all but one had adopted a policy with three working on drafts. Ownership over

faculty works generally is marked by the substantial investment of university resources to create the object, with forty-two universities using the “substantial investment” language in 1991 and fifty-seven doing so ten years later. Lape and Packard both found that institutional copyright policies assigned to faculty copyright to books, articles, plays, and poetry. Whereas Lape found in 1991 the existence of sixteen policies where ownership to the copyright for these items was disclaimed, Packard in 2001 found forty-nine policies.

Packard concluded her discussion by asking why an increasing number of institutional copyright policies allocated to scholars ownership of the intellectual property, including their articles and lectures. The most obvious reason was that the copyright was not valuable and too expensive to manage. Packard (2002) wrote:

...some legal scholars and even a few universities have noted that market conditions are probably a factor. As the University of Chicago Copyright Policy points out, traditional scholarly works, on the whole have never been particularly profitable. The expense of trying to manage all the scholarly articles, monographs and academic books produced every year by faculty would likely outweigh any profit that could be made from them.²³²

Packard also suggested the more troubling explanation that institutional copyright policies were generous because the institution had an expectation that the courts, if needed, would later rule the institutional copyright policy an invalid transfer of rights.

Packard wrote:

It is simply not clear whether university guarantees of copyright protection will hold up under the law. Some scholars have noted that university policies may not be effective in altering copyright’s presumption that a work produced within the scope of employment belongs to the employer, no matter how many times the policies cite academic freedom, disavow rights to traditional scholarly work, or define a work for hire as an

²³² Packard (2002), 306-307.

assignment beyond a faculty member's normal scope of duty. This is because Section 201 of the Copyright Act provides that the employer or the person for whom the work is prepared is the author of a work made for hire 'and, *unless the parties have expressly agreed otherwise in a written instrument signed by them,*' owns all of the rights comprised in the copyright....Without signatures from both parties, the policies might not alter the law.²³³

The fact that the economic and organizational disincentives to universities claiming ownership over the copyright have disappeared and the revelation that institutional copyright policies quite likely represent an invalid assignment of ownership rights to scholars leads me to conclude that scholars have little, if any, claim of ownership over the copyright to scholarly articles.

This section outlined changes in the source and magnitude of research funding, changes in the organizational structure of the academy, and changes in the perception of who owns the intellectual property contained within scholarship. Each of these changes mutually informed and reinforced each other and brought us to the present, where both the identity of the academy as a public or private actor remains unknown and the owner of the intellectual property within scholarship remains contested. In the next section I outline how this uncertainty over the identity of the university and who the owned the intellectual property within scholarship was problematic and potentially illuminated a different set of motivations behind the re-emergence of the author charge pricing mechanism.

²³³ Packard (2002), 307-308.

5.4 The Grab for the Copyright, the Serials Crisis, and the Author Charge Pricing Mechanism

The primary reason why we as a society are witnessing a re-emergence of the author charge pricing mechanism is not because of the university's (or any other research funding agency for that matter) desire to achieve cost efficiency or to liberate scholarly communities. University administrators and librarians have known since the 1950s that author charges created the conditions for a more cost-effective scholarly communication process, and yet universities have done nothing to support the charge's use outside of a few disciplines. As of late, we are witnessing calls for the revived use of author charges in a select set of disciplines. The choice of these disciplines and the changes outlined in the previous section hint that the motivation is linked to a desire on the part of the university to own the intellectual property within scholarship, which in many disciplines, is identified as being valuable.

There are three reasons why the university wants to control the copyright to traditional scholarly works such as the journal article in a select number of disciplines. First, there is an increasing realization by universities that distance education and electronic publishing makes the copyright potentially more profitable than was the case in the print era. Second, changes in the university's infrastructure makes owning copyrights more manageable. Third, the protection of valuable patent rights depends on how results are disclosed. As a result, in order to maintain the value of the patent, the university has to own and control the means by which results in some disciplines are disclosed in lectures, conferences, and scholarly articles. This ownership and control can only be

achieved through possession of the copyright to the object. The bleak consequence of all three changes is that the ownership of the copyright by the scholar will only occur to the extent it is either unprofitable or unmanageable.

In disciplines such as biomedicine, where the copyright within scholarly articles is both manageable and profitable, the use of an author charge pricing mechanism to fund the scholarly communication process creates a situation where the university potentially captures a stronger claim over the intellectual property. Scholars in biomedicine may be told by university administration officials that the charges are being paid out of a desire to resolve the serials crisis, but it is more likely that the significant direct financial investment made in the scholarly communication process in certain disciplines reflects a desire to either meet the exception criteria to scholar ownership of the copyright to their writings (the author charge representing a significant commitment of university resources and thus owned by the university) or to meet a number of the criteria outlined in *Community for Creative Non-Violence v. Reid*. This latter option establishes the scholar as the employee, the university as the employer, and the copyright as belonging to the university.

This attempt by the university to capture ownership of the copyright indirectly in some disciplines through the author charge occurs in a more direct fashion in other disciplines where the copyright is deemed not valuable enough to warrant an investment in author charges. Scholars in the humanities and social sciences find themselves in a situation where they are being asked by university administrators to relinquish their ownership of the copyright to the university in order to resolve the serials crisis. An

example of this kind of narrative is found in Bennett and Matheson (2001). Bennett and Matheson wrote:

What changes might be made to protect scholarly communication? Some experts believe that research universities should de-emphasize the 'quantity' of a scholar's publications when they award tenure or promotions. But a more powerful response lies in the commercial realm: the commercial value of a copyright must be recognized and managed as a university resource. Universities can manage copyrights so as to change marketplace conditions that are unfavorable to scholarly communication... Change is always problematic, especially when it involves something as fundamental to scholarly publishing as copyrights. Since faculty members tend to resist administrative interference, they probably will resist the idea that journal articles are work done for hire – until they are convinced that such a system can lower the cover cost of communication and thereby benefit scholarship.²³⁴

Here, the librarians blamed the commercial publisher for the crisis and highlighted the fact that the stranglehold of the publisher existed only because of the publisher's possession of the copyright to the article. Defining traditional scholarly works as works-for-hire was characterized as a positive consequence to scholars. Bennett, for one, took these ideas and, through Yale University's Committee on Cooperative Research, proposed an addendum to the institution's copyright policy.²³⁵

These proposals are not unique to Yale University nor do librarians alone promulgate them. Steven Koonin, provost of the California Institute of Technology has made much the same proposal and has argued that Caltech and its faculty members should jointly own and retain the rights to journal articles and license those copyrights to publishers on a limited basis. Provost David Shulenburg has made the same proposal at the University of Kansas. Even some academics advocated this proposal with twelve

²³⁴ Bennett and Matheson (2001), 136.

²³⁵ <http://www.library.yale.edu/~llicense/bennett.html>

scholars from the American Academy of Arts and Sciences writing a commentary in Science magazine that called on the federal government to require researchers using government funds to retain the copyrights to their published works.²³⁶ The Association of American Universities, Pew Higher Education Roundtable, and Association of Research Libraries all support university control of copyrights to resolve the crisis. In disciplines within the humanities and social sciences, scholars may feel they have little to lose if they relinquish control over the copyright to their article. These scholars already perceive the value of this copyright as being small, and may see university management of the copyright as a viable solution to the serials crisis. In disciplines within the sciences, such a relinquishment may not occur so easily. Yet it is in these disciplines where the copyright is the most valuable to the university administrator. Thus, ownership is a very strong motivating force behind the re-emergence of the author charge pricing mechanism. Not only can the use of the pricing mechanism be explicitly advertised to scholars as a means to reduce reliance on commercially published reader-subscription journals, but also can implicitly be used by administrators and intellectual property managers in technology transfer offices to establish the university as the owner of the copyright.

In paying an author charge like the page charge, the university or research-funding agency accomplishes several things. First, the payment establishes and makes explicit the financial investment of the university or research funding agency. This financial investment extends to the university a stronger claim of ownership by meeting the frequently cited exception criteria in institutional copyright policies that allow the university to claim ownership to a copyright typically reserved to scholars. Second, the

²³⁶ Bachrach, Berry, Blume, Foerster, Fowler, Ginsparg, Heller, Kestner, Odlyzko, Okerson, Wigington, and Moffat (1998).

payment extends to the university or research funding agency greater control over the means by which it is distributed (payment can be refused to for-profit journals, journals that fail to meet a specific review criteria, etc.). In so doing, the university or research funding agency can make the case that it meets the earlier cited criteria for defining something as work-for-hire and thus owned by the employer. Third, the university satisfies the 'exception criteria' in institutional copyright policies of a substantial investment of institutional resources and satisfying more of the conditions to be defined as an employer according to common law agency doctrine. Fourth, the author charge pricing mechanism makes electronic scholarly communication initiatives financially viable. Such initiatives reduce the role of the commercial publisher who, at the present moment, is the university's most formidable competitor for the control of the copyright. Given these reasons, it seems reasonable to conclude that not only might the scholarly communication process become cheaper as the author charge is used, but that the university, in using the charge, has identified several more reasons why they are the rightful owners of the scholarly article's copyright.

Scholars seem content to believe that copyright law, or at a minimum their institution's copyright policy, defines them as the owner of the intellectual property in most objects they create, and that the sole motivation of universities is to reduce their scholarly communication expenses. When there is a deeper discussion of the 1976 Copyright Act and the case law associated with it, it becomes apparent that scholars are employees that create works-for-hire. When there is a deeper discussion of institutional copyright policies, it becomes apparent that not only are these policies becoming more encompassing in what rights the institution reserves for itself, but that these policies may

also invalidly transfer the increasingly fewer intellectual property rights reserved to scholars. Given the increased value attributed to intellectual property even in traditional scholarly works and the rise of academic capitalism, it seems likely that the university will continue to expand its ownership claims over intellectual property. As a result of all of these facts, it stands to reason that the motivation of the university behind managing the copyright or paying the author charge are different than what is communicated. In the end, scholars, by allowing universities to manage copyrights or pay author charges, put themselves in no better, if not a worse situation than the present where the commercial publisher owns most of the copyrights.

