

THE OPEN ACCESS MOVEMENT IN CANADA:
A CASE FOR GOVERNMENT ACTION

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By

JEFFREY MARTIN

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Head of the Johnson-Shoyama Graduate School of Public Policy
University of Saskatchewan
Saskatoon, Saskatchewan S&L 6Y9
Canada

OR

Dean
College of Graduate Studies and Research
University of Saskatchewan
107 Administration Place
Saskatoon, Saskatchewan S7N 5A2
Canada

ABSTRACT

This thesis builds a public goods case for government intervention in the academic journal market. Synthesizing information from interviews with the existing quantitative and qualitative literature accomplishes this goal. The cost of doing business in the academic publishing market has steadily risen over time. In response, an “open access” (OA) movement has formed. Members of the movement argue that making academic research freely accessible to anyone with an Internet connection is the ideal way to control these costs. Others, however, are satisfied with the status quo. Determining who pays what price to allow free access has become increasingly important. National open access initiatives could be implemented without government aid if universities and academic libraries worked together; however, a collective action problem prevents cooperation. The government has tools that could be used to help these stakeholders transition to an open access status quo.

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DEDICATION

I dedicate this thesis to the wonderful people in my life. Your support and patience brightened up the darker days and gave me the energy to continue on.

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LIST OF ABBREVIATIONS

APC: Article processing charge.

CALJ: Canadian Association of Learned Journals.

CARL: Canadian Association of Research Libraries.

CHSRF: Canada Health Services Research Foundation.

CIHR: Canadian Institutes of Health Research.

CIPO: Canadian Intellectual Property Office.

CRKN: Canadian Research Knowledge Network.

IPR: Intellectual Property Regime.

NRC-CISTI: National Research Council-Canada Institute for Scientific and Technical Information.

NSERC: Natural Sciences and Engineering Research Council.

OA: Open access.

SSH: Social sciences and humanities.

SSHRC: Social Sciences and Humanities Research Council.

STEM/STM: Science, technology, engineering, and medicine

CHAPTER 1 INTRODUCTION

The ease with which academics and research communities can access scholarly knowledge is a key requirement for the innovation process. The ways in which people access this knowledge have drastically changed over the last 40 years. Previously, accessing scholarly knowledge was a cumbersome process that entailed patrons either going to an academic library to receive print journals or receiving journals via the mail. The Internet quickly presented people inside and outside of the academic community with the chance to enhance a “free market of ideas” (Gruss 2003). Supporters of free access began organizing into a so-called open access (OA) movement designed to move from an oligopolistic status quo to a new “open access” status quo. This was deemed possible through the widespread use of online repositories and journals. Open access repositories, known as the “Green” road to OA, are storage sites in which published articles can be deposited. Open access journals, which are journals that do not operate on subscription revenue, are called the “Gold” road to OA.

The OA movement is rooted in a scientific discourse that emphasizes the free exchange of ideas. The Internet, rather than being the source of this movement, is one mechanism that could help academics better reach a status quo of unfettered scholarly communication. Academics have historically valued free and easy access to their work by their peers and communities. Academic libraries were and are one step to reaching this end. The Internet is another tool to further reduce barriers to access.

The status quo, however, has largely been unchanged. Open access advocates are unable to find a collective way to transition to a new “open access” status quo. Convincing skeptics that OA is a sound policy has also made only modest progress. The problems are determining the price at which research should be provided to customers and who should pay. Some argue that

the government should not intervene in the journal market and let the stakeholders resolve the problems on their own; others think that government has policy tools that can push the actors toward an “open access” status quo.

1.1 Objective

This thesis will build a public goods case for government intervention in the academic journal market.¹ I will build this case by identifying signs of a market failure and describing a collective action problem. In doing so I will make the following arguments. First, the subscription-based academic journal market has failed as evidenced by rising subscription prices. The purchasers of these subscriptions are facing increasing difficulty paying these costs. The knowledge found in academic journals, most of which is fully or partially generated with government support, is a publicly funded public good that produces benefits for people inside and outside of academia.²

Second, a collective action problem is preventing the stakeholders from transitioning from an oligopolistic market to a new author-pays system. This problem arises from several conditions that open access proponents cannot individually overcome. Third, a variety of government interventions are possible to address this collective action problem. These interventions, some of which are more feasible than others, create conditions for the stakeholders to reach a new “open access” status quo.

Finally, this paper demonstrates the ways in which interests and ideas manifest at all levels of the open access debate. These concepts play critical roles among advocates and within government. Before the arrival of the Internet, the financial interests of the stakeholders were the

¹ Open access books are excluded to limit the scope of this thesis.

² Benefits that spread to third parties outside of a given market are known as positive externalities.

primary guides for their decision-making. The emergence of the Internet, however, has upset the pre-Internet status quo. These stakeholders argue, correctly in my judgment, that the author-pays system is the ideal way to ensure that publicly funded academic research is disseminated as widely as possible.

1.2 Methodology

All of the arguments are made using an extensive literature review and the results of semi-structured interviews. The literature is composed of qualitative and quantitative data. A market failure is established by linking basic economic modeling to real-world trends identified from the review and interviews. The literature outlining these trends is found in peer reviewed research and books, Canadian and non-Canadian reports from academic libraries, freely available government documents, and news releases. The peer reviewed literature was retrieved using the following search engines: Google scholar, Academic Search Complete and Web of Science.

Interviews were conducted with 12 well-placed informants in the academic journal market. Academics, librarians and legal experts came from Athabasca university, Harvard, the University of Saskatchewan, the University of Ottawa, and Simon Fraser university. Political and policy perspectives came from the MP Brad Trost, as well as a senior administrator from the Canada Foundation for Innovation. Finally, the commercial publishers that I contacted directed me to their statements on open access from their websites. Every participant was initially invited via e-mail to take part in a 30-minute semi-structured telephone interview. The semi-structured approach allowed for flexibility in the way in which discussions proceeded, with important issues emerging during interviews that were not covered by the questions. The questions were designed to gather opinions on topics ranging from the state of the journal market to the

feasibility of adopting a national open access model without government support.³ The wording of the questions was tailored to specific participants to elicit responses.

An interview time was set up if the experts chose to participate. They were asked to sign a University of Saskatchewan Behavioural Ethics consent form, return the signed form, and keep copies for their own records. A transcript release form was also sent and returned at the end of the study. Ten of the 12 interviews were recorded using a digital recorder. The remaining experts participated via e-mail due to time constraints. All data was then stored on a secure computer and transcribed into individual Microsoft Word documents by the principal researcher. The completed transcripts were sent to the participants for their review and approval, with the new transcripts being returned via e-mail. The release forms were also signed and returned at this time.

1.3 Thesis structure

This thesis unfolds as follows. Chapter one provides a brief introduction to the open access issue, describes the objectives and structure of the thesis, and outlines the methodology used throughout the thesis. Chapter two provides background to the open access issue. This is accomplished by describing open access and the stakeholders involved. Context is needed to show why the open access issue matters to both the Canadian government and governments around the world, as well as show where Canada's open access policy environment sits relative to the rest of the world. Knowing who is involved in the issue is also important. Descriptions of the many stakeholders and the arguments they use for the open access issue are found in this chapter. The chapter concludes with an outline of the rolls that ideas and interests play in the issue.

³ The questions are found in Appendix A.

Chapter three describes the status quo using conceptual and empirical information. This is important for a few reasons. First, no comprehensive academic analysis of the status quo has been done. Describing the status quo therefore contributes to the academic literature by shedding light on an under-researched topic. Second, giving a positive “what is” description of the current publishing system is needed to build a case for government intervention and identify points at which intervention is possible. Public policymakers increasingly create evidence-based policies, and describing the status quo is a crucial step in this process.

Chapter four shows what open access transition entails. This section outlines the normative “what should/could be”. The author-pays system is a radically different way of determining who pays what cost. Implementing such a system will generate positive and negative externalities by changing the behaviour of everyone involved in the market. Stakeholders and public policymakers need to know the nature of these changes to minimize the risks of transition.

The policy options available to the government are outlined in chapter five. The implications of any intervention are also discussed. A critical part of policy analysis is to aid decision-making by providing implementable policy options. Policy analysts seek to predict the broader ramifications of intervention. Changing the dynamics of a complex system to produce certain outcomes is rarely straightforward, and the public policy implications section covers this topic. Finally, chapter six contains policy recommendations and a conclusion.

CHAPTER 2 BACKGROUND

Knowledge is an important good that affects many parts of society. This is particularly the case for knowledge produced from academia. A substantial amount of literature outlines the direct and indirect benefits that a country's stock of available knowledge, notably technical knowledge, provides to an economy. Direct benefits take the form of technological advances, increased human resource capacity for the public and private sectors, contributions to the innovation process, skills training, and the simplifying of complex and complicated information into easily digestible forms (Tassey 2012, 1; Nelson and Romer 1996, 1-2, 20; Bush 1945). Indirectly, the accumulation of knowledge is presumed to contribute to the fostering of a more enlightened and democratic society (Lipset 1959, 1-3; Glaeser, Ponzetto and Shliefer 2007, 1-5).

Academic knowledge, a specific type of knowledge produced by higher education institutions, plays a critical role in the innovation process. The Oslo Manual defines innovation as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD/Eurostat 2005, 46). Using new knowledge to upgrade old processes and methods can add value, create efficiencies and make better use of scarce resources. Science, technology, research, development, and innovation exist in interlocking relationships, where each practice can influence the others (Science, Technology and Innovation Council 2012, 14-17).

The primary unit through which academic knowledge is both transmitted and accessed is the academic journal. An underlying assumption about the benefits that may accrue from research is that academic journals, and knowledge by proxy, are easily accessible for members of the academic and non-academic communities. If access to academic journals was fully restricted,

i.e., journal producers and researchers did not consent to their work being accessed by anyone, then any related social benefits would accrue slowly at best. On the other hand, the products of academic research are sold to others and subscription costs are the typical means by which access is granted.

2.1 Defining open access

Open access refers to making academic research accessible and usable by anyone at any time. Specifically, the Budapest Open Access Initiative defines open access as the

“permitting [of] any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself”.

Literature is rendered open access by removing *price barriers* and *permission barriers*. Price barriers are any cost that restricts a customer from accessing research. Examples of price barriers include subscriptions and license fees. Permissions barriers are any legal restrictions on the use of a manuscript, such as copyright. So-called “open access” journals and repositories are the mediums through which this literature can be accessed at no cost and without permission from the author.

Open access journals are found on the Internet and may or may not be peer reviewed.⁴ They do not survive on customer purchasing, such as subscription fees. Instead, financing comes from the following sources: Advertising, sponsorships, internal and external subsidies, donations, fundraising, endowments, in-kind support, partnerships, and Article Processing Charges (APCs) (SPARC 2013). About half of open access journals generate around 30% of their revenue by charging submission charges, page charges, illustration fees, society membership fees, and color

⁴ For example, the journal PLoS <http://www.plosone.org/> is peer reviewed and the Elder Law Studies http://www.ssrn.com/update/lsn/lsn_elder-law.html is not.

surcharges (ibid.). Some publishers charge a fee for all submitted articles, whereas others only charge for articles that will be published.

Approximately 26% of open access journals listed in the Directory of Open Access Journals (DOAJ) use APCs (Solomon and Björk 2012, 2). This fee is spread amongst publishers, authors, academic libraries and/or an author's host institution. According to SPARC (2013),

Article processing fees are wholly or partially subsidized, either by a research grant (34%), a foundation grant (5%), or by the author's host department (8%) or institutional library (27%). The payment of such fees out of an author's personal funds appears relatively low—about 5% across all open access journal. Several research funding agencies have policies supporting the payment of article fees, and a growing number of academic institutions have established funds to cover all or part of the article processing fee for articles submitted by affiliated authors to open-access publications.

Open access repositories are online indexes in which published material is deposited, stored and indexed for future access. They function as “containers” of research. Many universities maintain their own repositories; they contain published material of all types. There are also other repositories not attached to a particular institution are available on the Internet⁵. Repositories do not always have the quality control mechanisms found in peer reviewed journals. As such, the deposited articles can be of varied quality.

Article deposits can be done with or without a delay. Deposit delays, which range from six to 36 months and are used by all types of publishers, are called embargo periods. Immediate uploads are possible if an author is not bound by funding stipulations and/or reuse policies used by publishers of any type which require a deposit to be delayed. Some commercial and non-profit journals also allow for articles to be immediately uploaded into a repository if a fee is

⁵ A list of Canadian repositories is found at <http://www.carl-abrc.ca/ir.html>

paid.⁶ For example, a researcher funded by the Canada Health Services Research Foundation (CHSRF) who wants to publish in an Elsevier owned journal must make their work freely accessible within 6 months of the work being published.

The use of embargo periods has been justified in two ways. First, authors are free to use their work as they want during the delay.⁷ For example, an author can self-publish a work for profit if the work is not in the process of being published in a subscription journal or publish in a journal of his or her choosing. Second, they are designed to ensure that journal subscriptions are not cancelled en mass. The argument is that if research were immediately and freely accessible, then consumers would cancel subscriptions. This argument has some merit, as many academic libraries note that they would cancel subscriptions and either save the money or use the funds to pay for APCs (Bennett 2012).

Embargoes can also be problematic. Some commercial publishers will make any article in a subscription journal freely accessible if a fee such as the \$3000 charged by Wiley is paid (Wiley 2013). Authors who want their work immediately accessible in a reputable commercial journal may not be able to pay this fee. Academic libraries have responded by setting up open access funds; for example, the University of Calgary Open Access Authors Fund allows prospective authors to apply for funding if the journal is peer reviewed (University of Calgary 2013).

Open access publishing costs also differ according to discipline. Researchers in the STM disciplines face higher APCs than researchers in SSH disciplines. According to Solomon and Bjork (2012, 1490), researchers spent \$64, 400, 000 on APCs for Biomedical journals in 2010. This contrasts with Arts and Humanities researchers (\$84, 000), General Science journals (\$640,

⁶ A journal with subscription and open access components is known as a “hybrid” journal.

000), Social Sciences (\$3, 398, 000), Technology and Engineering (\$4, 906, 000), and Earth Sciences (\$17, 650, 000). Biomedical journals also charged the highest average APC at around \$1, 200. The Earth Sciences, Technology and Engineering, Social Sciences, Arts and Humanities, and General Science journals charged averages ranging from approximately \$400 to \$600 (ibid., 1491).

The prevalence of OA has also grown over time. For example, the DOAJ has increased the number of its searchable journals from about 1, 400 titles in 2004 to over 6, 000 titles in 2011 (Morrison 2011, fig. 5). If the inflation of titles followed an approximate average 3.5% annual growth rate of scholarly journals over the same time period, then about 1, 700 titles would have been expected in 2011. A similar growth trend has been found for OA articles in the DOAJ. About 62, 000 articles were searchable in 2004, whereas over 500, 000 articles were searchable in 2011 (ibid.) This rate exceeds the average 3% annual growth rate of searchable articles over the same time period. About 75, 000 searchable articles would be expected in 2011 with a 3% growth rate.

