I T H A K A

ITHAKA REPORT
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Scholarly Communications in the Economics Discipline

A Report Commissioned by JSTOR

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NOTE

This is an edited version of a study commissioned by JSTOR in 2006. It is being shared as the research presented here may be of interest to others in our community or beyond. For more information about this report or others in this series, please contact Heidi McGregor, Director, Marketing & Communications (heidi.mcgregor@jstor.org).

I. EXECUTIVE SUMMARY

This study by Ithaka's Strategic Services group is an attempt to understand the way scholarly communications works in the discipline of economics. The study was commissioned by JSTOR. We aimed to understand the role of journals in economics and determine how that role may change in the coming years. We attempted to identify triggers that would lead economics to shift to electronic-only scholarly communication.

Our basic means of collecting information was interviews with important figures in the discipline and related areas. These included junior and senior faculty members, graduate students, government economists, publishers, resource providers, scholarly association representatives, librarians, and experts in scholarly communication. In total we interviewed 24 people. We also reviewed the range of tools that economists use to validate some of the information we gathered through the interview process.

Economists confirmed that journals and working papers continue to be their most important means of scholarly communication. Working papers are used to communicate the most recent scholarship. Journal articles remain the version of record for scholarly output and achievement, and the basis for the assessment of scholars' work. In economics, journal publication takes at least two years from manuscript to print due to the peer review process. Despite this delay, we do not believe peer reviewed journals are going to disappear any time soon given the importance of peer review to the current system of scholarly advancement. A third scholarly resource gaining currency is data. Economists agreed that access to datasets is valuable in allowing other researchers to replicate research in order to validate or challenge the author's conclusions, and as a teaching tool. Datasets can also be used for new research. Some journals, such as the American Economic Review, have begun making datasets available alongside articles.

Economists in various subfields and at any point in their careers tend to follow similar research processes and rely on many of the same resources. When beginning exploration of a new topic, they generally begin by tapping personal networks, whether advisors for graduate students or colleagues for senior faculty, to identify a few good papers to read. They then follow the bibliographies of those initial papers to other papers they find interesting. This is the process that economists have used for decades and no one suggested that it is likely to change soon. However, the tools economists use to follow the bibliographies have changed dramatically with the rise of the internet.

EconLit, an AEA bibliographic service that indexes and provides abstracts for global economics literature including journal articles and working papers, was traditionally where economists would begin a research inquiry, but the people consulted for this study felt that it has largely been supplanted by Google Scholar and Google as a primary search tool. Google and Google Scholar index content from publishers and connect users to working papers on individual websites as well as those indexed by RePEc or hosted on SSRN. Researchers do not seem to have a strong preference regarding the website where the paper or journal article is located. Economists also use older journal articles and see JSTOR as a trusted, easy-to-use source of older content. However, researchers told us that they rarely go back more than 20 years.

II. METHODOLOGY

In designing the economics discipline study, a primary objective was to talk with important figures in the discipline and related areas. These included junior and senior faculty members, graduate students, government economists, publishers, resource providers, scholarly association representatives, librarians, and experts in scholarly communication. In total we interviewed 24 people. We found that, by the end of our interview process, perspectives began to converge, research methods showed clear trends, and opinions on resources shared common elements.

To ensure that our interview population covered a broad spectrum of perspectives, we spoke with economists at a variety of institutions and working across the many subfields of economics. The 17 academics we spoke with came from a range of subfields, including monetary policy, finance, development, public sector, political, trade, industrial organization, education, and behavioral economics. They were affiliated with programs in the first and second tiers of the roughly 90 PhD-granting economics departments in the U.S., including Harvard, Princeton, UC Santa Barbara, Vanderbilt, Dartmouth, Georgia Tech, and UC Berkeley. In addition to academics, we spoke with four government economists from the St. Louis Federal Reserve, Department of Treasury, and the Council of Economic Advisors, as well as three librarians – one each from the National Bureau of Economic Research (NBER), Princeton Economics Library, and the Fed.