The question comes down to whether the research funding agency, by virtue of investing financial resources in the research and the reporting of it, emerges as its owner? From what I have outlined above, it is not inconceivable to see the research funding agency (the university) encouraging a transition to an author-based pricing mechanism out of a desire to pursue more than cost efficiency. In fact, the author charge pricing mechanism, when used in conjunction with an intentionally designed scholarly communication process, can potentially give the research funding agency a stronger legal defense in claiming ownership over the scholarship. The advantage to the research funding agency in staking out such a claim with a pricing mechanism is that it is less contentious than a court battle, and the motivation behind the change in pricing mechanism can be manipulated.

When one asks why the university or any other research funding agency is so concerned about restructuring all aspects of the scholarly communication, certainly efficiency is a motivation. However, as we saw in Chapter 2, a crisis in the scholarly

communication process is not a new phenomenon. Why now is the university so actively seeking a solution to the serials crisis? And can the answer to this question also explain why the university is currently focusing its attention first on finding solutions for the scholarly communication processes in the natural and physical sciences? Is it the case that the severity of the current manifestation of the serials crisis is somehow so intense as to warrant action, or does the university have an unrevealed incentive to structure the scholarly communication process in a particular way? The existence of an unrevealed goal may explain why the university is acting to alter the scholarly communication process in the natural and life sciences first. While the serials crisis is perhaps more intense in the sciences, why would the university enthusiastically act now to change the process when previously crises were dealt with only reluctantly? That the university's primary motivation in using the author charge is the establishment of an ownership claim over the copyright to the scholarly article is reflected in the fact that most electronic projects in the life and natural sciences are funded by author charges. Focusing on use of author charges in those disciplines where the results of research are potentially more lucrative, it becomes increasingly apparent that a research funding institution like the university is more concerned about the assignment of intellectual property than cost effectiveness.

The same argument could be made for those research funding agencies in Europe. The research funding agencies in Europe are primarily the national governments. The national government is faced with the task of justifying the significant expenditures on research. One justification is that funded research creates real assets for the government that can generate revenue in the future. At a minimum, many of these national

governments seek to ensure that their interests in owning intellectual property is not compromised by the creator transferring the rights to a third party (such as when authors sign copyright transfer agreements presented to them by journal publishers). While the UK House of Commons inquiry into the scholarly communication process neglected to consider intellectual property concerns with regard to the use of the author charge pricing mechanism, intellectual property concerns were discussed in relation to institutional archives. The inquiry reported that:

A recent analysis of publisher copyright agreements with authors found that "90% of agreements asked for copyright transfer and 69% asked for it prior to refereeing the paper. 75% asked authors to warrant that their work had not been previously published although only two explicitly stated that they viewed self-archiving as prior publication. 28.5% of agreements provided authors with no usage rights over their own paper."²³⁷

From this finding, the inquiry concluded that for the purposes of institutional archives that "A greater degree of consistency is desirable in copyright agreements, from publishers, but also from Government, institutions and academics, who have the power to influence the terms on which copyright agreements are established."²³⁸ The report also noted that authors face no incentive to retain these intellectual property rights because they fear alienating the journal's publisher and compromising their future ability to publish with the publisher. Jane Carr of the Authors Licensing and Collecting Society (ALCS) provided oral testimony to the House of Commons and in her remarks on the copyright suggested that "because scientific authors may be less concerned about personal financial return (due to research and publication being part of their salaried position or grant money) they are largely unaware of the substantial secondary rights

²³⁷ House of Commons (2004), Section 6 and paragraph 121

²³⁸ House of Commons (2004), Section 6 and paragraph 121

incomes currently available.”²³⁹ The House of Commons report, when discussing copyright in the context of institutional archives, concluded that the government should determine

...what impact a UK-based policy of author copyright retention would have on UK authors. Providing that it can be established that such a policy would not have a disproportionately negative impact, Research Councils and other Government Funders should mandate their funded researchers to retain the copyright on their research articles, licensing it to publishers for the purposes of publication.²⁴⁰

The suggestion made here is that the government protects their copyright for research they finance. As a result, the report also recommended that the locations where this research is occurring, primarily the universities, be given funds and trained staff to manage and control the copyrights they would be acquiring. In other words, the report recommends, with respect to institutional archives, that the government take an active role in universalizing the intellectual property transfer agreements signed by faculty members and that the government provide staff to universities to administer and manage the intellectual property rights they would be capturing from authors. While section 7 of the House of Commons report which deals with author charges does not discuss the issue of the consequences to the ownership of intellectual property, it would seem likely that such a discussion would have made the payment of author charges by the government contingent on the government securing ownership of the copyright themselves rather than permitting authors to transfer it to publishers.

²³⁹ House of Commons (2004), Section 6 and paragraph 123

²⁴⁰ House of Commons (2004), Section 6 and paragraph 126

In this section, I revealed that the university, across the disciplinary landscape, sought ownership and control over the copyright to scholarly articles. In many disciplines where the copyright has little value, citation of a serials crisis and blaming the commercial publisher provided sufficient motivation to encourage scholars to transfer the copyright to the research funding agency. In disciplines in the sciences, the stakes are higher. Many of the scholars in these disciplines are aware of the high market value attributed to the intellectual property they create. Thus they are not likely to part with their intellectual property without receiving something in return, unless they are forced to part with their work. Furthermore, given the potential high value of this intellectual property, the university may seek a more fail-safe means of establishing themselves as the owners. Enter the author charge pricing mechanism. The author charge pricing mechanism, when paid by the university, not only strengthens the university's legal claim over the intellectual property in scholarship, but it also reduces the overall financial burden of the scholarly communication process thus pleasing both scholars as the severity of the crisis is mitigated and the university who bears the financial burden. In the next section, I outline the design of three electronic initiatives where an author charge pricing mechanism is used, and I highlight the dangers posed to scholarly communities that contribute scholarship to a journal where ownership of the copyright remains unresolved.

5.5 The Author Charge Pricing Mechanism in Practice in the Electronic Era

In this final section I outline the design of several electronic initiatives that employ an author charge pricing mechanism in order to illustrate the motivation of the

publisher and to allude to the motivation behind the author's decision to (in most cases, the university) pay or not pay the charge. There are roughly three categories of actors that are making use of an author charge pricing mechanism. First, there is the for-profit publisher who funds the electronic scholarly communication initiative with author charges but only to the extent that expenses are met. In this case, the author charge financed initiative is used as a vehicle to sell more lucrative products and services. Second, there is the not-for-profit publisher who uses the author charge to meet the expenses of initiatives that are organized solely around expanding the distribution of scholarship. Third, there is the for-profit commercial publisher who offers authors an option to either pay an author charge and have their article freely available to others or use the traditional reader subscription model. The initiatives organized by each of these publishers, although sharing the fact that they are funded with an author charge pricing mechanism, are very different from one another with regard to how the fee is designed, how the technology is used, and the treatment of the intellectual property. The scholarly communication initiative that best represents the first category is BioMed Central (BMC). The scholarly communication initiative that best represents the second category is Public Library of Science (PloS). Finally, the scholarly communication initiative that best represents the third category is Open Choice. I will first outline the design of each of these initiatives. Next, I will compare and contrast these projects against each other to illustrate how those authors, submitting materials to the first two initiatives and relying on the university to pay the author fee, obtained a legally defensible claim of ownership and control of the intellectual property to the scholarship.

5.5.1 The For-Profit Publisher using the Author Funded Scholarly Communication Process as a Vehicle to Sell Goods and Services

BioMed Central (BMC) is a publisher of over 100 electronic journals that provide “peer reviewed research across all areas of biology and medicine with immediate, barrier-free access for all.” BMC is an independent publishing house within the Current Science Group. The Current Science Group describes itself as a group of independent publishing companies that collaborate to publish and develop information services for the biomedical community. BMC emerged in mid-2000 as a response to the large commercial publishers defeating an attempt by the National Institutes of Health to make articles funded with grant money available free of charge electronically either immediately or after a delay of 6-12 months. After the publishers rejected this proposal, many scholars formed an organization known as the Public Library of Science (PloS). PLoS first circulated a letter where scholars pledged to boycott pay-for-access journals and, instead, pledged to submit, review, and edit manuscripts that appeared in author-pay journals. Sensing the opportunity, BMC journals emerged in 2001 and until October 2003 was one of the few publication outlets where authors that signed the letter of protest honored their pledge.

When an author submits a manuscript to one of the over 100 journals associated with BMC, they receive a fast review process from two reviewers (plus a statistician if necessary). Upon acceptance, either the author pays a processing charge (currently set at \$525 for most journals, explicitly stated as a fee set to cover the marginal costs of publishing the article), receives a waiver based on institutional affiliation, or receives a

waiver based on economic hardship. The article, once published, is made available free of charge to readers. The author only grants BMC a non-exclusive right to publish the article and identify itself as the original publisher. Drawn entirely from the Creative Commons Attribution License, anyone is free to copy, distribute, display the article, make derivative works, and make commercial use of the work provided that the author is given credit and it is made clear to others what the license terms of the work are.²⁴¹ This license is seen as securing for authors “their ‘moral’ right to protect the integrity of their work and to have the full work referenced whenever all or part of it is reproduced.”²⁴² Published articles are immediately archived in the National Institute of Health’s repository called PubMed Central and submitted to electronic indexing and citation services. Authors can download data that would indicate how often their article was viewed or downloaded. Finally, the time period between acceptance and publication is significantly shorter than is the case with the print journals, and in most cases this time frame was less than sixty days.