The “gold” and “green” open access models have strengths and weaknesses. A significant strength is the rapid accessibility to research that otherwise would not be easily accessible. Indeed, this feature of OA targets one of the core issues of scholarly communication mentioned earlier. Another strength of OA is the lowering of publishing costs. The size and scope publishing has grown over time. For example, researchers have steadily produced more articles over the last decade, with article lengths increasing from an average of 7.4 pages to 12.4 pages. The cost of printing these articles, which may also include more figures, have increased as a result. Open access publishing is electronic; as such, costs normally incurred during the printing process are eliminated (Ware and Mabe, 35).

Open access, however, is not flawless. A vulnerability of OA is the higher average cost of APCs for STM disciplines relative to SSH disciplines. If high average APC costs for STM journals is the norm, then some researchers seeking to publish in these journals will require more grant funding than their SSH counterparts. These higher costs can pressure government granting agencies to redistribute grant funding. As Porter (2012, 5) suggests, policies designed to pay for APCs can result in funding being arbitrarily redistributed, such as from teaching-oriented universities to research-oriented universities.

The rapid and exponential growth of OA, particularly OA journals, is another source of vulnerability. This growth has outpaced efforts to educate academics about the quality of OA journals. This lack of awareness has given rise to predatory publishing practices. These so-called “predatory” or “vanity” journals are designed to maximize profit by having very high acceptance rates and no peer review (Beall 2012).⁸ These publishers profit by charging high APC costs. Some of these journals also name researchers to their editorial boards without consent and/or plagiarize and publish research. Similarly, some authors wanting to expand their list of publications can submit research to these low-quality journals and likely have the work published (ibid.).

2.1.1 Price barriers - The author-pays system

The author-pays system is the business model that removes price barriers. Commercial publishers do not receive subscription fees from customers, instead being compensated via APCs by publishing academics and/or their sponsors⁹. In other words, this system spreads all costs amongst the producers of academic research. When all costs are fully borne by this group, the

⁸ This issue also applies to repositories. One such repository Beall (2012) highlights is found at <http://www.intellectualarchive.com/>

⁹ Prices are set through contract negotiations between commercial publishers and authors.

criterion of free access is met and the idea of open access comes to life. There is more than one way for an APC to be paid. Generally, payment sources are the following: Private (Self-financed), private and public (Self-financing supplemented with research grants) or public (Research council grants, institutional payments). For example, a university can deposit money earmarked for APCs into an APC fund in cooperation with other universities. The institutions then allow their publishing faculty to access the money based on pre-defined policy guidelines.

The biggest issue with the author-pays system is its questionable sustainability at any scale. Some stakeholders may not be able to pay APCs that are too costly. As a result, any repository or journal that survives on these fees may lose revenue and potentially die. Fees that are too low may not cover the operating costs of the journal or repository. Generating sufficient revenue is only possible if a high number of authors pay a relatively low APC. Doing this is impossible if the quality of published or deposited articles is compromised.

2.1.2 Permissions barriers - Legal perspective

Copyright law is an integral part of the entire publishing system. The Canadian Copyright Act defines copyright as “the sole right to produce or reproduce the work or any substantial part thereof in any material form whatever, to perform the work or any substantial part thereof in public or, if the work is unpublished, to publish the work or any substantial part thereof. . .” (Government of Canada Copyright Act 2013). Normally researchers who publish a work have the option to place copyright and licensing restrictions on the work. These restrictions, known as permission barriers, specify the ways in which the work can be used.

Everyone involved in the cycle of research production can place certain requirements or restrictions on the way a work is published, reproduced and/or made accessible.¹⁰ These controls

¹⁰ Stipulations include royalties mechanisms and controls on use and reuse.

fall under the purview of the Fair Dealing clause of the Copyright Act. Fair Dealing is defined as statutory exceptions to copyright infringement. These protections are enforceable boundaries that apply to the underlying “fairness” of a transaction. They become legally enforceable after the author officially registers their work through the Canadian Intellectual Property Office (CIPO 2013). The access model used does not change or otherwise interfere with these boundaries.

Consider a researcher who submits a manuscript for publication in the Elsevier-owned journal Cell. If the work is accepted, then the researcher can then negotiate the transfer of their copyrights to Elsevier. If the manuscript contains a figure from another author, then the researcher must receive permission from the original author to reproduce the work. At this point, Elsevier and the researcher own certain rights to the way that the article can be used (Cell 2013). The researcher loses some rights and Elsevier gains some rights.

Open access publishing, however, removes most permission barriers that are found in subscription models. This does not mean that open access models are not legal. While interviewing a prominent legal scholar on the legal dimensions of open access, the compatibility of open access and copyright were discussed¹¹:

... publishers have solved their problem simply by getting your [researcher] permission before they publish and they do that without a contract ... A funder can say...if you take our money you'd have to make a result open access...It's simply a contract you make with your funder ... You retain the rights to retain open access and you use those rights to use open access... your funders are happy because they get what they wanted. Your publisher should be happy because it consented to publish your work anyway knowing that your work would be open access.

The “fairness” of the transactions is of concern. Now consider a researcher who publishes in an open journal such as the Public Library of Science ONE (PLoS ONE 2014). This journal, which is owned by the publisher PLoS, uses Creative Commons licensing to stipulate how the

¹¹ The interviewee chose to remain anonymous.

article is made usable. The PLoS licensing guide states that: “authors retain ownership of the copyright for their content, but allow anyone to download, reuse, reprint, modify, distribute, and/or copy the content as long as the original authors and source are cited. No permission is required from the authors or the publishers” (PLoS 2013).¹²

2.1.3 Research as a public good

Conceptually, many goods can be classified based on their excludability and rivalry. Rivalry refers to whether or not the use of a good by one person precludes another person from using the same good. If a person can stop another person from using a good, then that good is excludable.¹³ Knowledge as a toll good arises when, for example, some researchers repeatedly read a research article in a subscription journal (non-rivalry), but other researchers cannot afford to pay the subscription fee (Excludability). Knowledge as a public good, however, means that nobody needs to pay a fee to access the research (non-excludability). Rendering knowledge freely accessible is thus synonymous with research being made open access (Gray, Fulton and Furtan 2007, 7).

Some stakeholders want publicly funded research to be primarily toll-gated (pay to access). Blocking access by charging some fee is known as toll gating. A toll gate can be either artificial or natural. Charging subscription fees is an example of an artificial barrier restricting access to a good. An example of a natural access barrier is the prerequisite knowledge needed to understand the contents of a given journal. The highly technical nature of some subjects, such as those found in the natural sciences, act as built-in “natural” toll-gates. A customer could pay a journal subscription fee (the artificial toll gate) but be unable to understand the journals contents (the natural toll gate).

¹² This statement outlines the functions of a Creative Commons license.

¹³ The types of goods are public, private, toll, and common pool.

Others think that research should be a public good (freely accessible to all). Open access achieves this end by changing academically produced knowledge into a good that is accessible by anyone at any time in any place. Research becomes non-excludable, a change from toll-gated access that is guided by Intellectual Property Regime (IPR) guidelines. One consequence of this change is that the cost of publishing is shifted entirely onto the knowledge producers or funders. Consumers do not pay for access. Stated another way, the maximum that a customer is willing to pay to access this research drops to zero at the expense of the producers. Consider Figure one below, which shows a conceptual model of research as a public good.

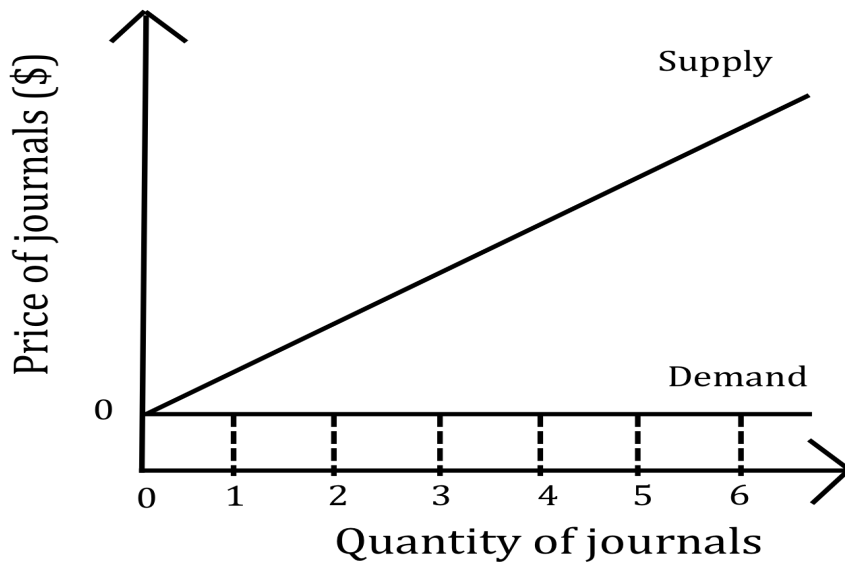


Figure 1 Conceptual model of research as a public good.

Assume that journal supply is linear. The price a customer is willing to pay, denoted by the horizontal Demand line, is zero regardless of the pricing that the seller offers. Stated another way, there is no price that a seller could use that the customer would pay. Publishers would not be able to generate revenue, as no consumer (academics, libraries, universities, and the general public) would pay any fee. The market equilibrium is found at the intersection of the downward

sloping Supply line meeting the Demand line on the vertical axis at price = \$0.¹⁴ A market for open access thus forms when subscription prices are \$0 per journal. However, when the price reaches zero, there is no output and no articles are published.

2.1.4 Peer review and the issue of journal quality

The quality of a publication is of principal concern for most people who access academic research. There is a perception that open access literature found in either journals or repositories is not peer reviewed or that administrators knowingly publish or deposit low quality articles (Bohannon 2013). Stated another way, the author-pays system and high-quality peer review are perceived as mutually exclusive or of low compatibility. Conversely, peer reviewed subscription journals are considered more stringent in their manuscript acceptance guidelines. This argument implies that the mode of journal access is causally linked to journal quality.

The above argument may or may not be true. Any possible link between access models and quality does not mean that the relationship is causal. That is, correlation does not equal causation. The ways that journals can be accessed, be it an open access journal or subscription journal, are ways of doing business. Peer review is an unstandardized process whether the journals are of the subscription or open access variety. For example, the open access journal PLoS has a rigorous review process and rejects an average of 31% of all submissions per year (PLoS 2013). In this case, the perception of low quality may or may not cause the journal owners to use a stringent acceptance policy.

On the other hand, there is some overlap between peer review and mode of access. Some repository administrators may review an article before deposit. Similarly, some repositories may stipulate that only peer reviewed research will be uploaded. In either case, however, the function

¹⁴ An equilibrium is the point where competing variables, such as journal price and quantity supplied, are balanced.

of repository administrators is not to determine the quality of a manuscript. Instead, they are more concerned with ensuring that the repository functions smoothly.

2.2 Open access policies around the world

Governments from Canada and abroad have used economic and ideological arguments to justify a variety of interventions in the academic publishing market. The Canadian research councils have gradually moved to make publicly funded research freely accessible. Within the granting agencies, this move has been motivated partially by the growing field of knowledge mobilization. Knowledge mobilization is defined as efforts taken to improve the production and accessibility of research, as well as generating consumer desire to access and use this research (Levin 2008, 12). Exploring and testing ways to make knowledge freely accessible is an important part of the knowledge mobilization strategy. Open access is considered the ideal way to realize this goal.

In Canada, the Tri-Agency research councils have followed international developments on the OA issue. For example, the Social Sciences and Humanities Research Council (SSHRC) has signed the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities and the Natural Sciences and Engineering Research Council (NSERC) has endorsed the Global Research Council Action Plan towards Open Access to Publications. The Canada Institute for Health Research (CIHR) has an open access policy in place that remains unchanged.¹⁵ The agencies recently released a draft document on their stance on open access policies. The objective of the policy is to “improve access to the published results of research funded by the Agencies, and to increase the dissemination and exchange of research results.” (Draft Tri-

¹⁵ See Section four “What are the Agencies’ current policies on open access? Why harmonize?” at http://www.nserc-crsng.gc.ca/NSERC-CRSNG/policies-politiques/OpenAccessFAQ-LibreAccesFAQ_eng.asp#8 for more information.

Agency Open Access Policy 2013, 2).” The core values and ideals driving this objective are committing to academic freedom and the right to publish, maintaining high quality and standards of research, aligning with the practices of international funding agencies, promoting the proliferation and advancement of research in all disciplines, and adhering to established and new best practices in research (ibid., 1).

For peer-reviewed journal publications, a recipient of a grant from any of the agencies has two guidelines to follow. The first requires that a recipient must either submit an article to a peer reviewed journal that offers open access or deposit the peer-reviewed full-text article in an online repository. The journal does not need to be a “gold” journal. Also, the repository can be institutional or discipline-specific. In both cases, there must be an embargo period ranging from immediate accessibility to a one-year delay. The guidelines for publication-related research data sets are Agency-specific. The CIHR mandates that their grant recipients place their research data in a “green” repository of their choosing. The data sets must also be kept for a minimum of five years (Draft Tri-Agency Open Access Policy 2013, 2). The SSHRC and NSERC do not have mandatory data retention or archiving policies. The SSHRC, however, has a Research Data and Archiving Policy that facilitates rather than mandates making data available to others.¹⁶

The policy developments in Canada, however, lag behind developments in other countries. According to ROARMAP (2014), Canada has implemented 22 open access policies as of 2014. Compare this amount to the number of policies in Australia (28), the United Kingdom (60) and the United States (125) for the same time period. Second, Canada is not among the top 10 countries in the amount of known repositories when measuring the proportion of open access

¹⁶ See Section eight “Does the draft policy require making data openly accessible?” at http://www.nserc-crsng.gc.ca/NSERC-CRSNG/policies-politiques/OpenAccessFAQ-LibreAccesFAQ_eng.asp#8 for more information.

repositories by country. For example, the top five countries are the United States, United Kingdom, Germany, Japan, and Spain (OpenDOAR 2014). An important consideration is that the amount of repositories may differ as a function of relative population size. For example, the smaller amount of repositories in Canada could be due to Canada having less academic institutions, and therefore less institutional repositories, relative to countries such as the United Kingdom. Similarly, the lack of open access policies in Canada could be due to a smaller population relative to the United States and United Kingdom. That is, larger populations may need a broader range of policies to address research access issues.

The UK government has been a leader in tackling the open access issue. Policy makers recognized that the changing landscape of academic publishing needed an appropriate government response. A recently released study, commonly called the Finch report, offered several recommendations to guide the governments' decisions (Finch 2011,). Every recommendation was accepted by the national government, including expanding digital infrastructure, implementing a national "gold" open access journal model and requiring publicly funded research outputs be placed in repositories. Note, however, that the government has been criticized for supporting open access journals due to the uncertain sustainability of this model (2011). Sustainability, defined as the capacity for journals to survive only on APCs, is threatened when authors do not have the money to pay this cost. The owners of open access journals must risk the possibility that not enough authors can or will pay the cost.