Of the eight senior faculty members we spoke with, four had significant expertise in scholarly communications. In addition, one heads the NBER, the foremost provider of working papers in economics. Another founded the Social Science Research Network (SSRN), a leading repository for working papers. A third is the Secretary-Treasurer of the American Economic Association (AEA), which publishes three top journals and EconLit, a comprehensive indexing service for economics. Of the four junior faculty members we spoke with, two are also experts in scholarly communications and one of those is the founder of the Research Papers in Economics (RePEc), a repository of bibliographic data that links to journal articles and working papers.

Our goal in these interviews was to learn how people in these various roles conduct research, what tools they use in their research process, and how they expect scholarly communication in economics to evolve over the coming years.

Finally, we reviewed the range of tools that economists use and gathered information ourselves about them. We collected citation and subscription data for journals and other research tools. These data points allowed us to validate some of the information we gathered through the interview process.

III. RESOURCES USED IN ECONOMICS RESEARCH

Working Papers

Working papers, which are pre-publication research outputs, have long played an important role in economics relative to other fields. One reason for this is probably the long lag time in journal publication, which we will explore in the next section. Reliance on working papers has increased in recent years due to the rise of computer network technology.

The major difference between journals and working papers is that journals are peer reviewed and working papers are not. Working papers may be read over by a colleague to check for gross errors, but their main function is to bring new research quickly to the scholarly community, to gather criticism and comment and improve the paper in preparation for publication in a journal. Working papers have for the most part been published in local series by university departments of economics, independent research institutions (e.g., NBER), and government and multilateral agencies (e.g., OECD and the Federal Reserve banks.) Print copies were circulated by mail to a list of subscribers. With no significant editing required and publication decisions made in-house, the barriers to sharing ideas in working papers has always been low.

The internet has further lowered the barriers to publishing working papers and increased their 'speed to market' from completion to public dissemination. Because they are not edited or reformatted, an electronic working paper can go from a scholar's computer to a department web server almost instantaneously. The internet has also reduced the cost of working paper publication. Almost every working paper publisher has ceased printing paper copies of its papers and mailing them in the traditional fashion. NBER stopped printing its yellow-bound series just this year, and now distributes exclusively online.

While journals typically provide the primary record of academic achievement in economics, researchers may continue to refer back to working papers for published works. Working papers often contain the longer, more detailed version of a paper, because a journal editor required that the paper be cut down as a condition of publication. Close readers may want to refer to the working paper edition to delve into the details and appendices that may have been left out of the journal edition. As journals transition to electronic-only, this distinction may disappear.

Peer Reviewed Journals

Journals have not been able to match the advances in productivity and speed that working papers have achieved. Publication in top economics journals takes approximately two years from finished manuscript to published paper – around the same amount of time it took 40 years ago. Journals were never the fastest mechanism for communicating findings to the scholarly community, but as computer technology increased the speed gap between working papers and journals, they have been further relegated to the role of recording knowledge that has already been communicated elsewhere. Journal articles remain the version of record for scholarly output and achievement, and the basis for the assessment of scholars' work, but are decidedly not at the cutting edge.

The main reason journal publication has not accelerated as rapidly as working papers is peer review. Peer review is slow, painstaking work. Top journals assign two referees to a paper. Each referee may spend six months reviewing it. If the manuscript is accepted by one referee it will be passed on to the next. More commonly, referees will require changes, which must be made by the author, who then resubmits the paper. If the article is rejected, it will be sent back to the author. By convention, articles may not be submitted to more than one journal at a time. Most researchers will submit their paper to more prestigious journals first, wait for a rejection, and then submit anew to lesser journals. Publishing in lesser journals

therefore generally takes longer than in top journals, usually in the range of three years. While an article may indeed improve through the peer review process, reviewers' comments do not travel with the manuscript from one journal's reviewers to the next, so in some cases the same critiques will be made over and over again.[1]

If journals are so slow, why have they not been replaced by a more efficient system? Indeed, why has the exact opposite happened – why have they grown from only a handful one generation ago to over 600 listed in EconLit today?[2] One important factor is tenure. In economics, publishing in peer reviewed journals is the gold standard of scholarly achievement, and it is the primary tool tenure committees and provosts use to make decisions about academics' promotion and pay. Journal quality is widely used as a proxy for the quality of research.[3] In selecting referees, journals locate specialists who are qualified to evaluate work that may be too narrow and technical to be properly reviewed by a tenure committee. As long as publication in peer reviewed journals is the sine qua non of academic accomplishment, the future of peer reviewed journals is secure.