What is perhaps more revealing about BMC is not its present structure nor even the participation of BMC officials in UK parliamentary investigations into commercial publishes and their self-promotion as a solution to the serials crisis. Rather, the motivations of the organizers and funders of BMC are revealed partially through a history of the pricing mechanisms used. Originally, advertising on the website was the primary source of revenue. On June 29, 2001, BMC proposed charging authors of accepted papers as a means to cover publication costs. Announcing this proposal, BMC was quick

²⁴¹ <http://creativecommons.org/about/licenses/>

²⁴² BioMed Central (1999-2004)

to note that charging authors had a well-established past. In the press release BMC wrote:

By paying a moderate charge to cover the cost of publication, which in turn will fund open access, scientists will be contributing to a system that is revolutionizing the way in which research is shared.²⁴³

On November 30, 2001, BMC announced that, after consultation with scientific communities and representatives of funding agencies, that the author charge would consist of a \$500 accepted article submission charge effective January 1, 2002. In the press release, BMC wrote:

BioMed Central's business model attempts to address the concern within the scientific community that subscription charges are strangling the communication of scientific research....BioMed Central believes that the payment of a small processing charge in return for immediate and permanent free access to published research will become a widely accepted and standard part of scientific funding policy. Preliminary discussions with funding bodies and research institutions suggest that payment of processing charges from research grants and infrastructure funding will be allowed.²⁴⁴

A little over a year later, on December 20, 2002, BMC announced that it would introduce a membership scheme that would reduce the reliance on the author submission fee.

While BMC reiterated its commitment to making research articles freely available to readers, BMC discovered that it was difficult to convince individual scholars to pay the charge and, at the same time, compete with those journals that published an author's article free-of-charge. BMC's solution was to invite institutions to join as members and, as members, pay a fee determined by the number of possible researchers at the institution and ranging from \$1,500 to \$10,000 per year. Two benefits of membership were that all research staff and students at the institution could submit an unlimited number of papers

²⁴³ BioMed Central (2001a)

²⁴⁴ BioMed Central (2001b)

to BMC journals free of charge and that institutions could archive on a customized BMC website all of the abstracts to articles by their scholars irrespective of where these articles were originally published.

In early 2004, BMC proposed yet another change to the pricing mechanism used. BMC proposed, via the Yale University LibLicense Discussion list, that the fee charged an institution to renew their membership would be determined by the number of articles submitted by the institution in the previous year. BMC noted that the previous practice of determining the fee on the basis of the number of potential authors created a situation where costs were unequally shared. However, librarians complained not only about the way the proposal was announced but also about the fact that this new membership scheme was no better than the current subscription model, that this scheme would cause budgeting problems, and that this scheme neglected what many librarians saw as the fundamental problem of the scholarly communication process -- researchers bore none of the costs of publication and librarians bore all of the costs. As a result, on September 15, 2004 BMC rescinded its proposal.

While BMC continues to use a variation of the author charge pricing mechanism, the focus of the publishing house has been and continues to be the use of scholarly communication portal as a vehicle for selling more profitable goods and services. Vitek Tracz, Chairman of BMC, reiterated this in an April 6, 2000 press release when he commented:

We do not see primary research data as a direct source of income for us. We want to redefine the role of commercial biomedical publishing by focusing on adding value and offering services that complement the freely available original research and literature of the future.²⁴⁵

²⁴⁵ BioMed Central (2000)

And this business model of using open access author charge supported journals as a service that allows for the marketing and sale of other products and services is evident today. BMC, for instance, also operates the Faculty of 1000 service, which evaluates and recommends new scientific literature and Images.MD, which makes available the medical imagery published by Current Science Group.²⁴⁶ BMC also offers services such as Open Repository where professionals from BMC offer to help institutions “launch, maintain, and populate” their institutional repositories.²⁴⁷

5.5.2 The Not-for-Profit Publisher using the Author Funded Scholarly Communication Process as a means to Subvert Commercial Publishers

Besides BMC, the journals in the Public Library of Science (PloS) also rely on funding from author charges. PloS is a coalition of research scientists primarily in the biomedical sciences that seek to make access to literature free of charge to readers. One of the first acts of PloS was to circulate the earlier mentioned pledge to boycott pay-for-access journals and turn to ‘author pays’ journals that promote the open access movement. Scholars that signed this pledge initially turned to BMC journals. After some frustration with the fact that BMC’s desire to earn a profit and their resulting decision to shift from author charge to institutional membership revenue as the primary source of income, PloS became convinced that there existed no meaningful and respected avenue of communication where librarians were not the primary financial backers of the

²⁴⁶ <http://www.facultyof1000.com> and <http://www.images.md>

²⁴⁷ <http://www.openrepository.com>

scholarly communication process. As a result, PloS realized by the summer of 2001 that the only real solution to the problems faced in the scholarly communication process was to launch their own set of journals that relied entirely on financial support from authors and their research funding agency. In December, 2002 the Gordon and Betty Moore Foundation granted PloS \$9,000,000 to create a non-profit scientific publishing venture. In October, 2003, the journal PloS Biology was started. In October, 2004, the journal PloS Medicine was launched.

Similar to BMC, a publication charge is asked from authors of accepted articles.²⁴⁸ Like BMC, PloS uses the Creative Commons Attribution License where authors irrevocably license the work to any third party to redistribute and use the article, provided proper attribution is given. By retaining the copyright, authors and their representatives retain the right to enforce the terms of the license, but not the right to dictate how or by whom the work is used. Also like BMC, PloS articles are immediately archived with PubMed Central. There are however at least two significant differences between PloS and BMC. First, PloS is quick to point out that even though BMC journals arrived on the scene first, that BMC is trying to make open access a viable commercial business model and earn a profit. This motivation is different from PloS which is a not-for-profit organization and seeks only to make scholarship widely available at a low cost. The other way in which PloS differs from BMC is that whereas both have an institutional membership category, PloS offers in return only a reduction in the author charge rather than a complete waiver as is the case with BMC. The institutional membership fee in PloS represents more a show of support while in BMC institutional membership

²⁴⁸ PloS is explicit in noting that the \$1,500 article charge has been set such that actual expenses are met. As procedures become more efficient and technology less expensive, PloS expects the article charge to be lowered.

represents a fee in exchange for a service (author charges are eliminated and the institution is provided with a customized web page featuring research created by scholars affiliated with the institution when the membership fee is paid). While PloS and BMC both keep with open access principles with regard to ownership of copyright and archiving, BMC has made it clear that they are providing open access to articles out of a belief that there is more money to be made in providing search services to researchers and practitioners in the biological sciences; commentaries, analyses, and reviews; databases; collaboration tools; and links to purchase information, software, materials, and equipment. Thus, open access journals are the primary focus for PloS, and are the means to income from other sources for BMC.

5.5.3 The For-Profit Publisher using the Author Funded Scholarly Communication Process as a means to maintain a Competitive Advantage

On July 1, 2004, the commercial publisher Springer announced a new publication model called Open Choice. Besides supporting the traditional reader subscription business model, authors can choose to support an author charge business model by paying \$3,000 (in addition to any print publication charges) and having the article freely accessible to the public via the online SpringerLink service. Springer's CEO, Derk Haank (formerly a CEO with Elsevier), described the motivation behind the Open Choice program in the following way:

The existing traditional subscription model has put us well on our way to efficiently connecting the entire research community electronically. At the same time, however, we want to respond to the demands of the small

group of researcher and certain publicly funded research communities who are advocating even wider unlimited access to scientific content and who are in a position to pay for that service. Springer Open Choice is therefore not a matter of either/or. We want to offer our customers both options and let them choose. Ultimately, the customers will decide what they want.²⁴⁹

Authors choosing either model have their article undergo the same review process, and, if accepted, their article is similarly indexed and abstracted. When an author chooses the Open Choice model, a designation is placed by the article to denote to others how many authors chose this method. With journals containing a mix of both types of articles, Springer indicated that it plans to adjust the subscription price accordingly with librarians only paying for access to non-Open Choice articles. Open Choice authors, like those that chose the reader subscription revenue model, still have to transfer their copyright to Springer. Springer justifies this act as necessary to protecting author rights. Springer's website contains the following statement:

To protect the rights of authors and to guarantee a high standard of quality, Springer will continue to require standard consent-to-publish and transfer-of-copyright agreements. Copying, reproducing, distributing, or posting of the publisher's version of the article on a third party server is not permitted. This enables Springer to provide the benefit of free online access while preserving scientific integrity and author attribution.²⁵⁰

It should also be noted that Springer itself has done little to encourage the use of Open Choice. The lead web page to Open Choice proclaims:

Springer still offers, and recommends, the traditional publishing model as a time-tested way of guaranteeing editorial quality and independence, but now also offers authors the option to pay to have their journal articles made available free to anyone, anywhere in the world. Springer believes in the value and longevity of the subscription publishing model, and is not changing its business model. Springer Open choice is an option, designed

²⁴⁹ Springer (2004a)

²⁵⁰ Springer (2004b)

to ensure that authors will never have to question whether or not a business model will keep them from publishing in any of our more than 1,150 quality publications.²⁵¹

In the description of the Open Choice program to authors, scholars are told that the choice is their own. Authors that choose the subscription model are described on the website as supporting a publication process that is free of charge to them and offers a pressure-free editorial process. Authors are informed that choosing the subscription model permits them to post their own versions of an accepted article on an institution's server. In this statement to authors, Springer argues that it is only when the subscription model is chosen that authors are ensuring "that authors all over the world have equal opportunity at publication and a peer review process free from commercial pressure."²⁵²

For those authors who prioritize the free availability of the published version of the article, Springer states that the author should then choose Open Choice.²⁵³ With this, the author that chooses Open Choice is portrayed as being eccentric in his or her desire to post the published version of his or her article rather than the final edited version (the postscript). Springer, no doubt, views Open Choice as a project that will prove to its critics that commercial publishers, in offering reader-pays journals, are only responding to scholars' signals. The coexistence of the "reader pays" and "author pays" financing models are implicitly advertised as a market experiment. When the expected result of more scholars choosing the 'reader pays' model over the 'author pays' model emerges,

²⁵¹ <http://www.springeronline.com/sgw/cda/frontpage/0,11855,1-40359-0-0-0,00.html>

²⁵² <http://www.springeronline.com/sgw/cda/frontpage/0,11855,1-40359-12-115392-0,00.html>

²⁵³ Springer at <http://www.springeronline.com/sgw/cda/frontpage/0,11855,1-40359-12-115392-0,00.html> underlined the word 'published.'

undoubtedly Springer will mention this ‘evidence’ when there are calls for increased funding to author-supported scholarly communication initiatives.