Australia and the United States have also implemented open access policies. Both governments have recently mandated that publicly funded research from any discipline must be placed in freely accessible repositories (Australian Government 2013, Department of Health and Human Services 2008). The United States has received notable praise for implementing open

access policies that render all federally funded research freely accessible.¹⁷ A key difference between the UK and the United States and Australia, however, is that only the UK supports open access journals. The Australian and United States governments consider open access journals a risky investment due to the sustainability issue noted above.

The policy landscape in the developing world is different. Members of academia and governments face difficulties in connecting and contributing to global and local knowledge societies (BioMed Central 2013). Blade Nzimade, the current South African Minister of Higher Education and Training, noted that African researchers are primarily consumers of research from developed nations (UNESCO 2009).¹⁸ This does not, however, imply that open access policies have not been developed or implemented. Many open access initiatives in Africa have been pursued (Armstrong, De Beer, Kawooya, Prabhala, and Schonwetter 2010). For example, publicly funded universities that are members of the Consortium of Academic and Research Libraries in Ghana (CARLIGH) have accepted private universities as members. This policy was implemented in order to lower the costs of accessing electronic journals.

2.3 Stakeholders

In Canada, a variety of stakeholders from all areas of the market have voiced several justifiable arguments in favor of transitioning to a new open access status quo. This new equilibrium would involve all publicly funded research being made freely accessible to everybody. These actors argue that the government should play a larger role in facilitating open access than it currently does. Table 2 provides a brief description of the stakeholders, their roles

¹⁷ See the discussion by Timmer (2013) at <http://arstechnica.com/science/2013/02/obama-administration-backs-open-access-to-all-federal-research/> for more information.

¹⁸ These consumption patterns rely, in part, on free accessibility.

in the market and their arguments on the merits and downsides of transitioning to a new “open access” status quo.

Table 1			
<i>Description of stakeholders and their perspectives on open access transition</i>			
Stakeholders	Description and role in the market	Arguments for open access	Arguments against open access and other considerations
Research libraries	<ul style="list-style-type: none"> • Primary purchasers and distributors of academic research • Found in Canada • Represented by Consortia Canada and the Canadian Association of Research Libraries on financial, operational and policy issues 	<ul style="list-style-type: none"> • The status quo is financially and ideologically unsustainable • Free access the most cost-effective means of providing information to patrons • Open access best realizes the idea of making knowledge freely available to everyone 	<ul style="list-style-type: none"> • Tight budgets may hamper transition to free access e.g., unable to fund infrastructure, IT support • Cannot individually transition to a new status quo
Commercial publishers	<ul style="list-style-type: none"> • Large scale; based outside of Canada • Profits from many products and services • Owns copyrights to many high impact journals 	<ul style="list-style-type: none"> • Open access can allow more people to freely read academic research. 	<ul style="list-style-type: none"> • Free access can undercut profits if open access services cannot be monetized
Non-commercial publishers	<ul style="list-style-type: none"> • Small-scale; can be non-profit • Typically offers small number of lower impact journals • Subscriptions usually the primary revenue source 	<ul style="list-style-type: none"> • The idea of making knowledge freely available to everyone is best realized with open access 	<ul style="list-style-type: none"> • Free access jeopardizes survival if subscription revenue is lost • May not have the infrastructure to support transition
Public research funders	<ul style="list-style-type: none"> • Represented by the Tri Research Councils • Offers competitive grants to researchers and publishers from any academic discipline • All types of research are funded 	<ul style="list-style-type: none"> • Open access can improve the provision of knowledge, a public good • The idea of making knowledge freely available to everyone is best realized with open access 	<ul style="list-style-type: none"> • Lack of information may prioritize some needs at the expense of others • Unneeded action can complicate the market failure • Policy implications of open access transition
Academics	<ul style="list-style-type: none"> • Diverse group of individuals from all academic disciplines 	<ul style="list-style-type: none"> • Easier access to local, national and international research, 	<ul style="list-style-type: none"> • Open access perceived to interfere with right to profit from research

	<ul style="list-style-type: none"> • Primary producers of research • Often fill many roles, such as peer review, editing and publishing • Purchasers of academic research 	<ul style="list-style-type: none"> • particularly in the social sciences and humanities • Useful for health practitioners who quickly make use of new medical discoveries 	<ul style="list-style-type: none"> • using intellectual property regimes • Research producers may bear the full cost of publishing their work • Perception of interference with academic freedom
Private industry	<ul style="list-style-type: none"> • Any private sector business, industry, or corporation 	<ul style="list-style-type: none"> • Accessible research can spur new innovations 	<ul style="list-style-type: none"> • Spread of easily accessed research can hurt businesses that use knowledge as an operations input
Private research funders	<ul style="list-style-type: none"> • Closely linked to and may be subsumed within private industry • Contracts researchers for a specific purpose, e.g.; medical or technological advances 	<ul style="list-style-type: none"> • Accessible research can spur new innovations • Helps sponsors realize goal of dissemination and impact 	<ul style="list-style-type: none"> • Freely accessible research can undercut profit and/or market advantage

Research libraries are the primary purchasers and distributors of academic research.¹⁹ These institutions, which are found across Canada, buy subscriptions for print and digital literature in all forms from publishers and distribute this material to patrons. These institutions are represented by a variety of groups, notably Consortia Canada and the Canadian Association of Research Libraries (CARL). Consortia Canada is a national research library consortium composed of smaller academic library programs, groups and consortia. This group is actively involved in both opening access to digital information, investing in digital infrastructure and liaising with other stakeholders to promote the benefits of open access (Consortia Canada 2012). This consortium, which has 29 member research libraries, provides policy leadership for its members and is the popular face of Canadian research libraries. The consortia and all of its

¹⁹ See Consortia Canada (2012) for a complete list of the groups goals, as well as the functions of it's individual members.

members favor academic knowledge being freely accessible to everyone for ideological and financial reasons (2012).

The publishers from which research libraries purchase subscriptions are either commercial or nonprofit. Commercial publishers publish for profit a variety of material including print and digital journals. This industry fills the following functions: establishing the ownership of an author's idea, coordinating peer review, archiving articles for later use, and selling academic works to consumers (Ware and Mabe 2009, 13). Over 40% of the journal market is currently controlled by Elsevier, Wiley-Blackwell, Springer, and Taylor & Francis. The oligopoly is implicated in using their market advantage to raise journal subscription prices beyond what would be expected in a competitive market (Merrett 2008, 96-97). Nonprofit publishers fill the same roles as the large publishers, but on a smaller scale. These actors make up the majority of the Canadian journal market, generally produce a small amount of lower prestige low-impact journals and typically survive on subscription revenue.

The primary customers of journal publishers are academics. Academics encompass the whole spectrum of academic disciplines and include researchers and editors. Researchers are the primary producers of research, aggregate research outputs, and control the quality of research outputs. Academics often fill multiple, concurrent roles that have both complimentary and competing interests. Research active academics simultaneously produce research and/or have extensive research histories, edit and prepare peer reviewed documents for publication in all formats and participate in the peer review process (Porter 2012, 12-13). The interests of publishing researchers include any mix of the following: publishing in prestigious and/or high impact journals, satisfying personal curiosity, generating profit, being recognized for their work, contributing to the extant literature, answering questions, solving problems, and gaining tenure.

Journal editors are interested in preparing properly edited material for publication. The Canadian Association of Learned Journals (CALJ) is a large, member driven non-profit organization that identifies and voices the collective needs of both editors and publishers in a variety of academic, industry and policy settings (Canadian Association of Learned Journals 2012). Research quality is controlled via the peer review system. Peer review frequently occurs on a volunteer basis through an informal network of academics.

Researchers can be funded by public private and/or non-profit sources.. Public funding bodies include the Tri Research Council: NSERC, SSHRC) and the CIHR. These institutions are responsible for addressing the research funding needs of people from all parts of academia. Private funders include any group that uses academic research to gain a market advantage over competitors. For example, the pharmaceutical company Pfizer takes part in the public-private partnership called the Quebec Consortium for Drug Discovery. This partnership between academia, the government and Pfizer aims to create new technologies and testing models that increase future product output. This output is designed to be competitive in the market (Lévesque 2009). Non-profit organizations also fund research from the sciences and humanities. Examples include the Heart and Stroke Foundation and the MacArthur Foundation (Heart and Stroke Foundation 2014; MacArthur Foundation 2014).

Funders of each type are primarily interested in receiving the highest return on their research investment, with one caveat. Ideally, the returns sought by public investors are for the benefit of the public. These returns do not necessarily need to be profitable. This differs for private investors, who seek profitable returns on their investments. For example, private investment into a new pharmaceutical medicine is done with the anticipation that the medicine will eventually generate profit.

Underpinning the interests of academics is the concept of academic freedom. The capacity for scholars to direct as many aspects of the research and publishing process as possible is a key requirement for the smooth functioning of academia (Schonfeld and Housewright, 2010, 32-33). Some academics have called for publicly funded research to be freely available to everyone without the involvement of commercial interests, whereas others argue that commercial publishers fill important roles in editing, distribution and access (Porter 2012, 2).

2.4 Ideas and interests

Surveying the stakeholders allows us to discern a link between their ideas, interests and behaviour. A growing body of literature recognizes that ideas and interests play crucial roles in the behaviour and policy preferences of people, as well as in the policy process. Ideas are defined as causal beliefs produced by human minds; they connect to the surrounding world via human interpretation and aid in problem solving (Béland and Cox 2010, 8). Cause is used in two ways. The first is that one event is responsible for producing (causing) a sequence of another event or events. The second are links between two or more things that a person believes exists. There are two critical ideas in the open access debate. The first idea is that academic knowledge is not compatible with toll-gating. The second idea is that this knowledge is compatible with toll-gating.

Interests, the strategic behaviours of a person designed to reach some goal, are a type of idea. The two critical interests in the open access debate are money and prestige. There is debate on the nature of the relationship between ideas and interests. Some scholars argue that interests exist only after a person defines them. These definitions can be influenced by politics, ideals, beliefs, emotions, history and so on. Other scholars think that interests have an “objective existence independent of the person who holds them” (ibid., 10). In this case cognitions, and thus

ideas, are of minor importance. In this chapter, I assume that ideas are a significant part of stakeholder interests and that interests do not exist independent of its holder. All of the ideas and interests to be discussed are found above in Table 1.

I discuss ideas first. The first proposition is that the free movement of knowledge provides general benefits; restrictions reduce the availability of intellectual capital. This proposition manifests in the argument that knowledge should be treated as if it were a public good that should not be toll-gated.²⁰ Publicly funded research should be fundamentally incompatible with generating revenue and/or profit. Stated another way, the ideal way that access should be granted is through the author-pays system.

The second proposition is that restricting the flow of knowledge is acceptable. That is, publicly funded academic knowledge is a public good that is compatible with toll gating. The first criterion for knowledge being toll gated is financial. This is identical to what happens in an oligopolistic and competitive market. Some journals survive on access fees, whereas others generate profit from these fees. In both cases, charging toll fees is built on the assumption that any member of the research cycle has the freedom to seek revenue and/or profit from their research.

Making people pay to access this public good has produced a tension that can be interpreted as a clash of ideas. That is, the ideas that underlay the open access debate are not the same. Such a clash implies that the idea of treating publicly funded research as a public good is mutually exclusive with the idea of toll-gating knowledge. Indeed, these differing ideas are an important generator of the various arguments. All else being equal, if all of the stakeholders had

²⁰ The criterion for knowledge being a public good is whether or not tax dollars was used to fund a given project.

identical values and perspectives, then debates on open access would lack an ideational dimension.

I now discuss interests. Academics are primarily concerned with prestige and research impact. These interests manifest as a culture that is conservative and resistant to change. The rewards system in academia, particularly tenure and promotion, is an important cause of this resistance. Academics have an incentive to avoid any change that could interfere with gaining tenure and promotion. For example, academics prefer to publish in the most prestigious and high-impact journals, no matter the cost. (Porter 2012, 13). A government policy that limits or jeopardizes this freedom may be met with resistance. This possibility was reflected during an interview, when an anonymous participant who was asked about government involvement in academic affairs noted that “its important that scholars have academic freedom. The federal government should not be more involved.”

For academics and non-profit publishers, the importance of toll gating highlights their need to find revenue as a means of survival. Academic libraries face similar financial constraints, but do not have the freedom to impose access fees on their customers. Instead, the rationally self-interested arguments of libraries reduce to liaising with the government and large publishers to find ways to ease the burden on library budgets.

Commercial publishers, by contrast, are interested in maintaining profit margins. Parts of the open access debate require changes to the current publishing system. Assuming that these publishers do not adapt to changes in academic publishing, then moving to a new status quo could be against their rational self-interest. If they adapted to these changes, and evidence suggests that they are, then a new status quo could align with their financial interests (Porter 2012, 2-3).

An important consideration is that ideas and interests are not mutually exclusive concepts. They interact in a variety of ways to guide behaviour and policy preferences. Nearly all of the stakeholders on every side of the debate prioritize financial interests for a variety of justifiable reasons. These interests have, in turn, informed stakeholder behaviour, policy preferences and policy implementation. Commercial publishers are interested in profit, and monetizing opening access is viewed as a profitable business opportunity.

Non-profit publishers express concern over losing subscription revenue during and after any transition. In a market that has not adapted to open access developments, this is not surprising. During an interview, senior policy advisor from one of the research councils who chose to remain anonymous highlighted this sentiment when asked about the financial state of the journal market: “It has to be paid for, the money has to come from somewhere. . . . A journal like Cell charges \$40,000 a year for a subscription; everyone knows that’s absurd. That’s not how much it costs to produce the journal.”

The importance of financial interests does not, however, imply that ideas are absent in the open access discussion. These concepts interact such that ideas can influence interests and interests can influence ideas. Some actors think that open access models are both ideal cost-control measures and the most practical way to realize the building of a “marketplace for ideas”. This argument has broad appeal; for example, Consortia Canada, CARL and CALJ have used this argument when debating the merits of transition.

A different example of the interplay between ideas and interests is found on the other end of the debate. Some researchers and publishers of all types, despite agreeing with the value of making knowledge easily accessible, think that the current system of research access is meeting their interests. Researchers who have the freedom to publish in prestigious journals want, in part,

to raise their profile among the academic community. Upsetting this system could hinder the efforts of these researchers to be well-known within their field. During an interview, open access expert Michael Geist²¹ highlighted this sentiment by saying that “Academics have supported the [traditional publishing] system due in part to reputational benefits and the absence of viable alternatives.”

Financially viable publishing alternatives have, at their core, a self-interested component. The balance of ideas and interests that underpin reputational benefits, however, is more complex. At first glance, an academic who chooses to publish in a prestigious journal appears to be motivated solely by her own interests. Publishing in such a journal both builds reputation and contributes to the academics’ drive for tenure and promotion. Being promoted relies in part on an academics’ reputation; therefore, academics need to be interested in their reputation. The “scale of ideas and interests” tips toward self-interest. From another perspective, the value of freely accessible knowledge is replaced by the values of being recognized by peers and the host institution.