There are imaginable alternatives to the peer review-based evaluation system, some of which were suggested by people we spoke with. One leading economist mused that the AEA might put in place a panel of economists to evaluate the quality of working papers. Another suggested the possibility of developing metrics for working paper quality based on website activity – citations, downloads, page views – that substitute for peer review. He noted that continual certification of work allows its relative value to be measured over time instead of just at the moment of publication.

There is an interesting question about the impact of transitioning to electronic dissemination on the quality of journals. Right now, printing cost considerations for editors and publishers work alongside peer review to keep journal quality relatively high. As new electronic-only journals are launched and pre-existing print journals migrate to electronic-only, these space factors will disappear. Some are concerned that journals may relax editorial standards. One senior economist, on the other hand, argued that at that point, peer review may become even more important than it is today, as the only remaining feature that distinguishes a journal article from a working paper.[4]

We could imagine a world where digital metrics become part of the editorial selection process – one input in an editor's decision as to whether an article is worth publishing. Peer review could evolve into a blended system that relies partially on the referees' judgment and partially on the statistics and comments that a manuscript collected as a working paper on SSRN or another repository.

From Print to Electronic

Most if not all the major journals in economics are now available in print and online, usually through some combination of library site licenses, individual subscriptions, and pay-per-view. It is worth speculating on how long print journals will remain. There are at least three impediments to a transition to electronic-only journals in economics.

1 There are many reasons why peer review is slow. It is hard to get some referees to respond because there is little incentive for them to turn papers around quickly – they would just get another paper to review sooner. While payment for review is theoretically based on a turnaround as short as six weeks, journals will in many cases pay even those referees who miss their deadlines, given how hard it is to attract them. And the amount of money at stake – in the high two-digits or low three-digits – is not enough to be a real motivator. Finally, economics papers are also generally quite long (approximately 50 pages), which makes the review process more time-consuming relative to hard sciences, where significant papers can fill just three pages. Publication turnaround times in fields like biology, for example, can be as quick as six weeks.

2 EconLit actually lists 987 journals in total, but many of these are multidisciplinary, and touch on economics tangentially. The Swiss Political Science Review is an example. ISI tracks citation data and assigns impact factors to 172 economics journals.

3 Even outside of academia, in such institutions as the Fed, publication in peer reviewed journals is the primary measure of a researcher's performance.

4 This line of thinking reflects a wider perception that digital-born, open access journals are not yet of the quality of their print peers. Despite the prestigious mastheads that many bear, the new electronic journals, such as Theoretical Economics from the University of Toronto and the various Berkeley Electronic Press journals have not altered the conventional wisdom, according to our interviewees. The perception may be explained by contingent factors, such as the youth of born-digital journals, or by inherent factors, such as the absence of significant marginal costs for added content that force print journal editors to choose only the best content and cut the rest. Some top senior scholars with little to lose have published in these journals, but graduate student and untenured faculty seem more wary due to the potential tenure implications of publishing in less established journals. The website EconPhD.net, which provides advice for economics graduate students, makes no mention of any open access journals in its Journals section. See http://www.econphd.net/journals.htm, accessed May 24, 2006.

First is preservation. One librarian told us he is more comfortable canceling print editions from large commercial publishers, because he trusts that they will be in business for the long term. His university has stopped receiving print copies of Elsevier journals. If his view reflects a wider belief, Elsevier, Blackwell, and their peers should be able to do away with print more aggressively than their non-profit peers.

A second factor is convenience. One publisher posited that the most important general journals (the *American Economic Review*, the *Journal of Economic Literature*, and *Journal of Economic Perspectives*) are almost like magazines for economists, and that they need to have print versions available to drop in a briefcase and browse on a plane ride.