5.5.4 Discussion

In this overview of author funded electronic scholarly communication initiatives it becomes apparent that the motivation of publishers behind initiating author charge financed scholarly communication initiatives is not solely a desire to make the process more efficient. In fact, BMC and Springer both seem to have chosen the author charge pricing mechanism so as to gain a competitive advantage over publishers that rely entirely on reader subscription revenue. As indicated earlier, some scholars prefer author funded journals because they extend free access to readers. In most cases, universities and research funding agencies are willing to pay author fees. While one motivation of the university and research funding agency is providing support for a scholarly communication process that may be more efficient, it is unlikely that this is the only reason. For one, why is the university supporting initiatives that are solely devoted to the biomedical sciences, as is the case with BMC and PloS? Second, why are individual universities choosing whether or not to pay the charge and citing efficiency as the motivation when efficiency would only occur if all universities collectively were honoring the author charge? Why are certain projects such as BMC and PloS supported, and why are universities so willing to invest directly in a scholarly communication process that was previously funded indirectly through overhead charges and reader subscriptions? The answer likely has something to do with the university’s increased desire to own and control the intellectual property in scholarship.

When there is a consideration of these three projects, we see a very different approach to the intellectual property. Springer, in Open Choice, continues to insist that the author sign a transfer of copyright agreement. To further bolster Springer's claim of ownership over the intellectual property in a scholarly article, the publisher insists that it is the author and the author alone who initiates and is ultimately responsible for payment. One cannot help but think of this requirement as devised by the lawyers at Springer as a way to collect the author charge yet to not compromise their control over the copyright. BMC and PloS, on the other hand, used the Creative Commons Attribution License. The Creative Commons Attribution License allows the author (which in this case is in all likelihood the university) to retain their copyright but allows others to freely copy, distribute, display the article, make derivative works, and make commercial use of the work provided that the author is given credit and it is made clear to others what the license terms of the work are.²⁵⁴ Creative Commons is a not-for-profit organization whose major goal was to create a license where the author reserves only some of the rights afforded to them under copyright law. Creative Commons advertises these licenses as keeping intact the copyright protection to works while at the same time promoting that they be shared. In fact, the FAQ section of the Creative Commons website remarks, "Our licenses help you retain your copyright while allowing certain exceptions to it, upon certain conditions. In fact, our licenses rely upon copyright for their enforcement..."²⁵⁵ Thus, not only does the author retain the copyright, but the Creative Commons license ensures that the author also controls the distribution of the intellectual property. The question left unanswered however is who exactly the author is. With reference to section

²⁵⁴ www.creativecommons.org/about/licenses/

²⁵⁵ www.creativecommons.org/faq

three, it seems entirely possible that universities and research funding agencies seek to define themselves as the author. BMC and PLoS, in the eyes of the university and research funding agency, are initiatives that can on the one hand be advertised to scholars as a more efficient and cost effective way of distributing scholarship. On the other hand, BMC and PLoS also serve as a way to simultaneously submit scholarship to the traditional peer review verification process and strengthen the ownership and control claims the university and research funding agency claims to have over the intellectual property within the article.

For the most part, BMC, PLoS, and Open Choice are doomed to fail. In the case of Open Choice, the high chances for failure are perhaps intentional. With regard to BMC and PLoS, it simply is unsustainable over the long run, from the perspective of the research funding, to subsidize the scholarly communication process two ways when other research funding agencies subsidize the scholarly communication process using only one way. Those research funding agencies that pay author fees for some journals and reader access fees for other journals, from a cost efficiency standpoint, are bound to get displeased with the fact that they are subsidizing the reader access received by scholars associated with different research funding agencies. This frustration of the research funding agency is apparent with the AEC in the 1960s in physics. AEC's complaint with paying author charges was that they felt they were subsidizing the reader access received by others and also subsidizing access for their own readers. In some disciplines where cost efficiency concerns are not the sole organizing principle of the scholarly communication process, such as biomedicine, intellectual property concerns may be sufficient reason in the short-run to convince the research funding agency to pay author

charges. Over time research funding agencies are likely to exert direct influence over the rewriting of the copyright agreements to their advantage rather than paying author charges so as to establish ownership over intellectual property in the existing intellectual property framework.

5.6 Conclusion

This chapter showed that ownership of the copyright to the scholarly article by the scholar employed by a university is weak at best and further weakened by the shift in funding to an author charge paid by the scholar's research institution. This chain of events is significant for two reasons. First, it illustrates how an event as wrenching and destructive and complex as the serials crisis can be used to sidestep an informed discussion of what the legal consequences are to the university paying this charge on the author's behalf. Quite simply, the nuances of the intellectual property law regarding ownership of the copyright and the technical and organizational design of the electronic initiatives discussed in the previous section (well, at least BMC and PloS) are left unexplored because of an expectation that the serials crisis will be resolved. Even if one were to explore these nuances, the question might still be, so what? Many scholars might ask what is the monetary value of the average article that is read perhaps at most a dozen times and cited once or twice. Certainly, the direct royalty payments would be insufficient to meet the expenses of managing the copyright. It is not so much the revenue from the scholarly article itself that the university, as a research funding agency, is interested in capturing.

In the biomedical sciences, ownership of the copyright to the scholarly article is essential to protecting their ownership stake in patents. When a scholarly article is authored by the inventor of a patent, the university, as owner of the patent, has to protect all forms of intellectual property that are associated with it including the copyright to the scholarly article where the idea is disclosed and communicated to others. Thus, one can see that in order for the university to maintain control over patents, it also needs to manage the disclosure of research in scholarly articles (as well as conferences, lectures, and course materials). This management occurs through control over the copyright, which is in turn captured in some disciplines by the research funding agency when they pay the page charge, or as is the case in a increasing number of disciplines, is freely relinquished to the research funding agency by scholars who deem the value of their intellectual property as negligible.

If owning the copyright to articles is argued to be essential to resolving the serials crisis but is actually used to further protect ownership rights to patents, what stops universities from appropriating ownership over the copyright to lectures or course materials? Instead of invoking the serials crisis, the university may remark that there exists a higher education crisis where for-profit higher education institutions use and profit from variations of a scholar's lecture and course materials. In order to prevent these most intimate representations of a scholar's identity from being compromised, the university may request that scholars transfer ownership of the copyright to the course materials to them. As a consequence of this transfer, the university may entice scholars with a promise that education can be made available to others at a lower cost once they offer distance education courses. Or if the university faces reluctance to this proposal,

the university may decide to pay scholars separately for preparing course materials and delivering lectures as many for-profit higher education institutions already do. Scholars, sensing little value in the copyright to their courses, agreed to transfer ownership. However, what happens when the university creates what Noble (1998) described as “digital diploma mills?” What are the consequences to scholars as universities deliver courses online that are administered by graduate students or adjuncts? The largest consequence was what Noble described as a “regressive trend towards the rather old era of mass-production standardization and purely commercial interests.”²⁵⁶ Thus, it would seem that no area of scholarship is immune to the desires of universities owning copyrights to traditional scholarly works. Once scholars relinquish control of the copyright to scholarly articles, what stops the university from requesting or demanding the copyright to lectures or syllabi? Once universities develop institutional archives of scholarly articles, what stops those same archives from storing course web pages and digitized recordings of lectures? Owning the copyright to scholarly articles, either through the author charge or not, is just the first step of many taken by a university practicing the religion of academic capitalism. The serials crisis, like the citation of other crises in academia, can be manipulated such that in many disciplines the university can get something for nothing. In other disciplines, such as biomedicine where the copyright to a scholarly article is more valuable, universities find themselves in a position where they have to buy the copyright with the author charge. This is not an unrealistic doomsday scenario. Those at MIT who are forced to submit articles and course syllabi to D-Space, an institutional repository created jointly by MIT and Hewlett Packard, may be

²⁵⁶ Noble (1998).

unique now. As providing higher education services becomes more lucrative and the academy organizes itself differently, institutional ownership of the intellectual property in traditional scholarly works will become commonplace. The appropriation of the copyright to scholarly articles through the author charge pricing mechanism is just the tip of the iceberg.

This chapter showed that recent changes in the organization of the academy (increased managerial capacity) and changes in the legal interpretation of the work-for-hire clause of the 1976 Copyright Act have created a situation that fosters a contestability of the copyright in scholarly articles. The university, an institution with a stronger interest in being defined as the owner of the copyright, has used the serials crisis to convince scholars in many disciplines that their intentions are honorable. However, as the university signals a willingness to selectively pay significant author charges, it becomes apparent that the author charge pricing mechanism serves a role other than alleviating the serials crisis. When payment of the author charge is considered in the context of the criteria that must be satisfied to identify the university as the owner of the intellectual property in scholarship, it becomes apparent that a consequence of an author charge financed scholarly communication process is that the university, rather than the publisher, will own the copyright. Given the influence academic capitalism has on research and teaching, it may end up being the case that scholarly communities will be in no better a situation than they presently are in.