The complex interplay of ideas and interests is also present at the level of policy creation and implementation. That is, these two broad concepts are not exclusive to stakeholders. When asked about the ways that the value of making academic research freely accessible affects policy building during an interview, an anonymous consultant who took part in a variety of policy discussions at the granting agencies and CARL noted that the desire to build open access policies was motivated by ideas-based rather than interests-based arguments: “I think that that [the idea of freely accessible research] resonates especially at the government level, so the funding

²¹ I interviewed Michael Geist, who is a Canada Research Chair of Internet and E-Commerce law at the University of Ottawa.

agencies. So it has a huge role in convincing funding agencies in implementing open access policies.”

The idea of freely accessible research resonates with these policymakers because publicly funded research is produced using tax dollars. The participant above noted that well-constructed arguments that incorporate the idea of accessible research are powerful means of persuading the research councils to implement open access policies. These policies take the form of increased financial support for researchers who lack the money to publish in open access journals and/or commercial or non-profit journals that offer open access services. This is not surprising, as applying purely interest-based arguments to public goods issues are not necessarily convincing. Monetizing and profiting from public goods is often not sustainable, as was the case with the privatization of the British railway system (van Vugt 1997).

The funding agencies also do not have sufficient influence alone to lobby the government for more funding. There is a divide between the desire of the granting agencies to implement open access policies and the willingness of governments to financially support open access intervention. If academics and librarians jointly lobbied the government using arguments based on ideas and interests, then this divide could be bridged. Indeed, the federal government has said that funding will gradually be diverted towards projects that have more tangible uses by industry (Geist 2013).

2.5 Discussion

The funding agencies have heard and made many arguments on implementing open access policies. The government is receptive to these discussions and developments. For example, the SSHRC has implemented a “green” open access policy for research data and the CIHR has a mandatory open access policy for research data and publications. Though these

discussions are a continuing process, Canada has not been a leader on the issue. Other countries, notably Great Britain, have taken steps to integrate author-pays systems into the publishing market.

The government can use the policies from other countries as blueprints for action. Doing so, however, is not a simple matter. Taking immediate and comprehensive action on the open access issue is akin to prompting a sudden paradigm shift (Coleman, Skogstad and Atkinson 1997). Such a new “public policy paradigm” entails a change in the fiscal priorities of a government. In Canada, the government would need to restructure the ways in which access to publicly funded research is viewed. Such a shift could emerge if factors such as political will and strong lobby efforts aligned at the right time.

Some academics and librarians who support the open access idea are dissatisfied with the current policy environment. Concern is still being voiced over the status quo and the government is being pressed to implement policies that foster the development of the open access ideal. Pushing for this ideal requires a public policy paradigm shift away from the status quo. The following chapter will describe the status quo from a variety of angles.

CHAPTER 3 THE STATUS QUO

The goal of this chapter is to lay the groundwork for a public goods case for government intervention. This goal will be met by describing the following parts of the status quo: Market structure, business models used, the presence of a market failure, and the link between journal price and access to knowledge. Describing the status quo is an important step in outlining the ramifications of a widespread “gold” open access model. In other words, determining whether or not open access is the ideal means of knowledge dissemination is only possible by comparing “what is” to “what could or should be”.

First, a broad description of the market is given from a Canadian point of view. The flow of public money from the granting agencies to commercial publishers, via the proxy of publicly funded research, composes this section. The cost and permission barriers built into the market are also highlighted. Viewing the market in this way gives policymakers a backdrop against which policy options can be discussed. Several business models are then presented and discussed. The rapid growth of open access has forced universities, research libraries and academics to find new ways to determine who pays what cost. Research libraries and universities have a particularly strong financial incentive to find a new payment method. Paying subscription fees, the primary means of doing business, are only one way that academic research is made accessible. All of the known models are compared and contrasted along five dimensions: cost, who pays, who uses the model, payment sources, and large-scale sustainability.²²

I argue that the market is failing to supply a public good at an economically efficient level. This failure is established by comparing two microeconomic models to existing real-world

²² The author-pays system (open access journals and repositories) is described in chapter two and is not reproduced here.

quantitative and qualitative data. Economic models are useful for depicting market failures, as well as the impact that changing the price and/or quantity of a good has on the supply of and demand for that good. This is particularly helpful in showing that prices in the journal market are restricting access to some research. A discussion on the impact of the market failure on the stakeholders concludes this sub-section.

A discussion of the relationship between subscription prices and knowledge accessibility follows. This discussion proceeds by first showing how changing prices affect accessibility to academic knowledge. A conceptual model of this link is combined with interview quotes and real-world data. Finally, connections are drawn between this relationship and ideas and interests.

3.1 Market structure

Four European-based commercial publishers control over 40% of the global market in academic journals (Porter 2011 pp. 5). These publishers are Elsevier, Wiley-Blackwell, Springer, and Taylor & Francis. This type of structure is termed an oligopoly. An oligopoly is a relationship between at least two firms that exert control a market. An oligopolistic market is not perfectly competitive, as the firms have sufficient power to set prices at which goods or services are sold. This control manifests in the journal market as, for example, the setting of subscription and APC prices. A monopoly, by contrast, is a market controlled by one firm. If one commercial publisher began buying the other publishers, then a monopolized market would emerge. In other words, a monopolized journal market is a possible endpoint that the current oligopoly could move toward.

There is, however, a nationalist perspective on this market structure. A Canadian customer could justifiably argue that the oligopoly is harmful. The case of a Canadian research library illustrates the nationalist perspective. First, public granting agencies award both

academics and research libraries money to conduct research, purchase journal subscriptions, publish in academic journals, and upgrade research infrastructure. This money comes from the granting agencies and federal transfers to provincial advanced education ministries. The granting agencies award money directly to successful research applicants who then produce research using all or part of their award.

These researchers then give the copyrights of their work to publishers inside and outside of Canada. Giving these copyrights to a European commercial publisher means that the rights to a publicly funded research output from Canada are owned by a European business. A library that wants to access this research must pay a fee. The money that the library uses is public. In other words, the library is using Canadian tax dollars to access research that was generated using Canadian tax dollars.

3.1.1 Business models

Determining whether or not this market structure is desirable is complicated by a lack of other competitive and sustainable large-scale business models. If a sustainable alternative to the subscription model exists, then rational self-interest suggests that this alternative model would be adopted by a capable actor and used in the free market. That no such model is being used on the large scale suggests that either the stakeholders are uninformed about existing models or no model exists. If the actors are uninformed, then the customers are paying a higher cost for goods and services that someone else could provide at a lower price.

That any of the stakeholders are uninformed about other ways of doing business is unlikely. Necessity has forced the granting agencies, libraries and academics to seek new ways to allocate resources. There is also a growing body of literature describing different business models (OASIS 2012). Consider the models presented in the table below.

Model	Cost	Who pays	Model used by	Payment source(s)	Sustainability
Toll-gating	<ul style="list-style-type: none"> • Subscription 	<ul style="list-style-type: none"> • Consumers 	<ul style="list-style-type: none"> • Publishers (commercial & non-commercial) • Academics 	<ul style="list-style-type: none"> • Private (Self-financed) • Private & public (Self-financing supplemented with research grants) • Public (Research council grants, institutional payments) 	<ul style="list-style-type: none"> • High if costs can be managed
Community publishing	<ul style="list-style-type: none"> • Subscription (sometimes) 	<ul style="list-style-type: none"> • Producers • Consumers 	<ul style="list-style-type: none"> • Academics 	<ul style="list-style-type: none"> • Primarily volunteer 	<ul style="list-style-type: none"> • High at small scales
Hard copy sales	<ul style="list-style-type: none"> • Selling print versions of works 	<ul style="list-style-type: none"> • Consumers 	<ul style="list-style-type: none"> • Non-profit publishers 	<ul style="list-style-type: none"> • Private (investments) • Public (granting agency funding) 	<ul style="list-style-type: none"> • High at small scales
Consortium purchasing	<ul style="list-style-type: none"> • Subscription • APCs 	<ul style="list-style-type: none"> • Consumers and producers (Collaborating institutions, scholarly societies and laboratories) 	<ul style="list-style-type: none"> • Universities and academic libraries 	<ul style="list-style-type: none"> • Private (investments) • Public (granting agency funding) 	<ul style="list-style-type: none"> • High
Institutional subsidy	<ul style="list-style-type: none"> • APCs 	<ul style="list-style-type: none"> • Producers 	<ul style="list-style-type: none"> • Universities 	<ul style="list-style-type: none"> • Private (investments, donors) • Public (granting agency funding) 	<ul style="list-style-type: none"> • High at small scales

There are several defining characteristics of these business models. One difference is the payment source. In all cases, funding sources are public, private or a mix of both. For example, institutional subsidies provided to academics can be funded purely by private investment or donations, from granting agency awards only or a mix of each. Some journals also sell their copyrighted work to other publishers. Toll gating exclusively uses subscriptions as the cost. Hard copy sales and consortia use a mix of subscriptions and APCs, whereas every other model uses

Article Processing Charges.²³ Customers pay subscriptions to access copyrighted research and authors or representatives of these authors pay a processing charge to publish their work accessible. Subscriptions are demonstrably economically sustainable, assuming that the costs do not rise so high as to force consumers to find alternative access routes.

Community publishing entails academics banding together into small groups to publish their work (OASIS 2012). These academics are found in all of academia, although the arts and humanities are the primary disciplines. These non-profit publishers conduct business by relying on volunteers to do the bulk of the work. Manuscripts are uploaded on the Internet to be freely accessed. Subscriptions are occasionally charged for hard copy versions of these manuscripts.

Publishers use mixtures of the models, whether their goal is to generate revenue or not. For example, commercial publishers use subscriptions and processing charges to gain profit. Individual academics do not have the capacity to manage repositories and typically manage subscription journals only. Institutions and commercial publishers, however, have the required infrastructure to manage repositories. Consortium purchasing and institutional subsidies are discussed as parts of the author-pays system.

3.2 “Is there a market failure?” - Linking models to data

So far, only overviews of the market and how business is conducted have been discussed. What has not been established is whether or not the market has failed. Some commentators have suggested that the high prices charged by commercial publishers are a sign of a market failure; others argue that commercial publishers fill roles that justify the costs (Taylor 2012, Porter 2012). Identifying the presence of a market failure is important from a public policy perspective.

²³ These charges are part of the author-pays system.

One of the roles of the government is to intervene into failed markets, assuming that intervening creates conditions for the stakeholders to find a new Pareto improved equilibrium²⁴.

The figure below depicts the demand for accessing some number of research articles at some price. In one case, customers buy access from a large commercial publisher that dictates quantity and price. The other case depicts demand in a competitive market. Consider the following model.

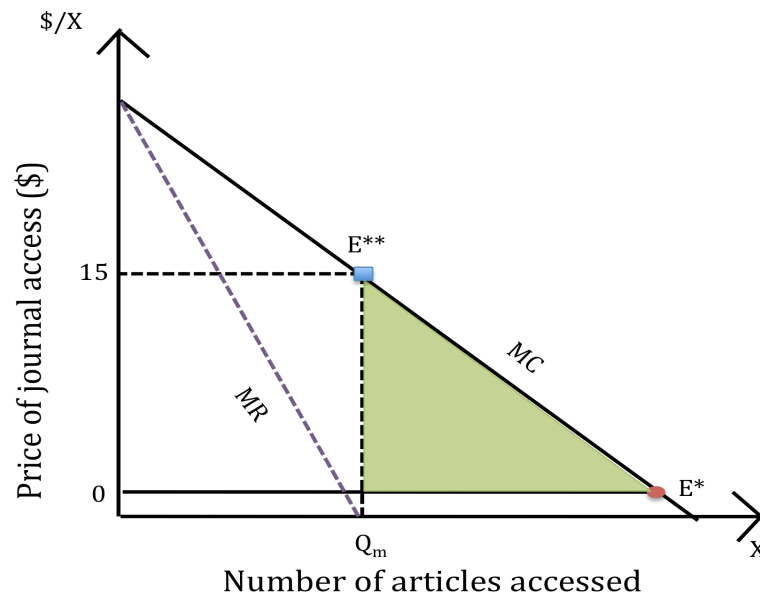


Figure 2 Demand for accessing research articles in monopolistic and competitive markets.

The number of articles accessed is on the horizontal axis and access prices are on the vertical axis. Assume that articles have fixed quality. This is justified because fixed quality simplifies illustration and interpretation. Varying quality would shift the demand line either to the left or the right. Researchers accessing lower quality articles would shift the curve to the left, whereas accessing higher quality articles would shift the curve to the right.

²⁴ Pareto improvements are instances where changing the allocation of a good or service makes at least one person better off and does not make anyone worse off.

Also assume that demand is downward sloping. This assumption is justified in two ways. First, a given researcher's decision to access research are subject to diminishing marginal returns; that is, she will find progressively less use for accessing additional articles. She will eventually stop accessing articles when no utility is gained. Second, researchers value the articles differently. Some researchers are willing to pay any price to access articles, whereas others will pay up to a given point. Aggregating all of these behaviours results in a downward sloping demand line.

The red dot E^* is the economically efficient outcome. Economic output is maximized at this point. Economic output is defined as the quantity of research articles accessed for some price. This point rests on the intersection of the demand line and marginal cost MC line at \$0 per accessed article.²⁵ If the market were competitive, both the marginal cost of access and the amount customers would be willing to pay would be equal to the marginal cost of access.

The blue square E^{**} , by contrast, is the point where customers are willing to pay a price P_m to access Q_m articles. The commercial publisher sets price P_m . The number of articles accessed at P_m is the point Q_m . The dashed MR line is marginal revenue, which depicts revenue that the publisher gains from selling one additional unit of access. Note the differences between the price and quantity in the commercial publisher case and the competitive case. An allocative inefficiency called the deadweight loss, which is depicted by the green triangle, results from this difference. Consider the following example where $P_m = 25$, $MC = \$5$, $Q_c = 6$, and $Q_m = 3$. Using the formula $\frac{1}{2}(\text{base} \times \text{height})$ yields $\frac{1}{2}(3 \times 20) = \30 economic benefit lost by customers who access these articles.

²⁵ The actual marginal cost, though negligible, is likely not zero.

There is strong evidence that the blue dot E** accurately depicts the buying and selling behaviours of academic libraries and the largest commercial publishers. From 1985 to 2001, the average real subscription prices charged for the top 10 commercial journals increased by 379% from \$286 to \$1372 (Bergstrom 2001, 8). Journals owned by professional societies and university presses, however, increased an average of \$104 to \$187, an 80% increase over the same time period (Ibid., 4). In 2001, the average real price per page charged by the 10 most-cited commercial publishers was nearly six times higher than what the 10 most-cited nonprofit publishers charged. The average price per citation charged by commercial publishers was even higher, being about 16 times greater than nonprofit publisher prices (ibid.). These drastic price increases are significant because these publishers own a variety of high-impact and high prestige journals. The demand for these materials is very high. That is, academics and academic institutions routinely purchase subscriptions for access that is perceived to be indispensable.