Third is economics. Some commercial journal publishers have 'flipped' their pricing, with the majority of the cost to librarians now coming from the electronic version, not the print. For these journals there are substantial system-wide incentives to cancel print. Libraries also benefit by saving money in 'non-subscription' costs of periodicals[5] – the traditional warehouse functions of cataloguing and records management. Publishers benefit by streamlining a publishing process that currently requires expensive dual infrastructures for print and electronic. But many society publishers like the AEA have not flipped their pricing, so they have strong incentives to keep print subscriptions in place. The AEA relies on individual subscriptions to its three print journals, included in membership fees, for the majority of its revenues. Library subscriptions cost only $105 per journal for both print and electronic edition (though the three journals are only sold as a package at $315), with no option to subscribe to electronic-only, so electronic access is essentially provided free with a paid print subscription. The AEA's reliance on individual subscriptions and its vulnerability to cannibalizing its membership revenues naturally makes it more hesitant than its commercial peers in its approach to electronic publishing.

5 See Roger C. Schonfeld, Donald W. King, Ann Okerson, Eileen Gifford Fenton, "Library Periodicals Expenses: Comparison of Non-Subscription Costs of Print and Electronic Formats on a Life-Cycle Basis," D-Lib Magazine, Vol. 10, No. 1, January 2004. Available online at: http://www.dlib.org/dlib/january04/schonfeld/01schonfeld.html, accessed May 24, 2006.

IV. DETAILED DESCRIPTION OF RESEARCH TOOLS

Google Scholar

Though staffed by only two people (both programmers), Google Scholar has in its short life become, along with Google's main search engine, the first place many economists we consulted go to start their research. We heard this from junior and senior economics faculty, as well as graduate students.

Google Scholar was created by Google engineer and former University of California computer science professor Anurag Acharya in 2005. It provides a simple way to search for scholarly literature across many disciplines and sources: peer reviewed papers, theses, scholarly books (via Google Book Search), abstracts and articles, from academic publishers, preprint repositories, university working papers, and other scholarly organizations. In deciding what content is 'scholarly' the search engine uses inclusive criteria. The rule is, "if it looks like a paper," with author, title, citations, and bibliography, "it is very likely a paper."[6] Where multiple versions of a work are available – a preprint, a conference paper, a journal article – Google Scholar will attempt to cite them independently but group them together for display in search results, using an algorithm based on the library Functional Requirements for Bibliographic Records (FRBR) protocol. As a rule, if Google Scholar has indexed a publisher's version of an article, that copy will appear as the primary version, unless the publisher tells Google otherwise.

Google Scholar prefers to index the full text of articles, but will also crawl and link to an abstract or a page with other limited metadata. It allows users to search on full text from many scholarly publishers. It includes as many open access journals as Google can find, and aggregated content from Highwire, Allen Press, MetaPress, Atypon, Ingenta, Project Muse, and JSTOR. Citations from public abstracting and indexing services such as PubMed, Astrophysics Data Service, and RePEc are searchable via Google Scholar, as is full text from open repositories such as ArXiv. Google Scholar has partnered with libraries to provide patrons with links to toll resources that their institutions have licensed (using linking and resolving tools like SFX and OpenURL technology) as well as books and other content it owns (using OCLC Open WorldCat). Library holdings information is periodically fetched by Google Scholar, so when patrons configure the search engine for their university Google Scholar is 'aware' of what resources they can access. The 750 entities (some of which are consortia that include many libraries) that are participating in this free program have experienced tremendous growth in click-through rates for licensed resources over pre-Google Scholar usage. When compared against tools that do not separate out offline and online content in the user interface, as Google Scholar does, this growth has been five-fold.[7]

EconLit

A bibliographic service from the American Economic Association, EconLit was first published in 1969. EconLit's electronic edition is currently available on CD-ROM for individuals and is licensed for site-wide access by libraries through vendors like EBSCO and CSA Illumina. Library patrons access the database through the vendors' interfaces.