CONCLUSION

This thesis explored the methodology of the economics of scholarly communication research agenda and its linkages to the more heavily discussed economics of science field. I also delineated the multiple conversations occurring with respect to the cause of and solution to the serials crisis, and then I brought together the economics of scholarly communication and serials crisis literatures by discussing the decision in physics and economics to make use of a page charge pricing mechanism in the print era and by exploring the motivations of actors that advocated a revival of the page charge pricing mechanism in the electronic era. I will now conclude by collecting the findings from the previous chapters and outlining the consequences of these findings on our understanding of the serials crisis. I will also outline the possibilities of scholarly communication in an electronic era, and the perceived boundaries of the economics of scholarly communication research agenda.

In chapter one, I revealed just how closely the economics of scholarly communication research agenda was influenced by the economics of science research agenda. In fact, at many points, it seemed as if the economics of scholarly communication literature was but a result of overcrowding in the economics of science literature. Not unlike the economics of science literature, the economics of scholarly communication literature drew entirely from the neoclassical economics methodology in that it characterized actors as utility maximizing and described problems in terms of

inefficiency and market failures. One of the pressing issues that every scholar in the economics of scholarly communication literature had to come to terms with was the serials crisis. It was the serials crisis that was the focus of chapter two.

In chapter two, I showed that the serials crisis was by no means recent and that it was an event that surfaced multiple times over the past three hundred years. I also showed that, with regard to this latest crisis, there were at least five different narratives occurring simultaneously, each citing a different cause of the crisis and each advocating a different solution. Each of these narratives framed the serials crisis as an economic problem, with the difference being that some used the tools and metaphors from neoclassical economic theory while others claimed to conduct an economic analysis but did nothing more than list cost effectiveness statistics or publisher profit rates. These narratives all advocated a scholarly communication process that made use of electronic methods. The use of such methods, depending on the identified cause of the crisis, was said to open up the scholarly communication production and distribution process to competition thereby eliminating the monopoly power that many claimed the commercial publisher had, reduced the expenses that libraries incurred in providing access to patrons by expanding the use of networked resources, increased efficiency by encouraging authors to circulate their scholarship to others in ways other than the scholarly journal, and improved the method by which the scholarly communication process was funded by making use of author fees like the page charge as well as license fees and bundling schemes. I concluded this chapter by noting that these narratives were flawed because they assumed that the scholarly communication process was homogenous across disciplines and that there was a universal cause and solution to the serials crisis. These

assumptions permitted scholars in fields outside of the library sciences to step in and immediately offer an understanding of the problem and to suggest methods for quickly improving the scholarly communication process rather quickly. These same assumptions have moved us further away from reality. As a result, the confidence that scholars such as economists had an understanding of the serials crisis problem and knew that the needed solution seemed misplaced. Thus, by the end of chapter two, it became apparent that the economics of scholarly communication literature and its interpretation of the cause of the serials crisis and its understanding of the consequences to using an electronic medium were flawed. It was this realization that led to the subsequent discussion of the use of the page charge pricing mechanism in physics and economics in the print era and the potential consequences to its use in the electronic era across chapters three, four, and five. By discussing the use of the author charge pricing mechanism across several disciplines and across both the print and electronic era, the foundation was set for revising the economics of scholarly communication and serials crisis literatures.

The focus on the author charge pricing mechanism was important for several reasons. First, the focus on the author charge pricing mechanism revealed, in a number of ways, just how different the scholarly communication process was across disciplines with regard to the communication needs of scholars, the research funding agencies involved and their needs, and the actors involved in structuring the process and the financial responsibilities they accept. Across physics and economics, these differences became apparent when focus was placed on the author charge and how scholarly societies in each discipline administered the pricing mechanism, the financial success of the device in each discipline, and the reaction of scholars and research funding agencies to them.

Besides providing an entry point by which to view the differences in the scholarly communication process across disciplines, focus on the author charge also permitted an identification of the non-economic and non-efficiency motivations that underlie the scholarly communication process and the decisions made over how to finance it.

Chapters three and four, besides revealing the differences in the scholarly communication process across disciplines, also revealed that there was not even a universal organizing principle in how it was financed such as efficiency and that pricing mechanisms like the page charge, besides being used to pursue economic goals, could also be used to pursue non-economic goals such as owning and controlling the intellectual property contained in scholarship. In chapter five, I used the author charge pricing mechanism to show that the design and financing of the scholarly communication process in the electronic era was motivated by and designed around concerns other than efficiency and that scholars should be cautious when the financing and organization of the scholarly communication process was altered as was the case in so many ways in the electronic era. These lessons, the heterogeneity of the scholarly communication process across disciplines and the pursuit of goals other than efficiency in the electronic era, were taught using the author charge pricing mechanism so as to better inform the economics of scholarly communication and serials crisis literatures. First, I will cover the differences in physics and economics with respect to the author charge and the differences in the use of the pricing mechanism across the print and electronic era. Second, I will outline the different understanding of the serials crisis that should emerge from this dissertation. I will conclude with a discussion of my future research plans

Although the author charge pricing mechanism was adopted in both disciplines as a reaction to a dire financial situation, there were many differences in the conditions leading up to the author charge's implementation, such as a different set of actors involved in its maintenance and a different set of conditions that caused scholarly societies such as the APS and AEA to abandon the page charge. In physics, the APS and AIP invented the page charge, and used it over forty years before the economists. The APS and the AIP devoted a great deal of effort to educating research funding agencies about why they felt that the funding agencies had a financial responsibility for funding scholarly journals, and they worked extensively to spread the use of the page charge to other disciplines in the sciences. The AIP and APS continually revised the justification behind and administration of the page charge. The commitment of the AIP and APS to managing the scholarly communication process was not limited to the page charge. As chapter three showed, the AIP was itself created out of a belief that the scholarly communication process in physics could become more cost efficient and effective. Besides the page charge, the AIP and APS were also active participants in transitioning the scholarly communication process in physics to electronic methods and actively introduced new specialized research journals to complement older generalist journals.

In economics, the page charge was only reluctantly passed by the AEA in 1975 when the financial situation was perilous. The charge was abandoned only a decade later when progressive dues, royalty payments, and institutional subscription prices generated significant revenue. The AEA adopted the page charge as a way to quickly fix financial problems rather than accept that the scholarly communication process would become more efficient or accept that research funding agencies had a financial responsibility with

respect to the scholarly communication process. The AEA also did little to work with other scholarly societies or research funding agencies to expand the use of the page charge in the discipline. That the AEA was rather uncommitted to the use of the page charge – uncommitted in terms of administering the charge and being active supporters of it. It is not surprising that the AEA, given their similar lack of commitment towards employing electronic methods, introducing specialist journals, and expanding the number of generalist journals. The implementation and maintenance of the page charge pricing mechanism in physics was the work of many individuals and research funding agencies – as reflected in the massive documentation that exists about the pricing mechanism in the AIP and APS archives. The page charge in economics appears to have been imposed upon economists by Fels who himself borrowed it directly from Ferber and the American Statistical Association.

This comparison of the scholarly communication process in physics and economics at the site of the author charge pricing mechanism was not meant to imply that the AIP and APS cared more about the micromanagement of the scholarly communication process in physics than the AEA did with regard to the scholarly communication process in economics. That the AIP and APS took active roles in shaping the organization and financing of journals in their discipline than the AEA reflected a variety of circumstances – not the least of which include different research funding agencies and different communication needs of scholars. This comparison of the scholarly communication process in physics and economics was by no means exhaustive, but it does make the assumption of homogeneity of the scholarly communication process across disciplines highly untenable.

That the scholarly communication process has no universal organizing principle such as cost efficiency was proved in chapters three and four. In chapter five, I dispelled the false notion that the scholarly communication process in disciplines in the electronic era was designed out of a concern for efficiency. The financial role of the page charge pricing mechanism, as revealed in physics, began to diminish in the 1970s when the intellectual property terrain changed. This was made more apparent in physics than in economics because the value of intellectual property in physics was potentially higher than was the case in economics. Consequently, the page charge was not implemented in economics until shortly before the 1976 Copyright Act was passed. In the early 1970s, the AIP and APS attempted to make a grab for the intellectual property in physics through the page charge, and the AEA paid little attention to the intellectual property in economics research. In physics, use of the page charge pricing mechanism became less desirable because of these changes in the intellectual property terrain. Just as the intellectual property in physics research was more valuable as a result of the 1976 Copyright Act, the page charge pricing mechanism was deemed by research funding agencies as an incomplete device in establishing the research funding agency's ownership rights. The previous chapter revealed that, if anything, an author charge pricing mechanism is being advocated for in the electronic era because of the pricing mechanism's newly assigned role in establishing ownership rights. Under the present intellectual property regime – a regime heavily influenced by publishers, university administrators, technology transfer office personnel, and research funding agencies, there is a strong incentive to own and control published research because of the ties universities has to the entire research process. Universities have invested millions of dollars on

research and significant sums of money on technology transfer offices and lawyers to claim ownership over research results that are patentable. It should hardly be surprising that these new actors in science management have expressed interest in owning the copyright to published research. Not only do the universities and research funding agencies find themselves expending few extra resources to protect the copyright to scholarship in the face of so many other property claims being protected, but in many ways the effort made to protect patents to final research depends critically on also protecting the copyright to intermediate and non-patentable products of the research process such as conference presentations, course materials, working papers, and journal articles. Given the nature of these dramatic changes in the intellectual property terrain, changes which are obviously impacting disciplines in a heterogeneous fashion, chapter five showed how the author charge pricing mechanism could be used to strengthen research funding agencies' intellectual property claims over non-patentable or intermediate research products such as scholarly journal articles. Chapter five showed how the page charge pricing mechanism could be used by a research funding agency to strengthen that agency's intellectual property claims over scholarship. Chapter three showed that the AIP and APS, in the early to mid-1970s, found themselves in an intellectual property terrain where they could use non-payment of the author charge to threaten research funding agencies with claims that they owned the scholarship (claims which were considered baseless after the 1976 Copyright Act). The organization and financing of the electronic era of scholarly communication in many disciplines is being shaped by this changed intellectual property terrain. Thus, comparing the general use of the author charge pricing mechanism across the print and electronic era, chapter four,

five, and six showed that the role the pricing mechanism was by no means constant nor was it limited to a financial role. As a result, I now conclude by urging scholars to be cautious of individuals or institutions that claim that the author charge pricing mechanism will be used in a way similar to how it was used in the past. Just as technology can be designed to help agents pursue certain goals (both financial and non-financial), this dissertation shows, among other things, that the same could be said about pricing mechanisms like the author charge.