Over 8, 000 researchers from around the world have responded to these high prices by actively boycotting Elsevier. This response takes the form of researchers signing a petition and consenting to making their name and boycotting activities publicly available. High subscription costs, publishing low-quality research and support of legislation that restricts open access initiatives are cited as motivations for this boycott (Gower and Neylon 2012). In Canada, these high prices force librarians to cancel subscriptions. The choices that these libraries must make to cover these cost gaps are part of a system of trade-offs. A librarian responsible for buying electronic and print titles noted that high subscription prices affected her ability to buy needed journals:

It is usually the big commercial publishers that have unreasonable subscription prices . . . Wiley is the publisher that is top of my mind right now . . . What always decides the case lately is cost. Our serials fund is completely spent out across the Library (i.e. all disciplines), in order to acquire anything new we must cancel something else, or transfer money from another fund.

The librarian is forced to drop some subscriptions, prepare to drop journal titles in the future and/or transfer money from a different fund to pay for the required journals. The first two decisions result in either an immediate or delayed loss of knowledge access for the consumers. Note Table 3,²⁶ which shows the most recently available acquisitions expenditures data for subscription electronic and print monographs²⁷ and serials among 13 of the 29 members of CARL:

Institution	Electronic Monographs	Electronic Serials	Print Monographs	Print Serials	Total Acquisition Expenditures	Acquisition budget
UBC	982,000	10,480,000	3,400,000	3,200,000	18,000,000	13,670,000
SFU	352,000	3,600,000	2,000,000	1,100,000	7,200,000	8,575,400
Usask	94,000	7,000,000	1,800,000	1,100,000	10,400,000	9,580,000
Manitoba	513,000	4,700,000	1,340,000	2,500,000	9,100,000	9,090,000
Regina	300,000	1,998,000	637,200	320,000	3,250,000	3,246,000
Brock	148,700	1,930,500	430,500	135,000	2,600,000	2,500,000
Carleton	34,800	3,753,000	709,000	584,700	5,000,000	6,064,000
McMaster	219,000	6,113,000	1,000,000	848,400	8,200,000	9,205,000
Ottawa		5,700,000	4,600,000	2,220,000	12,500,000	15,258,000
Queen's		6,700,000	1,400,000	1,388,000	9,493,600	10,377,000
Ryerson	111,000	2,511,000	1,100,000	416,160.40	4,143,000	3,852,000
Western Ontario		8,411,000	2,177,300	1,377,000	11,900,000	13,900,000
Windsor	394,000	3,492,000	584,000	575,800	5,000,000	4,440,000

Note. Green highlighted institutions had acquisition costs > budget. Sixteen members were excluded due to missing more than one data point.

In 2012, the subscription costs of electronic serials took up the bulk of the expenses in every library. In some cases, electronic serials subscriptions accounted for ~50% -75% of a

²⁶ Data taken from each institution's website. Contact the author for the data.

²⁷ Monographs data is included for the sake of completion.

libraries' total expenses. In six institutions, total expenditures even exceeded their allocated budgets (highlighted in green).

3.3 Linking price to public goods access

So far, a connection between subscription pricing and accessibility to academic knowledge has been assumed. This section will show how price dictates accessibility. Consider the following figure, which depicts the conceptual relationship between journal prices and the demand for some quantity of journals:

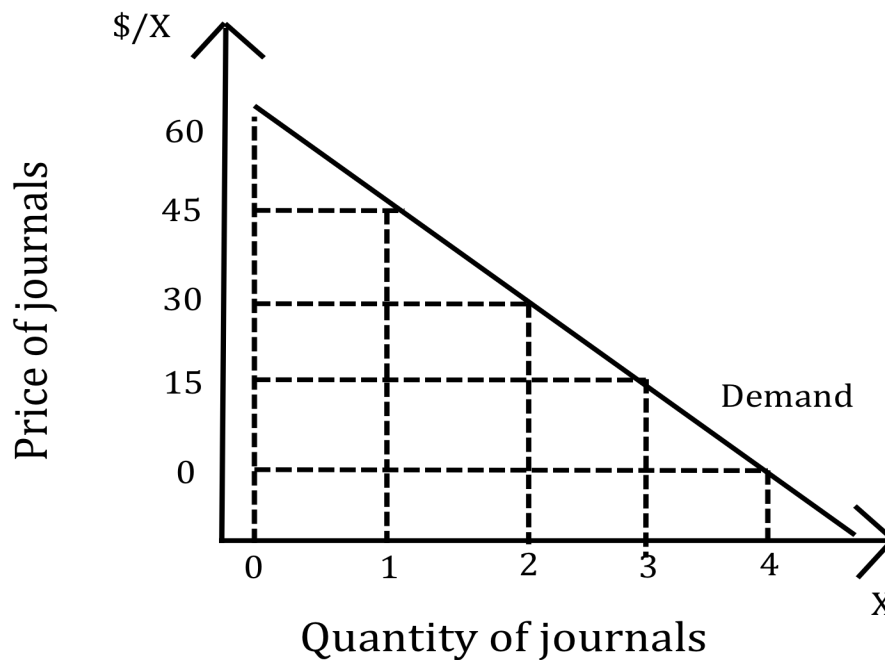


Figure 3 Relationship between subscription price and demand for journals.

Assume that demand is linear. The figure shows that the quantity of journals demanded and subscription prices are inversely related. First, consumers demand some quantity of journals at some price. Quantity of journals is shown on the horizontal axis and journal prices are shown on the vertical axis. As prices increase, demand for journals decreases and vice versa. For example, a research library could purchase a subscription to one journal at a total cost of \$45. Another research library could purchase subscriptions to two journals at a total cost of \$30.

Now consider the case where a journal subscription costs \$60. The quantity of journals demanded by a research library is zero. In other words, no research library would be able to access the journal due to the high price. If prices are too high, then accessibility to the journal(s) is low or absent. For example, this scenario could emerge if a commercial publisher charged subscription prices that were too high for any customer to buy.

3.4 Discussion

The status quo has gradually become too costly for libraries, academics and non-profit publishers to manage. High subscription prices charged by commercial publishers have driven this development. These prices are pushing libraries to either drop journal subscriptions or find other modes of purchasing. Canceling subscriptions implies that research that would otherwise be made available to consumers is rendered inaccessible. Stated another way, the accessibility of a public good is closed off. In the case of Canadian research libraries, the demand for the most impactful or prestigious journals is only met by jeopardizing other programs or acquisitions. This drop in either funding or subscriptions is reminiscent of figure two such that the high cost of some subscriptions results in a drop in accessing research articles.

Whether or not the status quo is ideal depends on the stakeholder in question. Some academics and publishers use rational self-interest as the guiding principle for their decisions. The status quo gives these actors the best opportunities to act on and fulfill this principle. Academics that value the prestige associated with publishing in top journals are hesitant to support an equilibrium shift that jeopardizes these benefits. Commercial publishers, who reap large profits at the expense of consumers, similarly support the status quo in order to maintain their profit margins.

The status quo could also be the most sustainable option. In other words, oligopolistic and competitive behaviours can be viable at large scales if the deadweight loss is minimized. If this is the case, then the status quo may be the most rational financial self-interested choice. If the other business models are not economically viable, have unknown viability or force stakeholders to change their behaviour in undesirable ways, then the demonstrable success of subscriptions may render the status quo ideal. Whether or not this arrangement is “the best”, however, is not clear. Some academics and librarians that value the idea of freely accessible knowledge more than rational self-interest do not consider any status quo characterized by toll gating as ideal. This is particularly the case if the toll gates are expensive.

In response to these costs, a joint Canadian Association of Research Libraries/Canadian Research Knowledge Network (CARL-CRKN) open access working group recently concluded that implementing open access initiatives on the national stage was the next step to control costs and offered several recommendations to this end (Owen, B., Blay, J., Clapperton, M., Godolphin, J., Hannaford, J., et al. 2012). The recommendations focus on the need to define what open access means to the different stakeholders, to find a financially sustainable national model and to build relationships with public policymakers, commercial vendors and other stakeholders as a means of managing costs and advocating for open access.

To date, no group has taken individual action to “get the ball rolling”.²⁸ There are legitimate reasons, often financial, for inaction. For example, research libraries are often constrained by tight budgets resulting in little money being invested in open access initiatives; conversely, commercial vendors have not taken steps to lower prices. Fritz Pannekoek, the current president of the CALJ, paints a grim picture of the future of the Canadian market and

²⁸ This lack of individual action is formally known as the Prisoner’s Dilemma, a concept explored in Chapter four.

Social Sciences and Humanities journals in particular if the status quo is maintained: “What will happen, the academic journal market in Canada, the Canadian journals-Canadian-grown journals will be marginalized. That’s what I think will happen, simply because there’s no financial support. There will be a few little bright spots, but generally Canadian Humanities and Social Sciences will be marginalized.”

As previously mentioned, the Canadian journal market is primarily composed of smaller publishers that survive on subscription revenue and government support. Fritz Pannekoek argued that publishers in the social sciences and humanities might lose subscription revenue as customers increasingly seek freely accessible research on the Internet. Without sufficient government financial support, this change could result in the SSH diminishing in size, scope and impact. This is particularly problematic for the SSH due to both the ways in which SSH literature is used and the relative incompatibility of SSH with open access compared to their Natural Science, Medicine and Technology (STM) counterparts. Social Sciences and Humanities literature generally has a longer shelf life relative to their STM counterparts, where new discoveries in the STM disciplines more often render past work obsolete or less useful than SSH work (Porter 2012, 1-3).

Early collaborations among concerned stakeholders yielded Synergies, a nonprofit organization that produced an online database designed to publish and disseminate only SSH literature via open access journals. The hope was that the Synergies infrastructure would be sufficient to improve access to SSH literature. This goal was to be reached by preserving documents, indexing, aggregating research, and offering consumers free access to the Synergies database. Unfortunately, this goal has been not fully met. During the course of the interview, the

same Fritz Pannekoek noted that he was a prominent leader behind the building of Synergies and stated that the program,

Sort of made it in part, but didn't make it far enough, and one of the key outcomes of Synergies was supposed to be the development of a business model which would see digital journals morph into open access journals. But someone had to come up with a business model that might work first. Most journals in Canada, particularly in the Humanities and Social Sciences are grossly underfunded. Most of them are extremely fragile and are run off the desktop. Most of these journals are, I would say, well-intentioned amateurs.

A goal of launching Synergies was to experiment with ways to transform digital journals into financially viable open access journals. Unfortunately, Synergies was launched without a sufficient budget. The Synergies program tried to “get the ball rolling” by having underfunded stakeholders take joint action. The result was failure.

The power difference between commercial publishers and their customers makes price reduction unlikely. The publishers have no incentive to price fairly. Indeed, they have incentives to integrate emerging open access publishing modes into their business models. If incentives are insufficient to change this behaviour, then the impetus to change falls on every other stakeholder who wants a new status quo. No actor aside from commercial publishers has the power to unilaterally create a new status quo. The attempt by Synergies illustrates this fact. That commercial publishers are not taking action requires that authors, non-commercial publishers, academic libraries, and universities cooperate. A variety of factors, however, are preventing joint action.

CHAPTER 4 WHAT DOES OPEN ACCESS TRANSITION ENTAIL?

Chapter three described “what is”, and this chapter covers “what could/ought to be”. The goal of this chapter is to analyze the consequences of transitioning to a widespread author-pays system as well as detail what is needed for this to happen. Reaching an open access world is not a simple matter. This move, which entails a variety of complex and interconnected changes to the status quo, is not uniformly good (or bad) for everyone. This chapter therefore starts with a broad overview and discussion of the impact that transition would have on the current publishing system.

What follows is a systematic description of and comparison among three journal market systems: oligopoly, competitive and author-pays. The model in Figure four on page 56 depicts who pays a given price for some quantity of journals within two status quo markets and an author-pays open access market. Such an interpretation is needed to concisely show why moving to an author-pays system requires a significant level of cooperation. Finally, I discuss what is needed for the actors to implement an author-pays system. Game Theory concepts are used to inform this section. Game Theory is particularly useful in depicting the conditions under which cooperation may or may not emerge. An explanation of why this change will not happen without government action concludes the chapter.

Implicit within all of the sections are changes in stakeholder behaviour provoked by transition. Behaviour is defined as the routine decisions and actions engaged in by the actors. Recognizing that transition will change behaviour from the status quo is justified because predicting these changes before implementing any large-scale policy can identify points at which the policy could fail. Ideally, a public policy will survive over a long time period. Not identifying as many stable patterns of behaviour as possible after transition could lead to scenarios where the

policy fails to achieve the desired outcomes or produces undesirable outcomes. As a result, such failures can render the policy open to change or removal.

4.1 Changes to the publishing system

A variety of significant changes to the publishing system would occur if a national repository and/or open access journal model is implemented. The table below compares these models along eight dimensions: Peer review, prestige, copyright ownership, accessibility, academic freedom, sustainability, transition costs, and transition risks.

Table 4			
<i>Comparison of open access models</i>			
	“Green” open access (no delay)	“Green” delayed open access	“Gold” open access
Peer review	<ul style="list-style-type: none"> Articles may or may not be peer reviewed before being deposited 	<ul style="list-style-type: none"> Articles may or may not be peer reviewed before being deposited 	<ul style="list-style-type: none"> Articles may or may not be peer reviewed before publication
Prestige	<ul style="list-style-type: none"> May or may not be compromised, depending on history of deposited articles 	<ul style="list-style-type: none"> May or may not be compromised, depending on history of deposited articles 	<ul style="list-style-type: none"> Perception of low quality Needs more time to become globally recognized
Copyright ownership	<ul style="list-style-type: none"> Ownership determined before deposit Ownership unchanged after deposit 	<ul style="list-style-type: none"> Ownership determined before deposit Ownership unchanged after deposit 	<ul style="list-style-type: none"> Ownership determined before publication Ownership unchanged after publication
Accessibility	<ul style="list-style-type: none"> Author(s) must deposit their work Consumers access repositories via the Internet 	<ul style="list-style-type: none"> Author(s) must deposit their work Consumers access repositories via the Internet 	<ul style="list-style-type: none"> Consumers access open journals via the Internet
Academic freedom	<ul style="list-style-type: none"> Academics deposit work after an embargo period Choice of repository subject to publisher restrictions 	<ul style="list-style-type: none"> Academics deposit work after an embargo period Choice of repository subject to publisher restrictions 	<ul style="list-style-type: none"> No publishing delay
Sustainability	<ul style="list-style-type: none"> Model has survived in many contexts 	<ul style="list-style-type: none"> Model has survived in many contexts 	<ul style="list-style-type: none"> Varies based on publishing cost
Transition costs	<ul style="list-style-type: none"> Low 	<ul style="list-style-type: none"> Low 	<ul style="list-style-type: none"> Low or high Needs unique systems and infrastructure
Transition risk	<ul style="list-style-type: none"> Subscription cancellations may cause small publishers to lose revenue and vanish 	<ul style="list-style-type: none"> Less risk than traditional “green” open access. Publishers can use work as a revenue/profit source before being deposited 	<ul style="list-style-type: none"> Business models allow for new revenue sources Costly APCs can dissuade authors from publishing

There are similarities and variations among these models. Take, for example, the matter of peer review. Repository administrators do not peer review articles that are uploaded. Peer review may or may not be done on a deposited article. Publishers of peer reviewed journals, however, require peer review as a condition of publication. Prestige depends on the quality and impact of published and deposited articles. Both models are relatively new to the market. Time is needed for open repositories and open journals to develop prestigious reputations. Open journals are particularly sensitive to prestige issues, as a given journal must also compete for readers against established print journals. Poorly peer reviewed research that is published can hurt the prestige of the journal. Repositories that primarily or solely hold research articles that are thoroughly peer reviewed before deposit could be deemed prestigious. On the other hand, a repository could be perceived to have low prestige if the indexed research is low quality.