EconLit indexes and provides abstracts for global economics literature: books of over 60 pages in length and dissertations (both beginning in 1987), working papers, full-text of *JEL* book reviews, conference proceedings, and journal articles. Using linking and resolving tools, the interface vendors link EconLit entries to full-text versions of articles, if the user's library has licensed them. As of 2006, EconLit includes bibliographic material from 987 journals. Of these, approximately 600 are economics journals;

6 For more details on Google Scholar, see the entry "Info Grid 2005 - Monday 26th, 09:30 - Google Scholar" on the Science Library Pad blog, available online at http://scilib.typepad.com/science_library_pad/2005/09/info_grid_2005__1.html, accessed May 17, 2006.
7 Ibid.

the rest are selected from related fields that touch economics tangentially. The database contains 650,000 current records, to which 27,000 records are added annually. EconLit receives working paper bibliographic information from RePEc.

EconLit has traditionally been the place where economists would begin a research inquiry, but many of our interviewees suggested that it has been largely supplanted by Google Scholar and Google for initial inquiries. EconLit is still used for in depth literature searches and is some researchers' first stop in a literature search. However, economists of all stripes noted the rise of Google and the decline of EconLit. Only two of those interviewed told us they regularly start searches with it.

EconLit is certainly more comprehensive and contains more targeted content than Google Scholar for economics literature, but we were told that it lacks features that researchers find useful, such as taking into account the quality of articles when serving search results. We also heard that EconLit, as a single-discipline resource, can be limiting for those pursuing cross-disciplinary research topics. Google Scholar is inherently multi-disciplinary. Content is disassociated with the journal that published it and the discipline to which that journal is directed. If a behavioral economist searches on 'irrationality,' Google Scholar will likely give her valuable results from psychology and philosophy journals, while EconLit generally will not.

NBER and CEPR

Founded in 1920, the National Bureau of Economic Research (NBER) is a non-profit, non-partisan economics research institute based in Cambridge, MA. Its mission is to promote understanding of how the economy works. NBER has published economics' most prestigious working paper series since 1973. NBER began publishing working papers online in the 1990s; in 2006, NBER dropped the print edition and moved its series to electronic-only. NBER working papers' purpose is to make the results of research conducted by NBER fellows – nearly 1,000 eminent economists around the world – available to other economists in preliminary form. It is intended to encourage discussion and suggestions for revisions to papers before their final publication.[8]

The NBER archive[9] includes 12,000 papers, of which it is estimated that about 95 percent go on to be published in journals. Approximately 700 new working papers are published by NBER every year. It recently added a feature that lists the 25 most-downloaded working papers each month. The site serves 2 million annual downloads. Between one third and half of usage comes from non-OECD countries. Forty percent of hits are referred from Google.

The Center for Economic Policy Research (CEPR) is a European equivalent to the NBER. It plays a similar role as a trusted source of working papers for economic scholarship emanating from the U.K. and continental Europe. Founded in Britain in the early 1980s, CEPR "develops [research] projects and obtains funding for them; administers and executes projects; and disseminates the results of the research" through publications, workshops and conferences. The relevant component of its mission for our purposes is its "discussion paper" series – CEPR's name for working papers.[10]

SSRN and RePEc

8 In the past, NBER also published two journals. These were cancelled due to low citations.
9 NBER has set up redundant servers and believes its standards of safekeeping deserve to be considered archival.
10The CEPR website currently contains 3,000 discussion papers authored by CEPR fellows; 2000 earlier working papers have not yet been digitized. CEPR charged £900 for electronic-only access to publications from all its programs in 2004 and £1,749 for paper and electronic editions. Discussion papers are also sold online individually for £3 per paper. In 2002-03, the latest year for which data were available, there were 340 subscribers to the series, 66 percent of whom subscribed to all areas of research. Total discussion paper sales were £365,000. See CEPR Annual Report 2002-03, available online at http://www.cepr.org/AboutCEPR/annualreport/02_03_AR.pdf, accessed May 17, 2006.

SSRN and RePEc are tools to aid economists in finding working papers and other scholarly content. The two organizations have very different strategies, which we will review below.