The implementation of an author charge pricing mechanism is not the only way which the scholarly communication process is being re-engineered to reflect the re-engineering of the research process. The scholarly communication process is also being re-engineered in the way by which research articles are peer reviewed, the method by which research articles are distributed, and the method by which the archive of research is made accessible over time. Differences across disciplines aside, the scholarly communication process for at least the past fifty years has been financed with reader charges. The scholarly communication process was designed such that authors subjected their manuscript to the editorial and peer review process at the journal where they sought publication. If accepted, the manuscript was combined with other scholarly articles, notes, and reviews into regularly distributed issue. These issues, in turn, were combined to form a volume. The volume was subsequently bound by a research library made accessible to researchers who visited the library. Over the past 15 years however there has been a series of proposed revisions in the validation, distribution and archiving of the research within the scholarly communication process – revisions informed by the same

financial, legal, social, and organizational changes that have motivated, in many disciplines, a revision of the financing of the scholarly communication process.

The peer review process is essential to the verification of the validity and originality of scholarship. While the peer review process has its share of deficiencies, few have abandoned the peer review process. Stevan Harnad, who is one of the most active proponents of revisions being made to the scholarly communication process, writes:

Neither the editor nor the referees is infallible....Nor are authors always conscientious in accepting the dictates of peer review....The system is not perfect, but it is what has vouchsafed us our refereed journal literature to date, such as it is, and so far no one has demonstrated any viable alternative to having experts judge the work of their peers, let alone one that is at least as effective in maintaining the quality of the literature as the present imperfect one is.²⁵⁷

Alternatives to the peer review process however have been proposed. The most extreme alternative proposed is that authors be permitted to publish what they want and that readers decide for themselves what is relevant and significant.²⁵⁸ Such a system is in use by the popular electronic preprint service in physics, arXiv (formerly known as the Los Alamos Physics Archive). Harnad however notes that:

...just about every paper deposited in Los Alamos is also destined for a peer reviewed journal; the author knows it will be answerable to the editors and referees. That certainly constrains how it is written in the first place. Remove that invisible constraint – let the authors be answerable to no one but the general users of the archive (or even its self-appointed ‘commentators’) – and watch human nature take its natural course, standards eroding as the Archive devolves toward the canonical state of unconstrained postings...²⁵⁹

²⁵⁷ Harnad (2001), 1

²⁵⁸ Hitchcock, et al. (2000)

²⁵⁹ Harnad (2001), 3

Klamer and van Dalen (2002) agree with this essential characteristic ascribed to the peer review process by Harnad. In an era when the amount of published research is increasing, Klamer and van Dalen argue that the peer review process serves as a sorting mechanism that effectively coordinates the flow of information and directs reader attention.

For the most part, the peer review process has been altered very little as a response to other changes in the financing and organization of the research and scholarly communication process (besides the fact that most of the shuffling of papers in the review process now occurs via email). While some physics journals, such as those published by the APS, supplement their standard peer review process with the reader reviews posted in arXiv, the peer review process in physics is little changed.²⁶⁰ The peer review process in economics has changed even less with perhaps the most ‘revolutionary’ change being the use of an “Authors and Reviews Bank” by the BE Journals in Economics. This system works on two principles: either an author pays a review fee or, after submitting an article, he or she is required to pay back the ‘bank’ by providing as many reviews as he or she receives. If a debtor does not review an article within a stipulated period of time, a fee must be paid. The result of this new process is that the amount of time that elapses between submission and decision is guaranteed to be no longer than 10 weeks (if it is longer, the submission fee of \$75 is returned). As this dissertation has demonstrated repeatedly, no aspect of the scholarly communication process, such as the peer review process, is sacred or unalterable in the face of the changed interests or motivations of

²⁶⁰ Martin Blume, Editor-in-Chief of the APS, notes in Blume (1999) that this hybrid peer review system is yielding higher quality reviews. It is important to note however that for the past 25 years, the acceptance rate for manuscripts submitted to the APS publication Physical Review have averaged 70% compared to the less than 10% acceptance rate in the AEA publication AER for the past 10 years and an acceptance rate that has been no higher than 19% the past 25 years.

actors in the scholarly communication process such as the university and research funding agency's desire to own and control the intellectual property in scholarship.

In the present structure of the peer review process, the research funding agency and university are forced to make use of particular journals in order to have the research they fund verified and classified in a particular way. In other words, in order to have research verified and classified as the 'best quality,' the research has to also be published in that journal and the copyright relinquished according to the dictates outlined by the journal's publisher. For instance, to have research in economics classified top notch, it has to be reviewed and published in journals such as AER, JPE, or QJE. The author and the research funding agency, as a condition for publication and in exchange for bestowing to the manuscript the classification of it being of high quality, is forced to relinquish the copyright. A proposed solution to this problem for the research funding agency is to separate the review process from the publication process.²⁶¹ While the peer review process would remain intact, no longer would it be attached to a single journal. Furthermore, if this review process was financed out of author charges, as suggested by Harnad (2001), the research funding agency would strengthen their ownership claim to the scholarship given their payment for the peer review validation service. In other words, an author charge pricing mechanism can be used to financially support an independent peer review process and in so doing, destroy the monopoly over the scholarship validation process held by a journal's peer review board.

The destruction of this monopoly over the peer review verification process eliminates the primary means by which publishers have forced authors and research

²⁶¹ Edmonds (2000).

funding agencies to relinquish their intellectual property rights. The destruction of this monopoly power over the peer review process also removes one of the primary ‘value added’ processes provided by journals and compensated for with high reader subscription prices. The author charge pricing mechanism, when used in conjunction with a peer review process independent from the publication process, creates a situation where the research funding agency strengthens their intellectual property claim over scholarship by eliminating the ownership claims made by a publisher who conducts the review process in-house and requires no financial contribution from the author or their research funding agency. Thus the author charge pricing mechanism is but one way in which research funding agencies can exert greater control over the intellectual property in scholarship with an alternative or complementary method being a separation of the peer review process from the publication process and an altering of the means by which the peer review process is paid for.

Besides altering the financing of the publication of the scholarly article and the method by which the value of the article’s intellectual property is established through the peer review process, there have been active attempts to re-engineer the financing and organization of the manner by which articles are distributed and archived. Instead of relying on distribution undertaken by publishers and archiving undertaken by the library, the research funding agency in many disciplines is organizing and financing the distribution and archiving of scholarship itself. Obviously paying for the research and then paying for its distribution and archiving further strengthens the research funding agency’s claim over the intellectual property in the scholarship.

An example of this re-engineering of the distribution and archival of research emerges most prominently in 1993 when the NSF, DARPA, and NASA created a joint venture known as Digital Library Initiative (DLI). The first phase of the DLI represented a joint venture between the NSF, DARPA, and NASA and resulted in the funding of six projects. These projects were designed as basic research initiatives that would advance the understanding of information in a digital form should be collected, stored, organized, and accessed. The success of this first phase led to DLI-Phase II in 1998 with some additional sponsors: National Library of Medicine, Library of Congress, and National Endowment for the Humanities. Each of these sponsors were, not coincidentally, also the major funding agencies of research in a variety of disciplines. These research funding agencies, as reflected in their interest in DLI, wanted to control the design of the electronic era of scholarly communication. DARPA, for one, was so interested in controlling the design that they organized and funded a publication, D-Lib, that publishes the research they have conducted in the area of electronic scholarly communication.²⁶²

Universities such as MIT and Caltech, as indicated in chapter 5, are also organizing and financing electronic archives. While certainly research funding agencies have an interest in increasing the accessibility of research they fund, these research funding agencies also have an interest in owning the means of distribution and archiving of scholarship. Obviously, the actor that facilitates distribution of scholarship establishes for itself an ownership claim over it. In the print era, this actor was the publisher. The

²⁶² The following footer appears on the website to D-Lib (www.dlib.org).

D-Lib Magazine is produced by the [Corporation For National Research Initiatives \(CNRI\)](#), has been sponsored by the [Defense Advanced Research Project Agency \(DARPA\)](#) on behalf of the Digital Libraries Initiative under Grant No. N66001-98-1-8908, and is currently being funded by the [National Science Foundation \(NSF\)](#) under Grant No. IIS-0122832

re-engineering of the scholarly communication process however reflects a desire by the research funding agency to own scholarship by owning and controlling the means by which scholarship is distributed and archived. It is hardly surprising that research funding agencies would spar with one another over control of the means of distribution and archival. An example of just such a battle occurred in 2001.