Academic freedom remains largely unchanged with open access journals. A small difference, however, may come from the "when" and "where" an article is deposited. Delaying uploads could be a barrier to an author's academic freedom by limiting how an author makes her work accessible. Consider the case of an open access proponent who publishes research. This author may want to make her work immediately accessible. Many publishers also stipulate where a research article can be deposited, such as an institutional repository or personal website.

Repositories are more sustainable than open journals by having lower transaction and operating costs (Commissioned report 2011). The risk of using either of the repository models is minimal. If journals charged APCs that were high enough to push

authors away, then transition risks would be high. The model would be unsustainable over a time period determined by how many journals charged high APCs. Conversely, risks would be lower if APCs were low (2011).

Financial sustainability, transition costs and transition risks are interconnected issues. Financial risk is shouldered if transition is costly. Moving to an author-pays system without establishing who pays what cost in what amount may render the change unsustainable. Conversely, switching to author-pays after “having all the pieces in place” i.e., having willing and able funders, limits risk and improves sustainability.

Potential revenue loss for non-profit publishers is a possible outcome from moving to an open access world. Assume that consumers will not be willing to pay any subscription price in an author-pays system. If more research is made freely accessible, then Canadian publishers that rely solely on subscription revenue may need to seek out more international publishing options.. Publishers that extract some fees from authors, however, may survive. This survival depends on the quality of the product that the publisher offers. Those publishers that offer high quality products are likely to have enough subscribers to survive.

When asked about a major hurdle to be overcome before a national open access model could be implemented, an experienced consultant who has worked with library consortia and the research councils noted the following:

I mean if you think of a national open access model, probably helping the smaller publishers transition ... a lot of the Canadian publishers are very small and they would need some support to change their business model. So SSHRC has an open access fund for journals and ... would probably have to provide more support than they are already doing ... helping the smaller journal publishers transition is probably a bit of a hurdle.

This consultant voiced concerns that small non-profit and for-profit Canadian publishers and their journals, notably in the Social Sciences and Humanities, will face potential revenue losses during a transition. If Canadian publishers are not financially supported during transition, then a shrinking of the Canadian journal market is possible. If these journals were to disappear, then Canadian researchers would have fewer Canadian outlets to have their work distributed. A consequence of this minimizing is that Canadian researchers who want their work to be distributed to as many people as possible would lose those opportunities.

On the other hand, the easing of access barriers opens new avenues for Canadian research to hit the international stage. Even if all Canadian print journals disappeared, researchers could still self-publish their work on the Internet. As a consequence, academics and non-academics around the globe with Internet access would have opportunities to easily access Canadian research that was put in repositories or open journals. This increased readership is called the Open Access Citation Effect (Harnad and Brody 2004, 1). This effect refers to the increase in citations of OA articles relative to citations for non-OA articles. This effect is particularly important to Social Sciences and Humanities researchers, who would have more opportunities to have their work easily accessible and, presumably, more widely read²⁹. Though the Canadian journal market may shrink, access to Canadian research could increase.

Eliminating access fees does not imply that production costs vanish. Costs shift instead of disappear. An author who chooses to publish in journal that may or may not be

²⁹ Look and Marsh (2012) outline further benefits of open access.

open potentially faces thousands of dollars in processing charges. Table five below lists APCs charged by three popular conventional and three open access publishers:

Table 5		
<i>Article Processing Charges per submission and journal type for commercial and open access publishers; post-negotiation*</i>		
	APC cost (\$USD)	Journal type
Elsevier	\$500 - \$5000	All types
Sage	\$1800 - \$3000	STM, SSH
Wiley-Blackwell	\$3000	STM, SSH
PLoS	\$1350 - \$2900	All types
Biomed Central	\$1280 - \$2565	STM
MDPI	Free - \$1905.17	All types
<i>*Note: Purple is commercial publishing and green is open access publishing.</i>		

Paying for these APCs can be difficult, and sometimes impossible, for some researchers. Researchers with sufficient money may be disinclined to publish in open access journals if APCs are too high. There are, however, still ways for unfunded or underfunded researchers to have their articles published. For example, an author from an underdeveloped country can have his APC charges waived (Elsevier 2014).³⁰ There are also several business models designed to pay for APCs. Consider universities, which currently pay for research with library subscriptions. In an open access world, these subscription costs may shrink. If this happens, then universities will have excess money that could be devoted to paying APCs. Collective agreements, for example, could stipulate that employers pay some amount of money to cover publishing fees.

Note that the private firm pricings are not drastically different from open access journal pricing. One possibility is that the oligopoly is not raising prices in excess of what

³⁰ Waivers are determined on a on a case-by-case basis.

would be found in a competitive market. If this is true, then the higher prices may reflect what is needed to pay for required technological and human resources. Commercial publishers may actually be matching or nearly matching the prices set by open access journal publishers. As a consequence, oligopoly pricing tactics may not be the problem.

On the other hand, the oligopoly has access to an economy of scale. Administrators of open access journals do not. As a consequence, open access publishers may need to inflate their prices to cover journal production costs. If open access was more widespread, these producers may be able to lower their prices. Assuming that commercial publishers did not lower their prices to stay competitive, price differences could become more apparent.

Making research freely accessible also affects stakeholders outside of academia. Fulton (1997) details the unsustainable increasing returns to scale that firms face when copyrighted knowledge (a toll good) used as a key input into their production function becomes freely accessible (a public good). Stated another way, businesses that rely on formerly copyrighted knowledge to function will be unable to cover its costs. This scenario applies to sectors that rely on IPR-protected production inputs, such as software companies that make use of certain technologies and agricultural businesses that use knowledge that improves crop-breeding efficiency.

Also, if free access persists over the long-term, then the host nation can expect some rate of return over time. Returns can take many forms, from technological advances to universities increasing their competitiveness on the international stage. Underpinning this argument, however, is the assumption that returns and freely accessible research are positively and causally related. That is, every one unit of freely accessed research

generates a positive return.

Making the above connection, however, is difficult at best. First, free access does not necessarily equate to useful access. The “publish or perish” environment has resulted in an explosion of research, some of which is of questionable quality (Cole and Cole 1967; Fabio, Fausto and Maurizio 2007). If some published research is not useful, then free access is not always useful. Some research across all of academia is demonstrably poor and practically useless (Bauerlein, Gad-el-Hak, Grody et al. 2010).

All else being equal, free accessibility to poor research confers no benefits and produces no returns. The quality of other research, however, is less obvious and relies on strong peer review. In these cases, research is useful if there is trust between the researcher and the peer review system. The usefulness of research is severely undermined if peer review does not filter out incompetent work. Therefore, having free access to all research is not always useful if some research is not used.

A lack of constant usefulness implies that any returns connected to free access will eventually taper off. Even if all freely accessible research were high quality, diminishing marginal utility would still apply. Every additional unit of research that is freely accessed, regardless of discipline, will not confer consistently positive returns. For example, the short shelf life of STM (science, technology, mathematics) and technical research (~5 to 10 years) implies that STM knowledge has limited reuse value in the long-term. This research is prone to losing utility over time by becoming outdated or obsolete (Porter 2012). This loss of usefulness is inevitable, as formerly cutting-edge research often becomes a so-called “stepping stone” on which new discoveries are made. A need to innovate and find novel solutions to old and emerging problems thus renders

the accessing of the same articles less useful over time.

Research in the SSH share similar, though not identical, traits to STM research. Low quality research is also found in the SSH, which implies that free access to poor and/or useless SSH research is also useless. Unlike the STM disciplines, however, research in the SSH has a shelf life of ~20 years (Porter 2012). This diverse base of research usually takes more time to lose value or become obsolete. This extended window of “usefulness” has implications for the diminishing marginal utility of free access. If STM research remains useful over a longer time, and access to this research is free, then free access is also useful access. The diminishing marginal utility of free access to properly peer reviewed research thus emerges later in time. Once the research loses usefulness, then the utility of free access will also drop.

4.2 Comparing author-pays to monopoly and competition

Proponents of the open access ideal desire a change from the status quo. Implementing an author-pays system free of all access barriers for consumers, however, is not simple. Reaching this new equilibrium must take account of costs that are not immediately visible. Consider the model below.

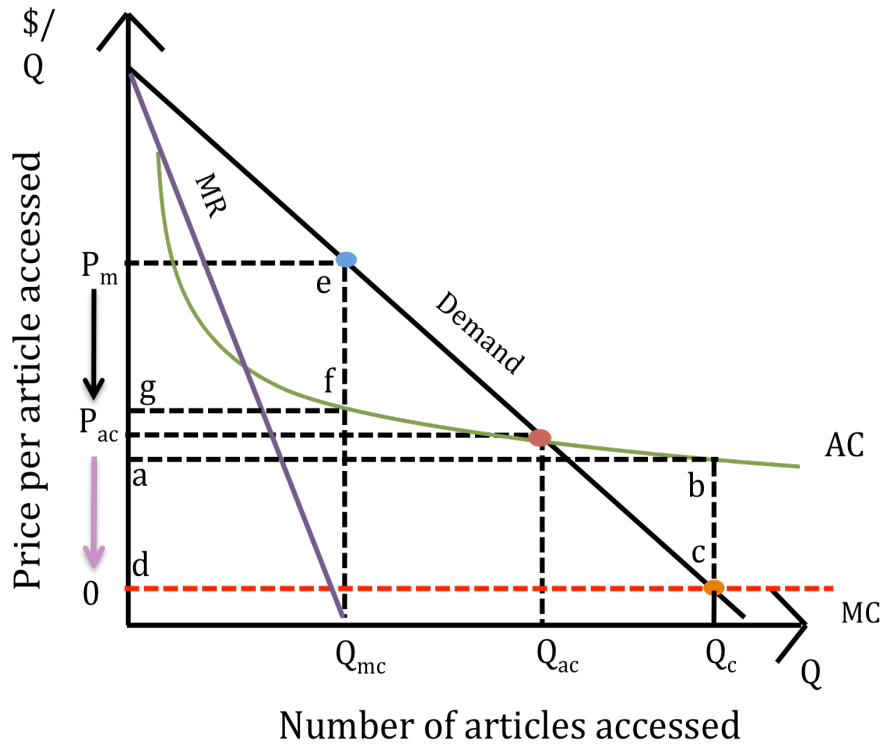


Figure 4 Research article access costs in monopoly, competitive and author-pays systems.

This graph shows that, no matter how research articles are accessed, some costs must be paid.³¹ The downward sloping black line is the demand for accessing articles. The x-axis depicts the quantity of research articles accessed. The y-axis depicts the price per article accessed. Overlaying the x-axis is the red dashed line, which is the marginal cost $MC = 0$ of accessing a research article. That marginal costs are zero or nearly zero does not, however, imply that journal access is free. There are fixed costs built in to free access: Computer hardware, software, IT support staff salaries, marketing, servers, and so on. The solid green curve AC depicts the average fixed costs underlying access.

The blue, orange and red dots are the equilibrium points in monopolized, author-pays and competitive markets. A monopoly is used instead of an oligopoly for ease of

³¹ Assume that demand, marginal revenue and marginal cost are linear.

illustration. At the blue dot, a commercial publisher sets the price of access at P_m . The number of articles accessed is Q_{mc} . The area P_mefg is the profit that commercial publishers gain from setting these prices. These prices allow the publisher to exceed the average costs of article access.

The orange dot represents the demand for article access in an author-pays system. The amount of articles accessed is Q_c and the price of this access is equal to MC . The area $abcd$ depicts the amount of money that must be paid to cover the fixed costs of article access. Price equaling marginal cost is possible due to technological factors, such as the Internet, that allow research articles to be easily accessed as frequently as desired. Though the cost of accessing additional articles is zero, the average cost of accessing these articles is above zero. During an interview, Fritz Pannekoek captured this reality by asking, “Who’s funding the universities? Who, when it’s all free, is paying salaries?”

A competitive market is represented by the red dot. Access prices are P_{ac} . Quantities of access are Q_{ac} . These variables meet exactly at the average cost of access. In such a market, journal producers such as those operated by scholarly societies sell access to their product at competitive prices. As a consequence, prices are lower and quantities accessed are higher than in the monopolized market.

The black arrow between P_m and P_{ac} pinpoints the gap between the higher prices charged by commercial publishers and prices that would be expected in a competitive market. Note that this gap is reflected in the APC costs depicted in Table 5 on page 44.³² Governments have tried to close this price gap by, for example, subsidizing some of the access costs incurred by authors. These subsidies work by forcing a convergence of P_m

³² The purple shaded rows depict P_m and the green shaded rows depict P_c .

and P_{ac} . The pink arrow between P_{ac} and 0, however, shows the difference between prices found in a competitive and author-pays market. For an author-pays system to exist, this price gap must be closed. This is synonymous with paying for amount found in the area abcd. Assuming that government pays to close this gap, then the investment needed to drive price to zero is akin to government controlling the system.

Reaching the “open access” equilibrium may not be feasible if figure four is accurate. People who argue that open access is nearly costless are actually referring to the negligible marginal costs of production. Paying for the average costs of production are another matter. Widespread cooperation between academic libraries and universities would be needed to push the price gap to zero. The problem, however, is having all or many academic libraries and universities cooperate by simultaneously investing in a widespread author-pays system. Such coordination becomes increasingly difficult as the number of stakeholders rises. For example, having every university and library in Canada work together is more difficult than having universities and libraries in one province work together. The following section describes this problem of collective action.

4.3 Changing the Status Quo – A Game Theoretic View

Ideally, from a government perspective, academic libraries and universities would implement a national bilingual author-pays system without government help. Language is an important consideration, as Canada is a bilingual country. This outcome would satisfy research libraries, universities, academics and authors that believe in the ideal of open access. Implementing an author-pays system, however, requires the actors to cooperate. Cooperating requires them to account for several related factors deemed sufficient to reach a new status quo without government intervention (CRKN-CARL 2012). These

intertwined factors are the following: Supplying more information to academics and institutions on the usefulness of open access, finding new funding sources, having academic librarians liaise with policymakers in the tri-councils, and finding a sustainable cost-sharing model.

The Working Group offers a clear plan to move to an “open access world” (Owen, B., Blay, J., Clapperton, M., Godolphin, J., Hannaford, J., et al. 2012). The actors, however, have not been able to individually or collectively act on all of these recommendations. The market failure has created conditions that privilege individual self-interest as the primary guide for behaviour. These vested interests guide actors’ decision-making processes even if the outcome is not collectively ideal. Consider the case of Consortia Canada. Despite having many members, the group has not been able to implement an author-pays model. Limited money is the primary reason for this inaction. Consortia members are risk averse and will not invest in models that are too costly (2012).