SSRN is a for-profit corporation founded by Michael Jensen and Wayne Marr in 1993 to "to create a way for scholars to share and distribute their research worldwide long before their papers worked their way through the journal refereeing and publication process."[11] It is made up of a series of networks, one of which is the Economics Research Network (ERN). Each network serves as a repository for working papers and other forms of current scholarship that are provided free of charge whenever possible.[12]

SSRN generates revenue from institution site memberships and also offering individual memberships. With membership, subscribers receive regular emails in specified subject areas based in ERN on *Journal of Economic Literature* subfield classifications (e.g., development economics) with the newest working papers in those fields.[13]

One benefit of SSRN is that authors' papers are not tied to the institutions with which they were affiliated at the time they wrote their papers. As economists move from one research institution to the next, they need not worry about having to resubmit all of their working papers to the new institution's repository. SSRN also acts as the official repository for Yale University and will be a repository for the University of Chicago's business school.

RePEc, which was also started in 1993, aims to facilitate access to scholarship in economics. RePEc was created, according to its founder Thomas Krichel, as an "application of the open source approach to bibliographic data." It does not act as a repository or archive, has no annual budget, and completes all tasks in a distributed way by volunteers without central management. According to Krichel, there are a set of individuals who have taken on responsibilities for certain areas of the site, but there is no formal structure.[14]

Instead of RePEc's managing document collections, documents must be stored in up-to-date institutional repositories in RePEc format. The institutions, generally universities, bear responsibility for maintenance and preservation of their born-digital documents.[15] If RePEc links to an open access institution repository, the paper is free. If it links to JSTOR or some other fee-based site, access is granted only to participants. The AEA selected RePEc to serve as its exclusive source providing bibliographic and abstract data for working papers indexed in EconLit. In return, the AEA will encourage all major research institutions to maintain an up-to-date repository of working papers so that RePEc has the most up-to-date working papers. In the past three months, RePEc has added 62 institutions to bring their total to 593 participants.

RePEc and SSRN both provide emailing services [16] and download counts, list top articles, and are attempting to provide citation counts. Both are also attempting to offer an alternative form of certification to that provided by traditional journals. As automated tools get more sophisticated and less open to

11 Michael Jensen on SSRN's website, http://www.ssrn.com/index-cm.html, accessed May 2, 2006.
12 According to its website, as of May 2006, SSRN has around 116,000 abstracts and 87,600 papers from 58,800 authors. Of these, about 59,000 papers are in ERN. SSRN does do a quick quality screen of these papers to ensure that they are contributing to global scholarship. In the last 12 months, SSRN had 2,644,197 papers downloaded in all of their research networks. Papers that are provided on a pay-per-view model are NBER and CEPR working papers series as well as journal articles from Blackwell and Oxford University Press. In each case, the charge was imposed by the publisher, not by SSRN. In most cases, SSRN tries to help users click through to a free version if their institutions have subscriptions.
13 The emails are compiled by editors (most of whom are professors) and serve as a resource somewhere between an abstracting service of new SSRN content and an e-journal of unedited working papers. Economists at NBER, Harvard, Dartmouth, and the St. Louis Fed all said they receive emails in their respective subfields.
14 RePEc has bibliographic data for over 178,000 working papers (123,185 online) and 192,000 journal articles (145,477 online). According to RePEc's usage statistics, 5.3 million files were downloaded from March 2005 through March 2006. Available online at http://logec.repec.org/scripts/seriesstat.pl?seriestype=archive, accessed May 2, 2006.
15 As RePEc does not archive documents, links are not always stable and content can be permanently lost. Krichel told us how, in 1996, a German university's repository disappeared and the data could not be retrieved. In addition to the burden of backing up institutional repositories, institutions are responsible for adding content to their repositories. Princeton University's library is going to work this summer to ensure their repository is up-to-date and in a RePEc-compatible format.
16 Though no interviewees mentioned receiving RePEc's emails.

gaming, they may substitute for the certification that currently requires editors and peer review. However, none of our interviewees believe peer review is going away any time soon.

Data

Economics can be divided into two main categories – theoretical and applied. In theoretical economics, working papers and journal articles are sufficient because economists work with abstract proofs. In applied economics, economists run analyses on datasets, then draw conclusions based on the data to write papers. Economists find datasets on the internet, solicit data from corporations or governmental agencies, purchase data, or collect data through field work. While in theory a research question is defined before data are collected, the reality is that the available dataset and the research question often influence each other, especially for researchers at earlier stages in their careers.