In July, 2001, Ginsparg resigned from Los Alamos National Laboratory (LANL) and took the physics pre-print archive (arXiv) with him. Ginsparg, who founded the server at LANL with government funding, accepted a faculty position at Cornell in the new Faculty of Computing and Information Science Department. Cornell plans to expand arXiv's reach into other disciplines and use it as a test bed for research into digital libraries.

Before the transfer to Cornell, ArXiv had received about \$300,000 in annual funding from the NSF, Department of Energy, and LANL. Ginsparg, in consultation with the archive's advisory board, funding agencies, and the American Physical Society, produced a consensus that the server would have more secure funding and stronger intellectual support at a university than at an organization such as LANL. With the server now at Cornell, both Cornell and LANL will share the costs and services previously provided by LANL. The server will remain a cooperative effort between Cornell and LANL since much of the expertise for the server remains at the LANL library.

The area of the university that he is joining, Faculty of Computing and Information (FCI), is a university-wide, interdisciplinary unit, separate from but related to the computer science department. Ginsparg earned his Ph.D. in physics at Cornell in 1981 and plans to spend his time equally on the archive and on his own research in

physics (string theory). Sarah Thomas, Cornell University Librarian, has indicated that she seeks to extend the archive to other disciplines such as biology. This admission should hardly be surprising given that Cornell is currently engaged in a project to facilitate the electronic publication of journals in mathematics with strict controls on access (with plans to make the access free a few months after publication).

One way to interpret this situation is one of arXiv being ‘competed’ away from the government by a private university with a strong digital libraries program and emerging distance-education program (eCornell). The government’s support after Ginsparg’s departure was redirected to other preprint servers and the electronic delivery of peer reviewed materials and gray literature (for instance, LANL’s Library Without Walls electronic scholarly communication initiative). This can be seen as a movement on the part of the government to place greater control over the informal publications that it directly owns and controls as well as lend to it a higher value by the scholarly community (as the materials become easier to search).

The re-engineering of the financing and organization of the scholarly communication process thus is reflected by more than just a transition to an author charge pricing mechanism. Rather, the desire by the research funding agency to own and control the intellectual property in scholarship, a desire that could go undetected yet be pursued through an author charge pricing mechanism, can also be pursued yet go undetected as the peer review process is re-configured and re-financed and as research funding agencies build and finance electronic distribution and archival systems. Following my study of the differences in the use of the author charge pricing mechanism and how these differences were indicative of the existence of a scholarly communication process more complex and

heterogeneous than was previously admitted in the economics of scholarly communication and having mentioned now the other ways by which the re-engineering of the scholarly communication process is occurring, I will now outline the different understanding of the serials crisis that should emerge from this dissertation.

The new interpretation of the scholarly communication process across disciplines and mediums provided through this analysis of the author charge will inevitably alter the understanding we have of the serials crisis. Again, the accepted interpretation of the serials crisis was that it was an inefficiency event blamed on a number of actors and that the crisis could only be resolved when there was a transition to electronic methods. Not only did this discussion of the author charge pricing mechanism undermine the assumptions of homogeneity, it also highlighted the interests that many actors, besides scholars, had in the organization and financing of the scholarly communication process. Throughout the economics of scholarly communication and serials crisis literature, there was a portrayal of scholars being the only actors really interested in the organization and financing of the scholarly communication process. Throughout the economics of scholarly communication and serials crisis literatures, there was an assumption that scholars were the only actors really interested in the organization and financing of the scholarly journal, and that the librarians and research funding agencies and university administrators acted in the best interest of scholars. That librarians, research funding agencies, and university administrators discussed the serials crisis the most and took the greatest interest in proposing ways to organize and finance was portrayed as reflecting their desire to have a scholarly communication process designed and financed such that it met the needs of scholars. This dissertation has repeatedly shown that the scholarly

communication process in a discipline was and continues to be designed and financed in ways that satisfy the needs of scholars only after or by coincidence of satisfying the interests of research funding agencies and university administrators. The scholarly communication process is organized and financed in a particular fashion only after actors such as scholars, research funding agencies, scholarly societies, and commercial publishers negotiated with each other and come to an agreement. Obviously these actors had different levels of influence in this negotiation process. Research funding agencies in disciplines such as physics, where funding was more concentrated, possessed the most clout in these negotiations and significantly less in disciplines like economics where funding was more de-centralized. Recognizing that actors had different and, at times, conflicting interests in designing and financing the scholarly communication process in a particular way, my narrative of the existence of a serials crisis asserted a new interpretation of the serials crisis event. Rather than report on problems and suggest solutions in a disinterested fashion, serials crisis narratives instead emerged as vehicles by which actors worked to convince others to adopt a particular method of organizing and financing the process that, for both economic and non-economic reasons, worked in the actor's best interest. Such an interpretation of serials crisis narratives should invite caution. Such caution however is advisable when one considers how much is affected by the organization and financing of the scholarly communication process.

However, the one question remains: how should an event like the serials crisis be discussed? While obviously there was some fiction inserted about the serials crisis event as a result of the motivations of the actors telling it, there were problems in the scholarly communication process in many disciplines that needed to be discussed and resolved.

While it is likely that the use of economic principles will be needed to discuss these problems, clearly the economics of scholarly communication methodology needs to be revised. If anything, the complexity alluded to and limitations inherent in this dissertation reflect this heterogeneity – a heterogeneity that up to now has been glossed over. Ultimately, research on the serials crisis needs to focus on just one discipline like physics, and in some cases only a sub-discipline such as nuclear physics. The same can be said with regard to the discussion of electronic initiatives that often go hand-in-hand with serials crisis narratives. Not only do scholars who conduct such research need to focus their discussion to a single discipline's scholarly communication process, these scholars also need to be conscious of the interests and motivations of those who portray the crisis in a discipline in a particular way.

The economics of scholarly communication has always been nothing more than the application of neoclassical tools and metaphors to the realm of scholarly communication. What results from this application is a notion of journals competing against one another for authors and readers in a marketplace of ideas. Journals are discussed as quasi-public goods, and scholarly societies, universities, and scholars are described as agents that seek to maximize their utility, acting in the best interest of the public. There is some value to neoclassical economic notions of efficiency and quasi-public goods. However such an analysis cannot be the only economics inspired interpretation we have of the serials crisis if we ever expect the crisis to be resolved. Other economic traditions that would be applicable to the topic of scholarly communication processes in a discipline would include institutional economics, radical economics, and evolutionary economics. The understanding we have of the scholarly

communication process through economics can only be enhanced when our notion of what constitutes economics is not limited to game theory within a public goods framework.

I will conclude this dissertation by discussing two future research projects that are inspired by this dissertation. The first project will explore the Chemical Foundation's and Francis Garvan's little understood and unappreciated role in manipulating the organization and financing of journals in physics. The second project will be a long-term commitment wherein I will update portions of the only study the federal government ever conducted on the page charge pricing mechanism – the 1970 National Academy of Sciences study entitled “Task Group on the Economics of Primary Publication” which was briefly discussed in chapter four.

In the process of exploring the conditions behind the formation of the AIP, I found that Francis Garvan and his Chemical Foundation were instrumental in consolidating the publishing process in physics and in creating the conditions of cost efficiency – two activities necessary if research funding agencies were ever to be convinced to accept the page charge. During World War I, Garvan was the Alien Property Custodian of German-held patents. Garvan's Chemical Foundation possessed these patents, and used the royalties to improve research and the scholarly communication process in chemistry. When Garvan was approached in the early 1930s by the leadership of the APS about possibly subsidizing the scholarly communication process in physics, he responded by becoming intimately involved in organizing and covering the deficits the first few years for the AIP (with much of this money coming out

of his own pocket). With respect to the AIP, the page charge pricing mechanism came to be universally and consistently used by scholarly society-published journals in the United States. While Kathryn Steed has written a dissertation on Garvan and the Chemical Foundation's impact on making the synthetic organic chemicals industry in the United States, nothing has been said about Garvan's impact on shaping the scholarly communication process in physics during a time when the funding of research was considerably smaller and de-centralized in comparison to chemistry. Research on Garvan's interest in micromanaging the scholarly communication process in chemistry and his later forays in the scholarly communication process in physics will expand our limited understanding of the scholarly communication process in the sciences in the inter-war period (a time period where again there was talk of a serials crisis, most notably by Vannevar Bush). This research will also complete the picture of the actors and institutions that were influential in sustaining the page charge pricing mechanism the first twenty years in physics. This research can be conducted using both the Francis Garvan papers at the University of Wyoming as well as a few boxes held at the APS archive in College Park, Maryland.

While this first research project completes the picture of the scholarly communication process in physics in the inter-war period and of the circumstances and institutions that shaped the implementation of the page charge pricing mechanism in physics, my second research project will update parts of a 35-year old government study on page charges. The original report conducted by the National Academy of Sciences was groundbreaking in that it represented, for the first time, a collection of data on page charge policies of journal and research funding agencies and then used this data to

recommend that page charge policies be universal across journals and to recommend that research funding agencies universally honor them. In return for receiving page charge revenue, journals would agree to undergo a monitoring process by the Office of Science Information Service in the National Science Foundation and would strive to federate with other journals when the readership overlaps. Just as this report was a reaction to the lack of data collected in the past on the costs of the scholarly communication process, a similar lack of data exists today at the same time as research funding agencies are being asked to bear more of the cost of the scholarly communication process. The collection of such data will inform the economic side of the question as to whether the scholarly communication process in the electronic era should be funded with an author charge pricing mechanism.