Overcoming vested interests is complex and not fully desirable in all cases for all stakeholders. In the first place, no university will voluntarily be the first investor into an author-pays system because they will be paying both subscription fees and authors’ page fees. Second, some actors benefit from parts of the current model. Academic libraries and academics still find use in the services offered by commercial publishers and the ability to access all journal types. Finally, many of the actors have neither the power nor the money to act unilaterally and overcome their individual interests. Actors who are the least satisfied with the current model do not have the power to motivate other, more powerful stakeholders to change. Coupling this lack of power

with individual financial constraints thus renders any desire to jointly pursue the collective interest untenable.

Game Theory is useful to elaborate on why cooperation has not developed. Additionally, Game theoretic concepts can show the strategies that would produce a collectively ideal outcome and identify the so-called “winners” and “losers” of strategic decision-making. Applying these concepts to CARL and Consortia Canada is justifiable. The decisions of each association are the best approximation of the preferences of their aggregate members. If the policymaking processes that underpin the academic and library communities are the ideal unit of analysis, then the groups that represent these populations are the easiest units to analyze. They collectively represent the preferences of the broadest range of stakeholders.

The Prisoners’ Dilemma details this cooperative gridlock. This dilemma refers to a paradox that can arise in cases of cooperative decision-making involving two or more rational actors. Imagine a scenario in which two partners, X and Y, have been arrested for committing a crime. They are placed in separate cells and cannot communicate with each other. A lack of evidence forces the police to charge each prisoner with a lesser charge. The prisoners can either betray the other by testifying that the other committed the crime or cooperate by staying quiet.

The results are the following: If both X and Y are quiet, each will only serve 1 year in prison. This choice is collectively rational, as each are convicted of the lesser charge. If X betrays and Y is quiet, X will be freed and Y will serve 10 years in prison. This choice is not individually rational for Y, as the punishment is the longest prison term (X receives the best individual outcome). If X and Y both betray the other, each is imprisoned for 7

years. Betraying each other is individually rational, as freedom is the award if the other does not betray. The paradox arises when X and Y each betray the other. Betrayal is the individually rational decision for the prisoners. The result is that X and Y receive the second-harsh punishment, when cooperating would have yielded the lowest prison term (Poundstone 1992).

Universities and academic libraries face this dilemma. Each must make individually irrational financial decisions to move to an author-pays system. Cooperation, which is collectively beneficial, would make this change easier. One example is that universities and libraries might avoid paying for open access infrastructure (the individually irrational decision), even if every other institution and person would benefit from using the infrastructure (the collectively rational decision). This scenario is akin to the two prisoners X and Y both staying quiet.

Information also plays an important role in the Prisoner's Dilemma. The dilemma assumes that there are information asymmetries between the actors and that these imbalances skew their decision-making. One actor makes decisions without having full information on the behaviour of the other actor. In the journal market, however, universities and library associations share information to reduce these asymmetries. The stakeholders work to keep each other as informed as possible.

This dilemma faced by universities and academic libraries is illustrated in Table six below. What is shown are the actual and potential strategies used by CARL and Consortia Canada when deciding whether or not to invest in digital infrastructure as part of a national open access strategy. Investing is defined as CARL and Consortia Canada spending money normally earmarked for subscriptions on an author-pays system. The

actual and potential strategies are presented in a 2x2 payoff matrix, where C = “cooperate”, D = “defect”, R = “reward”, T = “temptation”, P = “punishment”, and S = “sucker”. A Prisoners Dilemma is present if the formula $T > R > P > S$ is satisfied. These variables will be assigned arbitrary values as a calculation and interpretational aid.

Table 6		
<i>Payoff matrix for Consortia Canada and CARL</i>		
Equilibrium	Consortia Canada Invest (C)	Consortia Canada Not Invest (D)
CARL Invest (C)	5 (R), 5 (R)	0 (S), 10 (T)
CARL Not Invest (D)	10 (T), 0 (S)	3 (P), 3 (P)

The actors are choosing to not invest, seen in the bottom right cell. This dominant strategy is individually rational, as tight budgets and high costs constrain the choices that each group can make. Research libraries and universities typically do not have the budget to unilaterally invest in a large-scale author-pays system (recall the failure of Synergies acting alone). The “defect” by “defect” cell illustrates this scenario. The individually rational decision is to not invest, as taking individual action is either untenable or impossible. The “punishment” takes the form of both groups losing out on the additional benefits that mutual investment would create. That is, joint defection is the collectively irrational strategy.

Mutual investment, seen in the top left cell, is the collectively rational strategy. This decision yields a greater overall return than mutual noninvestment ($5 > 3$). The returns can take any of the forms discussed earlier. In practice, this means that research libraries and universities reap long-term benefits that exceed any benefits yielded by the other strategies. Both actors are rewarded (R, R) for their cooperation.

The bottom-left and top-right cells detail scenarios in which only one group invests. These cells show the conditions under which free riding is most likely to happen and who is most likely to free ride, where the free rider = 0 and the investor = 10. In practice, this would entail one or the other groups investing while the other does not. The investing group bears the full cost burden. The group that does not invest, however, still benefits from the new infrastructure. Both actors are united in their support of academics and the research community and would not restrict the other group from using the infrastructure.

4.4 Discussion

Underpinning all of the actors' decisional processes are time horizons. The collective action problem persists in part because the actors are focusing only on short-term survival. As a consequence, any benefits that might accrue over time are discounted and/or lost. Stated another way, time frames have consequences for how individually rational decision-making is interpreted. Individual decisions only consider the immediate to short-term costs of investment. If benefits accrued over time have either no impact or a positive impact, then individually rational short-term choices become irrational over time. If only the short-term environment is considered, then benefits will be lost and costs will not be controlled. Moving to an "open access world" will stall and the status quo will not change.

CHAPTER 5 PUBLIC POLICY INTERVENTIONS

Assuming that Consortia Canada, CARL and academics cannot find a way to cooperate on implementing any national open access strategy, then the government has a choice of whether or not to intervene. This chapter will cover a variety of policy options available to the government, as well as the implications of implementing these policies. I will consider in particular two policy instruments that governments might employ: subsidization and information provision. In each case the goal of using these instruments is improved access to academic research. The government can also take no action and let the stakeholders resolve the issue themselves.

A subsidy can be used in one or more of three ways: Cover APC costs, pay for digital infrastructure expansion or centralize publicly funded research. Any of these options is designed to close the price gap between oligopoly and competitive pricing. This policy is analogous to shrinking the “black arrow” gap detailed in Figure four on page 56. Shrinking this gap is designed to bring oligopoly prices closer to competitive pricing. Doing so would allow the recipients to better compete in the market.

Information provision targets two points: Having the federal government officially endorse the “gold” open access model and informing academics, research libraries and universities on how open access and IPR can be used together. A joint policy of paying for APCs and informing actors on the legal dimensions of open access rather than any single policy, is most likely to create conditions sufficient for a new equilibrium to be reached. Recommendations from the Finch report and CRKN report, as well as comments from interviewees, suggest this to be the case (Finch 2011; Owen, B., Blay, J., Clapperton, M., Godolphin, J., Hannaford, J., et al. 2012).

All of the following policy options assume that liaising between stakeholders and policymakers has been and is an ongoing process. The policies are listed in descending order, with the most feasible policies being listed first. The criteria for ordering this list in this way are the following: Is the policy a Pareto improvement over the status quo? Does the policy offer sufficient incentives for stakeholders to change their behaviour? Is the policy politically viable?

5.1 Subsidies

5.1.1 Option 1: Subsidize APCs

The government can attempt to push oligopoly prices toward competitive prices by subsidizing APCs. The subsidy needs to range from \$500 to \$5000 per published article to align with market prices. The CIHR and NSERC will likely need a higher dollar amount compared to the SSHRC, since publishing costs differ between disciplines. The potential efficacy of subsidizing APCs is outlined in the Finch report, CARL-CRKN paper and comments from the interviewees. These sources argue that covering APC costs will give researchers an incentive to publish both in open access journals and through similar services offered by other commercial and non-commercial publishers.

The Finch report (2011, 104) offers ways of implementing this policy. One way is by having the granting agencies reallocate funds from supporting research to paying for publishing and disseminating costs. For example, the SSHRC's current Aid to Scholarly Journals grant is awarded to the editor-in-chief of a journal (Government of Canada SSHRCa 2014). Reallocating these funds into the standard research grant funds used by a principal investigator/project coordinator would require the recipient to carefully consider how best to spend the money on publishing.

The Tri-Councils currently require all researchers who receive a standard research grant to file a variety of reports over the span of the research period. One such document is a final report filed no more than three months after the end of the research project. The agencies can adapt the final report to include the new APC policy. New sections detailing APC costs and the chosen peer-reviewed journal would be needed. For example, the Final Report – Form 10A used by the SSHRC for postdoctoral fellows would require new sections the grant holder would need to complete.³³

A researcher will be eligible for the APC funding only if the chosen journal publishes peer reviewed research. This eligibility criterion would align with the government's commitment to support high quality research. This subsidy is particularly important for non-commercial publishers or publishers that normally survive on subscription revenue. Movements toward OA create conditions for consumers to drop subscriptions in favor of free access. Subsidizing publishing researchers would enable non-profit publishers to replace at least some of this lost subscription revenue with money used by individual researchers.

Requiring grant holders to choose how much money to spend on publishing is important. Canadian academics are currently isolated from pressures in the academic journal market. This isolation has emerged due to funds designed to cover publishing and disseminating costs being gifted from their host institution, academic library or publisher to researchers. Researchers do not, therefore, have an incentive to consider publishing costs. Reallocating APC funding into the standard research grant requires that grant holders account for publishing costs by being exposed to journal market pressures.

³³ The Final Report – 10A form is found at http://www.sshrc-crsh.gc.ca/funding-financement/using-utiliser/guide-B/pdfs/guide_b_form3a_e.pdf

Covering APCs may or may not be politically viable. One argument that renders this option politically feasible is that researchers are only eligible if their research has been accepted for publication in a peer reviewed journal. Doing so would raise the odds that the funding would not be used to pay for publishing in poor journals. The grants would thus be used to promote the flourishing of high quality research. The result is an alignment with the government's goal of becoming a global leader in science, technology, research, and development. Similarly, the increasing movement toward an "open access" world could pressure policy makers to act. If this is the case, then the policy is politically viable.

On the other hand, not all journals are peer reviewed. Journals that do not use the peer review process would be ineligible for the grant. These publishers, as well as their customers, could be unhappy that their journal was unsupported. This displeasure could manifest as political action, assuming that the stakeholders could coalesce into a group that is sufficiently powerful to exert political influence. This does not necessarily mean, however, that such a group could form. The power of journal owners is currently limited, and the loss of journals will not necessarily motivate them to cooperate.

5.1.2 Option 2: Subsidize digital infrastructure expansion

The Canada Foundation for Innovation (CFI) is responsible for funding projects for the research community and investing in digital infrastructure for institutions. Digital infrastructure is defined as computers, servers, online architecture for repositories and journals, and the information technology experts who both maintain the computers and create the necessary online searchable databases. Expansion is defined as spending the

money needed to buy more computers and servers, and hire the experts needed to create and maintain these technologies. The SSHRC is currently investigating the expansion of digital infrastructure as part of a strategy to improve Canada's digital economy (Government of Canada SSHRCb 2013). The Agency could directly invest in infrastructure that affects open access, in addition to the other stated targets.

An appropriate dollar amount for the investments is not known. Liaising with stakeholders will produce a funding range that will address expansion costs. The cost of hardware and software will differ according to the size and needs of the institution. Academics who publish may only need investments in hard infrastructure, such as computers. Academic libraries, however, may need investment in all types of infrastructure.

Expanding infrastructure may or may not be politically viable. This subsidy may not be viable if the expected cost of expansion is very high. Unlike APCs, the cost of installing and maintaining new computers and software can be very expensive. On the other hand, investing in infrastructure probably only needs to be done once. New infrastructure, if properly maintained, can last for many years.

The CFIs' investment portfolio shows a successful track record of investing in open access initiatives. The CFI recently awarded a \$100 million grant to the University of Toronto, with a portion of the money being dedicated to creating open access research tools for epigenetics (University of Toronto 2013). Similar digital infrastructure initiatives were also awarded money. A downloadable database of the CFI investments are found on their website (Canada Foundation for Innovation 2013).

Subsidizing infrastructure upgrades and APCs create conditions for the open access journal market to grow. The demand for open journals could increase, both in Canada and abroad. Publishers of these journals, as well as academics and librarians who value the idea of freely accessible knowledge, would benefit as a result. The uncertain sustainability of open journals, however, renders this policy risky. The granting agencies know about this instability and could be reluctant to create new APC programs. The agencies and/or their funders could decide that money spent on APCs would be better used on other policies.

The net effect on the economy from investing in infrastructure would likely be positive. This is due to the value added by contracting workers in the hardware business to work on infrastructure upgrades. That is, upgrade grants would provide jobs. Upgraded infrastructure could also give members of academia more ways to have their research freely accessible. Assuming that research-related economic benefits accrue over time, and that these benefits exceed the grant costs, then the grant could benefit the Canadian economy.

A possible consequence of only supporting peer reviewed journals, however, is that the market for non-peer reviewed journals diminishes in size. Using peer review as an exclusion criterion would motivate this outcome. Whether or not this outcome is undesirable, however, is debatable. On the one hand, journals from all academic disciplines could suffer. If these journals disappear, then the body of potential knowledge could be smaller than if the journals persisted. On the other hand, non-peer reviewed research is rarely useful or used by much of the academic community.

There are also academic freedom issues to consider. First, the peer reviewed exclusion criterion restricts academics in where they want to publish. Without being able to use the APC grant on all journals, academics do not have full publishing freedom. This may or may not be problematic. If some academics publish in non-peer reviewed journals, then they could be unhappy about having their publishing decisions restricted.

Second, these grants create a tradeoff between supporting academic freedom and controlling the ways in which public money is spent. Opening the grant to academics allows them the freedom to publish where they want, subject to the peer review criterion. A likely result is that the recipients pay to publish in non-Canadian commercial journals. Doing so perpetuates the scenario where publicly funded research is toll-gated and paid for using public money. Commercial publishers would welcome this scenario, whereas academics and libraries would continue working in the status quo.

The concerns about Canada's innovation status are another consideration. The adjudication process is driven, in part, by determining the substantive impact a given research project could have on the economy or existing body of knowledge. Not all research is innovative. As a result, "non-innovative" projects may not receive funding. Researchers conducting basic research or experimental research will likely be unhappy if their work cannot be funded based on this rationale. If this is the case, then the potential body of research will be smaller than if all projects had equal consideration.

5.1.3 Option 3: Centralize publicly funded research

This option entails placing all publicly funded research into a central repository. This option is a way of supporting the "green" repository model. Doing so, either by mandate or encouragement, will address issues that libraries have when building

repositories that fit their customers' needs. Canadian stakeholders are challenged by a need to either locate small-scale open access business models that can work on the national stage or combine the existing piecemeal repositories into a unified national model.