Computer technology has expanded the availability and utility of data. Data that were once painstakingly collected and analyzed in analog form can now be collected, published, and shared over computer networks far more easily. There are two basic formats for economics data: general datasets, usually published by government departments or multinational organizations; and research-specific datasets that accompany a paper and support its conclusions. General datasets have migrated online and are in wide use. To offer only a few examples, the U.S. Departments of Labor (Bureau of Labor Statistics), Education (National Center for Education Statistics), as well as the Census Bureau and the Federal Reserve Bank System (e.g., the FRED and ALFRED projects from the St. Louis branch) compile data used by applied economists and publish it online.[17] Commercial services such as Haver Analytics and Global Insight[18] and research institutes with specialties in statistics aggregate publicly available data and repurpose and repackage them in formats that are more useful to scholars and analysts.

The Integrated Public Use Microdata Series (IPUMS) from the University of Minnesota has compiled data from every surviving U.S. Census (since 1850) and the American Community Surveys and published them for free on its website. IPUMS describes itself as "our richest source of quantitative information on long-term changes in the American population."[19] Similarly, the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan's Institute for Social Research houses and distributes data to support economics and other social science research, though it does so on a membership basis through academic libraries. Over 350 colleges and universities subscribe to ICPSR's roughly 10,000 data sets. The fees are set on a Carnegie classification-based tiered scale ranging from $1,600 per year for two-year colleges to $15,000 per year for extensive doctoral universities and are used to cover annual expenses of $11-$12 million.[20]

Published general datasets are one of the main sources of data for applied economists, and are in wide use. Specific data, accompanying research papers, are only beginning to gain attention. This trend has received a boost from the *American Economic Review's* new requirement as of last year that all manuscripts be submitted with the data that was used to write them. ICPSR has recently begun to experiment with a data depository service, for replication, secondary analysis, and preservation.

17 The Fed has roughly 1,000 data series on the US economy and over 2,000 data series on the Federal Reserve districts. FRED is a program that distributes current economic data. ALFRED is a recently-created data archive that allows economists to see historical FRED data going back to 1996. This is valuable because governmental data is continually being revised. With ALFRED, researchers can go back in time and look at data from a specific moment and replicate a paper from the original dataset. The Fed also hosts Liber8, a resource for non-economists seeking economic information. For more on FRED and ALFRED, see http://research.stlouisfed.org, accessed May 18, 2006.
18 See http://www.haver.com and http://www.globalinsight.com for more information about these services. Accessed May 23, 2006.
19 See http://www.ipums.umn.edu/usa/index.html, accessed May 18, 2006.
20 See http://www.icpsr.umich.edu/org/index.html for details, accessed May 18, 2006.

V. HOW ECONOMISTS DO RESEARCH

Across subfields, in different institutions, and at varying tenures, economists tend to pursue fairly similar research processes. Economists generally begin by using their personal networks, whether advisors for graduate students or colleagues for senior faculty, to identify a few authors and good papers to read. They then follow the bibliographies of those initial papers to other papers they find interesting. As described above, the most recent research they read is nearly always in working papers, due to journals' long publication lags. This is the process that economists have used for decades and no one suggested that it is likely to change soon. However, the tools economists use to follow the bibliographies have changed dramatically with the rise of the internet. This section will discuss how economists have incorporated the tools described in the previous section into their research methodology, and how economists see open access trends affecting these tools and processes over time.

How Economists Use Research Tools

While a few of the most senior economists noted that they find the majority of what they need by talking to colleagues in the field, an overwhelming number of interviewees said they first turn to Google or Google Scholar to look up the papers on their initial reading list. They then find additional citations in the bibliographies of those papers and search for those papers. They do not seem to have a strong preference regarding the website where the paper is located, be it a scholar's personal website, a link through RePEc to an institutional repository, within SSRN, or from another source. A few researchers preferred individual authors' websites because they could easily browse other papers written by the economist. None of the interviewees used RePEc or SSRN to search for working papers. Researchers often went through those sites to access a working paper, but only when linked from another site such as Google. A few would use NBER's website, but by and large, Google was the first step to get what they needed.