APPENDIX 1

ARCHIVAL SOURCES

Records of American Institute of Physics. Office of the Director, Henry A. Barton, 1931-1964

Finding aid: http://www.aip.org/history/ead/aip_barton/20000078.html

Records of the American Physical Society, 1899-1989

Finding aid: http://www.aip.org/history/ead/aip_aps/20000091.html

Records of the American Economic Association, 1886-2001

Finding aid:

<http://scriptorium.lib.duke.edu/dynaweb/findaids/americaneconomicassociation/>

APPENDIX 2

COMMUNICATION WITH DR. SANFORD A. BERG, EARLY PROPONENT OF THE AUTHOR CHARGE PRICING MECHANISM IN ECONOMICS

From: "Sanford Berg" <sanford.berg@cba.ufl.edu>

Date: Sat May 28, 2005 3:26:23 PM America/Indianapolis

To: "Thomas David Scheiding" <tscheidi@nd.edu>

Subject: RE: research question for dissertation

Dear Thomas: It has been fun to revisit how I got into my dissertation research. Your questions triggered lots of memories-as I tried to focus on issues that were conceptually interesting (information as a public good; copyright; the organization of disciplines). I also wanted to apply some statistical tests (very simple models) to demonstrate that while I was not econometrician, I could use the tools. In addition, I had audited a course on the History of Science (Derek de Solla Price, Big Science, Little Science) and a course in the Law School on Copyright-so I had an interdisciplinary orientation-for good or ill. I was captivated by the economics of information, though I certainly did not have early versions of

the breakthroughs that have advanced the discipline over the past several decades.

I'll try to respond to your questions, and hope my comments are useful in your research. You asked about my meeting with Dr. Herring. I was not involved in the SATCOM report. I interviewed a number of individuals who were engaged in innovative approaches to dissemination of scientific information. A Brookings Fellowship during my third year of graduate school brought me to Washington D.C. for a year, and I had appointments with people at the American Chemical Society, the American Psychological Association, and other organizations. I recall going to New York to meet with people at the American Physics Association-and being impressed by their translation journals.

At the time, there was a court case about "fair use" and access to the medical literature via MEDLARS. A publisher in Baltimore was suing those who were copying articles from their journal. Also, about the same time, the Institute for Scientific Information was beginning to develop citation analyses that measured the impacts of articles and journals. I became interested in the scientific journal market and how various disciplines organized themselves. Chemistry, biology, physics, and the social sciences (including economics) had very different mixes of society, university, and commercial journals at the time. The role of commercial journals in

economics was growing, and of course currently is enormous. I was curious about copyright and how Xeroxing affected the demand for journals. That required me to understand the economics of journals. I thought that the economic framework would be of interest to information science, so some elements of my Yale dissertation appeared in

"An Economic Analysis of the Demand for Scientific Journals," *Journal of the American Society of Information Science*, Vol. 23, No. 1, January/February 1972, 23-29.

I wish, now, that I had been less "interdisciplinary" in my orientation, since I might have been able to get the paper in a decent economics journal.

During this period while at Yale, I was working under Richard and Nancy Ruggles, who had an NSF grant to develop SIPPS (System for Information Processing for Scientific Societies). They used the software system for the Econometric Society and for the International Association for Research on Income and Wealth. The NBER had another project that examined the role of computers in improving economic analyses. The grant funded workshops and other events. I served as managing editor of their *Annals of Economic and Social Measurement* (which when it ceased publication after six years gave birth to the *Review of Economic and Social Measurement* and a journal that

focused on Control Theory and Economic Dynamics). So those associations brought me into contact with a number of researchers.

At about the time I served as a NBER Research Associate, I came into contact with Mark Perlman-since Richard Ruggles was trying to get the AEA to use SIPPS. As part of my writing about scientific journals, I looked at economics as a discipline. Perlman was interested, so I submitted a manuscript to the JEL. I don't recall him assisting to a great extent, but he certainly encouraged me to develop some themes regarding the economics of economics journals. I thanked him because he had some good comments on an earlier draft of the paper.

"Increasing the Efficiency of the Economics Journal Market," *Journal of Economic Literature*, Vol. 9, No. 3, September 11, 1971, 798-813.

A couple of years later, Baumol's article appeared in the AER: he saw the importance of economies of scale and scope-something that I understood intuitively, but had not developed in a rigorous way. My own work was unrelated to any AEA initiative to institute page charges. I certainly reported on how other disciplines used this mechanism to cover fixed costs and predicted its application in Economics. The idea was in the wind, and leaders in the discipline found it applicable. I doubt whether my own work had any impact on the implementation of page charges.

I had some data on economics, but the data from Psychology and Chemistry covered more journals and years, so my empirical work (estimating costs and demand) drew upon those disciplines. Because I was editing a journal in the early 1970s, I did attend the editors' breakfasts (hosted by the AER), where a number of topics were addressed: reviewer lags, printing costs, etc. But the gatherings seemed more directed at promoting collegiality than for sharing technical information.

The copyright aspects of my work appeared in

"Copyright, Conflict, and a Theory of Property Rights," *Journal of Economics Issues*, June 1971, 71-79. Reprinted in Volume 1, *The Economy as a System of Power*, Warren J. Samuels, ed., Transaction Books, 1979, 395-403.

It was not theoretical, but outlined why an "optimal" definition of property rights might come under pressure from new technologies. An examination of different disciplines appeared later in

"Entry and Performance in the Journal Market," *Nebraska Journal of Economics and Business*, Vol. 15, No. 1, Winter 1975, 5-19.

Because of my work at the NBER, I tracked what EDUCOM was doing in the area

of information. I had a paper on "Networks in Economics" in the 1973 Networks and Disciplines publication by EDUCOM. The themes were developed more thoroughly in my JEL and Management Science (see below) articles. During this period, I looked at other technologies, and their impacts on communication within and across universities:

"Planning for Computer Networks: The Trade Analogy," Management Science, Vol. 21, No. 12, August 1975, 1458-1465.

Of course, today, the role of digital journals and access to pdf versions of all articles raises the same kinds of questions as those raised by Xeroxing. Similarly, questions of information haves and have-nots arise: making journals available to developing countries is being addressed by MUSE and by the World Bank.

Finally, five or six years ago, an Italian journal devoted an entire issue to the economics of scientific journals. I wish I had the citation, but you might be able to track it down.

I wish you well in your research, and look forward to seeing your results.

Sanford Berg

Distinguished Service Professor--Economics

-----Original Message-----

From: Thomas David Scheiding [mailto:tscheidi@nd.edu]

Sent: Tuesday, May 24, 2005 1:09 PM

To: sberg@ufl.edu

Subject: research question for dissertation

Professor Berg.

My name is Tom Scheiding and I am a Ph.D student in economics working under Phil Mirowski. My dissertation is on the economics of scholarly communication and while I know that you are no longer in this research area, I have a few questions for you regarding your dissertation.

Don't worry, I don't want to ask anything technical. I am writing my last chapter now on the serials crisis and the reactions and subsequent restructuring of the AER (most notably the adoption of the page charge in 1975) and I want to get an idea as to what influence the likes of yourself, Barzel, Boulding, and Michael Lovell in the early 1970s had on the subsequent restructuring of the AEA publications in the mid- and late-1970s.

So here are a few of my questions. I truly would appreciate a response and would certainly provide you with a final copy of the chapter if you

were interested in it.

1. I saw in your dissertation that you cited assistance Dr. Herring who was with SATCOM. Were you involved in the 1970 report?
2. I also saw in your 1971 JEL article that you cited assistance from Dr. Perlman. I am curious as to what way he assisted.
3. Finally, in what ways did the AEA react to either your dissertation or your JEL article? I noticed that the AEA was not cited as providing data for your dissertation. Did they in fact provide some assistance or ask for your advice or comments in the early 1970s? Were you in any way involved in the discussion about whether or not to adopt the page charge?

Sincerely,

Tom Scheiding

APPENDIX 3

COMMUNICATION WITH GEORGE H. BORTS, FORMER EDITOR OF THE AER

Prior to quoting materials from the AEA archive, I was required to secure permission from those I cite. George Borts read an initial draft of chapter 4 in the process of extending me such permission and his graciously included some comments as well.

From: Borts, George Herbert [mailto:George_Borts@brown.edu]

Sent: Sunday, January 15, 2006 12:18 PM

To: Dr. Thomas Scheiding

Cc: Borts, George Herbert

Subject: RE: permission needed (AEA archives)

...

I had a number of reasons for proposing submission fees that were unrelated to the problem of covering the AEA deficit. First, I wished to slow down the submission of poorly written and conceived papers, and encourage authors to find outside readers on their own before considering their own work to be complete. This was in response to a large increase in submissions and increasing delays in obtaining high quality reviews from scholars. Recall that all this was in the days before the use of the internet to circulate preliminary research. Second, I wished to have a source of funds that could be

used to pay economists to screen submitted papers prior to (or in some cases as a substitute) for sending them out to be refereed. I was able to secure the cooperation of a large number of young economists who would gladly read the paper, summarize its findings, and occasionally point out its shortcomings. It was my expectation that the use of screeners would speed up the refereeing process by reducing the number of papers send out to referees, and thus reducing the number of editorial decisions that had to be made.

You have correctly interpreted my unenthusiastic response to the short lived policy of imposing page charges. In your manuscript, however, I detect a note of disapproval on your part directed toward my actions, but do not understand the reasons for it. It was very awkward to administer the policy because it was not uniform. Authors could easily evade the charge by pleading poverty, or as you cite, the expiration of the supporting grant, and my office had no resources to police what is essentially a tax on successful scholarship. And as you also point out, the main beneficiary of the research is the reading audience.

If you have any other coments, I will be glad to respond.

George Borts

Professor of Economics

Brown University

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