One way to implement this option is expanding the federal Open Data pilot program to house publicly funded research. This program is testing the efficacy of providing free access to government-compiled statistical and regulatory information. The program has been expanded into 2013 to further these tests (Open Data 2013). Expanding the pilot program offer academics a single repository to use. Another way to implement this option is to expand the National Research Council Publications Archive (NRC 2013) to accept manuscripts from any discipline. The archive is a searchable database that currently contains research from the STM disciplines. Expansion may require investment in computers that will provide the necessary virtual space to hold more works.

Centralization is less feasible politically than the other options. Requiring or encouraging that research be placed into either the Open Data or NRC repositories implies government control via the centralization of research. The current government is likely to oppose these measures on ideological grounds. In an environment characterized by devolution of powers, centralizing research access when there are many existing non-government repositories is untenable. In the case of the NRC, authors must sign a license that transfers some copyrights to the Crown. This transfer implies that the government owns part of the research. The usefulness of the Open Data repository, by contrast, is still undetermined. Expanding the program to be open access before determining the efficacy of making government data freely accessible may be hasty.

Expanding the program also raises practical issues. All data that are currently entered into the program are government-compiled data. Academic research, however, does not fit this description. Changing the status of publicly funded research to fit this description would require a host of time-consuming changes, legislative or otherwise. The benefits of supporting open repositories are more easily achieved through other means, such as the tri-council's depositing requirements.

Another consideration is infrastructure upkeep. As repositories increase in size of, the need for IT experts to maintain the repository and its' contents increases. Without regular upkeep, there is a risk that the deposited material will degrade over time. Having a greater volume of data puts extra strain on salaried IT experts to keep the repository and its contents healthy. Hiring more IT experts to fill this function may be an inefficient use of public resources, as there are many repositories that already exist.

5.2 Information provision

5.2.1 Option 1: Federal support for “gold” publishing

The Prime Minister's Office (PMO) could express support for “gold” open access as the next step in aligning with policies taken by the UK government. This support could be expressed through a news release. This policy requires no initial dollar investment and only a minimal time investment. Future costs, however, are likely to emerge from the granting agencies and the academic community. The granting agencies and academic community would have greater leverage than they currently have to lobby the government for more money. Implementing this policy also signals to the international community that Canada is committed to the ideological and practical sides of open access.

This policy is not politically feasible if the government values cost cutting over research accessibility. Having the Prime Minister's Office (PMO) voice support for open access will allow the academic community and granting agencies to demand more funding. This support is unlikely as there is evidence of a strained relationship between academia and the federal government (Fitzpatrick 2012). On the other hand, the PMO voicing support does not imply that more funding must be given. The government risks facing backlash if support is voiced but no funding is given. This risk, however, is contingent on whether any lobby groups have sufficient power to affect the policy process. Without the power to affect the policy process, such risk is low.

5.2.2 Option 2: Inform stakeholders on the benefits of OA

The Tri-Agencies can inform academics and academic librarians about the benefits, legality and uses of open access. This is possible by working closely with institutional librarians and research support officers in building or changing institutional open access policies. Providing education in this way could give the recipients the information needed to pursue open access alternatives. The Internet is the ideal vehicle through which this information can be disseminated. Information about the services provided by this office can be attached to online grant applications and/or e-mailed to libraries or universities to be distributed at their discretion.

This policy is politically viable. The Internet renders information access nearly costless in dollars and time. As such, the granting agencies will be able to quickly and efficiently direct grant recipients access to the Office website. This efficiency will allow the granting agencies to avoid any criticisms over wasting public money. This policy also

does not require any involvement from political actors. The agencies do not need extra money to enact this policy and have the latitude to act independently.

5.3 Take no action

The government can choose to let market forces create a new status quo. There is evidence that a transition to an “open access world” will happen whether additional intervention is pursued or not. If this is the case, then the government can save money by waiting for the stakeholders to manage the issues themselves. This policy does not, however, imply that the government does nothing. Enforcing existing rules to ensure a “fair playing ground” for the market actors is a continuous process. Transition must still be legal and as fair as possible.

This action, or rather inaction, is politically feasible and possibly even desirable. Minimal intervention and a push to streamline the government is an ongoing trend in the current government (McIlroy 2012). Taking no action falls in line with these values and actions. There is also evidence of tension between the academic community and the current federal government. Commentary on the actions of the government suggests that this is the case (Linnitt 2013).

There are trade offs to consider if this policy is pursued. Waiting for the stakeholders to resolve the issue will result in a temporary loss of access to research. If prices continue to rise, then this accessibility loss will keep increasing until the critical point where the equilibrium shift happens. In other words, access to a public good will become increasingly restricted. The government also risks alienating members of academia who consider the government as the most important actor to facilitate open access transition and/or control acquisition costs. Concerned stakeholders could join an

existing lobby group or coalesce into a lobby group and push the government to act. Similarly, these actors could become more vocal about the duties that they think the government should perform.

Taking no action sends more than one signal about what is on the government's agenda. The first signal is that the issue is deemed resolvable without government intervention. If no action is taken, then the government is expressing confidence that market forces will push the actors to a new equilibrium, although it is not clear how. The second signal includes the global community. No action signals to the international community that Canada does not consider making publicly funded research accessible to all as an issue sufficient to reach the government's agenda.

These signals are particularly striking in light of recent actions taken by the governments of Britain, Australia and the United States. They have invested the resources into promoting and facilitating the varied forms of open access transition. These actions imply that accessibility is sufficiently important to reach their agenda. These governments consider research accessibility an issue worthy of intervention beyond the open repository mandate. These actions also suggest that the governments are not sufficiently confident in market forces to create a new equilibrium.

There is also a reputational issue to consider. One traditional view is that Canada works in favor of public goods by targeting specific points in a market for intervention. The resulting perception is one of a government that considers intervention acceptable if the public interest is satisfied (MacQueen 2007). Leaving the stakeholders to solve the problem suggests that the government considers market forces, rather than open access, the ideal mechanism to determine who pays what cost. Coupling this attitude with the

lagging of open access policies portrays Canada as a place where the government does not support intervention in markets, even if a public goods case can be made.

5.4 Public policy implications

An ongoing trend in the Canadian public administration is the decentralizing of government responsibilities. That is, non-government actors are given the ability to perform functions that were formerly controlled by the government. This goal is achieved via the government giving some of its power to others (Winfield, Kaufman and Whorely 2000, 5). This devolved power allows the recipient, rather than the government to perform the given function. In the case of publicly funded academic research the government is mostly leaving the actors to resolve the cost issue alone. The government is not devolving authority to other actors.

Aside from non-action, power devolution is reflected in all of the policy proposals above. If the government gives power to semi-public or private entities, as is the case with funding programs that allow academic institutions and members of academia to have spending latitude, then principal-agent theory must be considered. The principal-agent problem arises when the principal contracts an agent to perform some duty without having perfect information on how the agent acts. The agent then performs this duty for a third party (Braun 1993). In this case, the principals are the advanced education policymakers, the agents are the funding agency intermediaries and the third parties are the recipient institutions and individuals. The devolved power is the decision-making capacity for the agents and funding recipients to control how the money is used.

The only accountability mechanisms available to track the use of devolved power are guidelines built into grant programs, applicant vetting processes and periodic follow-

up with recipients. Implementing any of the proposed policies will require more enforcement. Unfortunately, these mechanisms are not perfect. Any new or existing mechanism will not necessarily prevent an agent from misusing a devolved power or catch an agent who is misusing a power. Misuse of grant funding does happen, as was the case with two recipients of an NSERC grant (Government of Canada NSERC 2014).

The government faces a tradeoff between giving up some power to non-government actors and letting market forces dictate market dynamics. The results of either decision are neither fully positive nor negative. Leaving the actors to manage the issue themselves could result in a prolonged drop in the accessibility to a public good. In return, the government saves scarce resources for other policies. Intervening, however, requires the government to spend scarce resources to improve accessibility to a public good.

CHAPTER 6
POLICY RECOMMENDATIONS AND CONCLUSION

6.1 Policy Recommendations

The policies in the table below are ranked using the criteria implementation timeline, implementation ease, cost, political viability, and stakeholder satisfaction.

Table 7					
<i>Ranking of policy options</i>					
	Implementation timeline	Implementation ease	Cost	Political viability	Stakeholder satisfaction
Subsidize APCs	Short	Easy	Medium	High	High
Provide legal information	Short	Very easy	Very low	High	High
Take no action	Short	Very easy	Low	Very high	Low
Subsidize infrastructure	Medium	Medium	High	Medium	Medium
Centralize publicly funded research	Long	Difficult	High-very high	Low	Low-medium
Federal support of open access journals	Short	Difficult	Very low	Very low	High
<i>Note.</i> Rankings are determined based on complexity.					

Using these criteria, a policy package that combines directing granting agency funds to subsidize APCs with a campaign of education and awareness-building is the most defensible reaction to the open access challenge. This relative low-cost package has the most potential to satisfy as many actors as possible. There are no significant political barriers to be overcome. The research councils have past experience using programs of this nature. Using strict application guidelines can better ensure that the funding is only

used on high-quality research. Although the subsidy will not immediately result in moving to an author-pays system, the recipients will have sufficient incentives to use open access journals.

There are, however, weaknesses to implementing the APC subsidy. First, the conservative culture of academia could interfere with the effectiveness of the policy. Academics could resist combining APC money with tri-council funding. Being exposed to market pressures could be viewed as an attack on academic freedom and academic culture. For example, academics that normally publish in expensive journals may need to find a less costly and less prestigious and impactful alternative journal. If she had to use money that otherwise would be devoted to research. This issue is related to the conservative culture of academia. Being exposed to market pressure, which is a significant change that academics may not want, will not necessarily change the academic culture.

Second, this subsidy will not necessarily change the oligopolistic structure of the market or lower the overall costs of publishing. The commercial publishers are located in Europe and service customers around the world. Having access to a large customer base could minimize any potential profit loss faced by the publishers. Canada is also a relatively small player in the journal market. This means that changes in the behaviour of successful applicants will not necessarily change the behaviour of the publishers or the costs of publishing.

Third, transitioning toward freer access to research also entails transition costs. Anticipating and minimizing these costs is therefore important. First, APC amounts will not necessarily stay unchanged through the process. For example, some high quality

journals with low readership may need to increase APCs to cover lost subscription revenue. Other subscription journals could lose submissions of the highest quality research to OA journals that have less expensive costs. In some cases, a loss of readership and/or high quality submissions could cause some journals to die off.

The Finch report (2011, 111) advises that transition should occur over several years. Transition, however, requires cooperation between academic libraries, universities, academics, publishers, and the granting agencies. As noted in Chapter four, working together will not necessarily be easy. The granting agencies can continually liaise with universities, learned societies, academics, and publishers. Liaising can allow the government to track the changing publishing landscape. This monitoring is possible by using indicators such as changes to the average cost of APCs charged by journals and the growth of OA journals and repositories over time.

Taking no action is self-explanatory. This policy scores well in all metrics other than stakeholder satisfaction. Academics, universities and libraries will be unsatisfied. Similarly, subsidizing infrastructure scores well in many categories. The biggest issue is cost. The amount and type of infrastructure that is needed is unknown, and costs could be high.

The remaining policies suffer from at least one significant weakness. Centralizing publicly funded research is costly, not politically viable and difficult to implement and maintain. Federal support of open access journals is the probably the least desirable policy. If this policy were implemented, lobbyists would be given a so-called “green light” to ask the federal government for more funding. Coupling these possible costs with a government aiming to cut costs renders the implementing of this policy untenable.

6.2 Conclusion

One of the primary responsibilities of the Canadian government is to promote and support the public good. Academic knowledge, codified in journals as research articles, meets the criteria for being such a good. The ways in which this knowledge can be accessed have become increasingly restricted over time due to oligopolistic and competitive market behaviour. Some stakeholders have responded by calling for new “open access” status quo, free of such behaviour. Implementing a wide-scale author-pays system is argued to be the ideal way to reach this new equilibrium.

A series of related policies, if implemented, could result in a wide-scale author-pays system. Despite having such a blueprint, the academic community has been unable to cooperate. Insights from Game Theory suggest that this group is experiencing a collective action problem. The costs of individual action are too high to justify cooperation, with government involvement being an important requirement.

The government, which has policy tools that can offer incentives for Canadian stakeholders to find an open access equilibrium, face financial and political tradeoffs for any decisions made. Generally, the Government of Canada has an opportunity to synchronize its’ open access policies with similar developments around the world. Doing so will promote the flourishing of Canadian research on the international stage and provide researchers from developing countries costless access to quality research from all disciplines.

Open access is an under researched topic in the academic literature. This thesis contributes to the literature by providing avenues for future comparative and international research. First, the exclusion of open access books presents an opportunity to identify

whether or not the market for these goods is similar to the journal market. Major initiatives such as the Berlin Declaration make no mention of open access books, despite many academic disciplines rely on these sources.

Second, the basic economic models will help academics, policymakers and other interested stakeholders better understand the significant changes entailed by open access transition. Understanding these changes can help stakeholders cooperate to more effectively address the financial issues of an author-pays system. Similarly, public policymakers can craft policies that effectively address these cost issues.

Third, the collective action problem succinctly defines the dilemma faced by decision makers in Canada and abroad. International communities, academic or otherwise, can benefit from the knowledge generated by wealthier countries. Coordinated international cooperation is required to grant less wealthy countries free access to this research. These decision makers will therefore benefit by knowing what is needed for cooperation to emerge.

Finally, this thesis primarily looked at open access from a Western perspective. Freely accessible knowledge touches upon any place that has an Internet connection; as such, there are opportunities to expand upon comparative elements. Geographically, research could focus on the many places that are unstudied or under studied. Two important topics are stakeholder attitudes toward freely accessible knowledge from non-Western perspectives and public policy developments from these regions.

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Appendix A³⁴

Introduction

Thank you for participating in this interview. My name is Jeff Martin, and I am currently doing research with the Executive Director of the Johnson-Shoyama Graduate School of Public Policy at the University of Saskatchewan. I am doing some work on open access publishing in Canada and abroad. The academic journal market is currently going through a variety of changes that have captured the attention of many stakeholders. An ‘open access movement’ has gradually emerged within academia, with members wanting publicly funded academic research to be freely accessible to everybody. Others argue that the current journal market is beneficial and does not need to change.

My Research

I’m particularly interested in finding out the attitudes held by experts from different parts of the academic journal publishing market on the idea of freely accessible knowledge, open access and functioning of the market. As an expert involved in the market, I am interested in hearing your perspectives on the following questions.

1. How would you characterize the current state of the academic journal market?
2. Do you think the dynamics are sustainable?
3. What are some of the biggest hurdles to be overcome before any national open access model can be implemented?
4. What role, if any, did the idea of making academic knowledge freely accessible to everyone play in policy discussions that you’ve taken part of?
5. In what ways did the Government of Canada, either the granting agencies or otherwise, participate in open access policy discussions or actions that you’ve taken part in?
6. Have you noticed any differences in discussions between the social sciences and humanities versus the natural sciences, medicine, technology, and so on?
7. In what way, if any, should the government participate in future policy discussions?
8. Do you think if the higher levels of government took a firm stance on the open access issue, do you think that that would have any sort of impact?
9. Are there any other topics or issues that I haven’t mentioned that you’d like to talk about?

³⁴ Some of the questions were omitted depending on the background of the participant.