For current articles, individuals generally tend to go to the websites of specific publications if Google or Google Scholar did not index the article. Regardless of where the researcher began a current article search, he or she ended up on a publisher's website to download the particular article. Economists also use older publications, as is clear from JSTOR usage. However, they told us it was rare that they would go back more than 20 years. One economist said, "Economics is a discipline that tries to have no past." When researchers knew they were looking for an older paper, many would go directly to JSTOR to conduct a search. A few mentioned having trouble when going directly to JSTOR because they would forget the article was published by a publisher that does not participate in JSTOR, but we rarely heard about cases where known, older articles other than those in ScienceDirect could not be found in JSTOR. A few researchers used their library's SFX software to access articles, which would often provide several options for access.[21] They seemed agnostic about the source so long as it was electronic. It seems that many of those we spoke with who do not use available SFX services simply did not know they existed. Of the five graduate students we spoke with (all at Harvard), three had not heard of the SFX tool on their campus, even though it was available.

Given the research process described above, it seems that economists could quite easily miss relevant, existing research, meaning they could end up duplicating existing work. In fact, economists acknowledge this concern and note that it does happen from time to time. In those instances, the new paper simply has to cite its predecessor and highlight the new insights. One senior economist believes it is important that researchers do not do a full survey of the literature before they begin developing an idea. He argued that the risk of duplication is outweighed by the "defeating" feeling a full search can cause. At the same time,

21 See Harvard University Library's "Citation Linker," http://sfx.hul.harvard.edu/citation/sfx_local, accessed May 24, 2006.

it is clear that most economists do try to do a reasonably comprehensive search at some point in their research process, which leads to the question of where economists go for 'discovery' searches.

The Open Access Question

Open access (OA) advocates believe scholarship should be freely available. This OA imperative comes in part from a belief that there is value in making research accessible to the 'man on the street' and in part from the dramatic increase in journal costs that continue to put pressure on library budgets (between 1986 and 2002, the average price of a journal rose 215 percent).[22] However, we found that nearly all of our interviewees consider OA a non-issue in economics. They consistently described economics as a technical discipline intelligible only to trained readers – i.e., fellow economists – and assume that they would all have access to the journals. When economists write for general consumption, they publish in magazines and newspapers such as *The Wall Street Journal*.

Some of the economists we consulted believe that research should be free to those in the developing world, but they thought that demand would be small and that most researching economists in those countries already had some access.[23] The majority of papers published in economics journals are available as working papers on the internet, whether on individuals' websites or in other repositories.

22 For data on the rise of journal prices, see Ted Bergstrom's web page "New Data on Journal Prices in Economics," available at http://www.econ.ucsb.edu/%7Etedb/Journals/pricing.html, accessed May 18, 2006. The labor-intensivity of peer review provides one explanation for the rise in journal prices; others include the inelasticity of demand; the growth of for-profit scholarly publishers; the monopolistic nature of journal publishing; the consolidation of the industry; and the growth of low-circulation, high-margin niche journals. For an explanation of the rise in journal prices, see Donald W. King and Carol Tenopir, "Scholarly Journal and Digital Database Pricing: Threat or Opportunity," presented at Economics and Usage of Digital Library Collections conference, Ann Arbor, MI. Online at http://www.si.umich.edu/PEAK-2000/king.pdf, accessed May 24, 2006. Still another explanation for rising costs that is relevant to JSTOR is that journal publishers have not as yet been able to stop publishing print editions of journals entirely. When libraries like Princeton cancel their print subscriptions Elsevier can print one fewer copy of perhaps 1,200 journals. But as long any print subscribers remain, they will need to maintain the infrastructure to support it, and the fixed associated with it. Joop Dirkmaat of Elsevier made this point in response to an article by Ted Bergstrom. See "Comments: Pricing and Cost of Economic [sic] Journals," Journal of Economic Perspectives, Vol. 14, No. 4, Fall 2002. Available online at http://www.econ.ucsb.edu/%7Etedb/Journals/jepcommentjstor.pdf, accessed May 24, 2006.

23 Relatedly, economists noted that the United States produces the preponderance of research and that Europe accounts for nearly all of the rest of the research that is published.