Research Funding and Implications for Universities and their Libraries

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All organizations must be fed money for them to live. Higher education is no exception. The sources of funding for universities are rather limited. State appropriations constitute one, tuition and fees another, auxiliary services yet another, and gifts and endowments one more. As it happens, total state support for higher education fell 7.6% between the 2011 and 2012 fiscal years. Eric Kelderman (2012)[1] writes:

> As a whole, state spending on higher education—after being supported by the recovery-act money for three budget years—is now nearly 4 percent lower than it was in the 2007 fiscal year. Twenty-nine states appropriated less for colleges this year than they did five years ago.

We will concentrate here on a particular revenue source—external research funding. This is another area of concern when it comes to stability of support. There are reports of declines in the amount of federal research and development support that is available (for example, see Brainard, 2008, A32). In terms of immediate (at the time of this writing) action, the planned sequestration will have an impact of federal spending in many areas. As Alli Bidwell (2013)[2] says, "The group estimated that if sequestration goes forward, federal research spending would be trimmed by more than $12-billion in 2013 and by nearly $95-billion over the next nine years—a cut they said the nation's economy cannot afford."

Other writers have addressed the particular matter of research funding from different perspectives. For example, Jung Cheol Shin (2010)[3] employed performance-based accountability in an examination of institutional spending, especially related to trends. With regard to research funding, Shin found that, whether institutions used performance-based accountability measures or not, there are declines in research funding, beginning about 2006.[4] The reduction in federal research funding is affirmed by Henry Bienen (2012).[5] In a kind of corollary analysis, Trimble and colleagues (2010)[6] argue that re-inventing academic publishing, with a shift of emphasis from quantity to quality, may affect all realms of scholarly communication and the work that feeds. These authors do not tackle the research funding problem in the same way we do; our approach is intended to offer a new perspective of research funding as it actually works in practice.

Methodology

The database used for examination in this study is comprised of eight issues November-December, 2011 of *Science* and four issues November-December, 2011 of *Cell*. All issues, and research articles and reports in them, in those issues, were studied so as to determine the sources of U.S. federal support in each instance. The articles add acknowledgements that detail the sources of funding. For example, Treusch and colleagues (2011),[7] in an article published in *Science*, conclude with the following acknowledgement:

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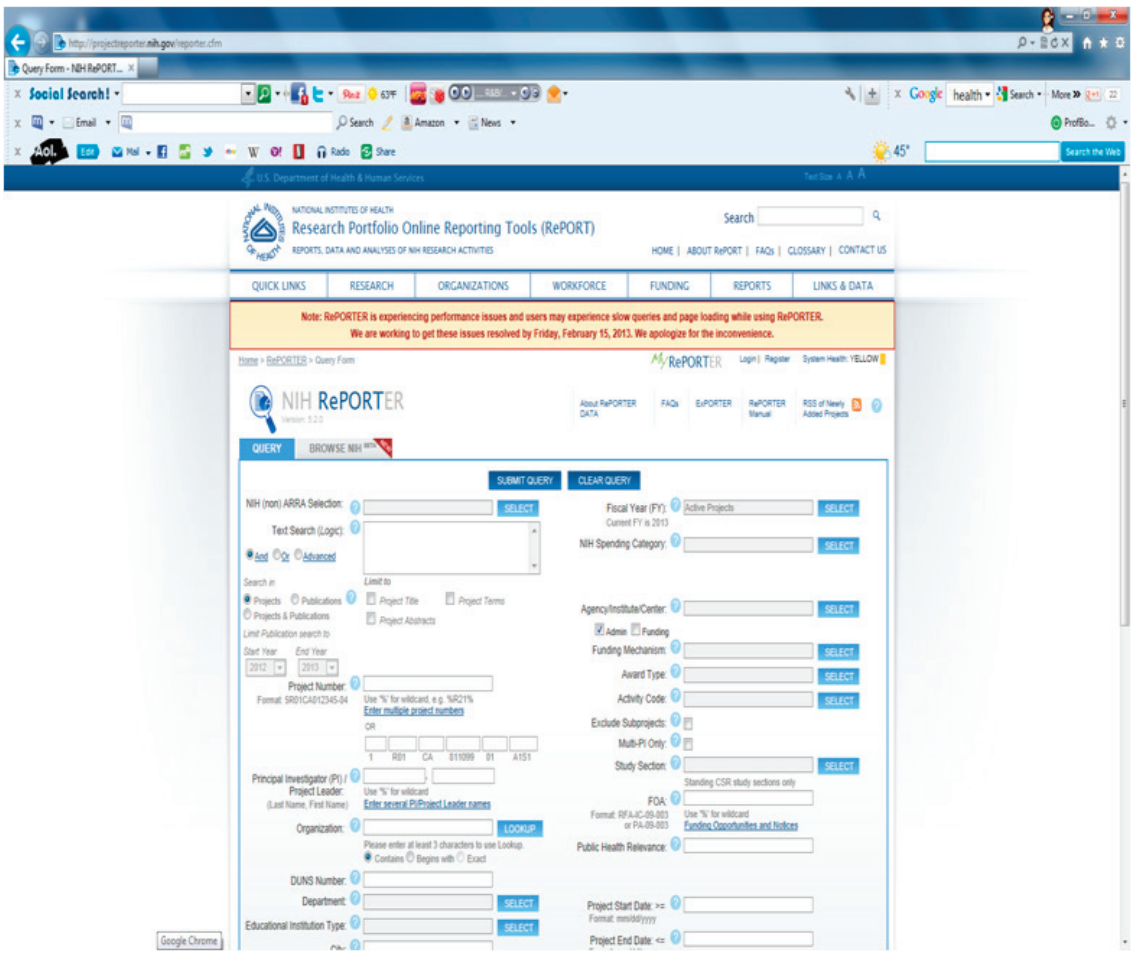
The indicator "NIH08AG034290" is a code for a specific grant. Other acknowledgements contain similar codes for grants from other federal agencies. These specific grant codes can be searched in agency databases, such as the National Institutes of Health's **RePORT**ER (see Figure 1). The Research Portfolio Online Reporting Tools (RePORT) states its mission as:

> In addition to carrying out its scientific mission, the NIH exemplifies and promotes the highest level of public accountability. To that end, the Research Portfolio Online Reporting Tools provides access to reports, data, and analyses of NIH research activities, including information on NIH expenditures and the results of NIH supported research.[8]

Data

The data of the journals (*Science* and *Cell*) are not easy to collect. There are limitations that have to be imposed for our purposes here. The first is that only

FIGURE 1
NIH RePORTER



funding from U.S. agencies is collected. There are numerous grants and contracts acknowledged from other nations, but there are two fundamental difficulties attached to those funding sources: (1) it is extremely difficult (usually impossible) to search for, and find, the information about the grants and contracts, and (2) the structure of funding in other countries, including Canada, is so different from that in the U.S. that productive comparisons are not possible. Because of these factors, the amounts of grants that are identifiable from U.S. sources are reported here. These amounts can be reported issue-by-issue for each journal. Table 1 illustrates the amounts of grant money received by authors of the articles published in November and December 2011 in *Science* and *Cell*.

TABLE 1
Grant Money Received by Authors of Articles Published in November and December 2011 in *Science* and *Cell*

Science **– November-December, 2011**	
Issue	Total Funds Received by Researchers
November 4	$3,476,704
November 11	$7,942,764
November 18	$2,180,831
November 25	$2,672,420
December 2	$6,472,534
December 9	$2,705,112
December 16	$2,520,320
December 23	$4,289,824
Total	**$32,260,509**
Cell **– November-December, 2011**	
Issue	Total Funds Received by Researchers
November 11	$5,198,901
November 23	$6,400,039
December 9	$10 ,446,713
December 23	$3,905, 215
Total	**$25,950,868**

By way of example, one issue of *Science* (December 16) published a total of fifteen articles, but eight were either not by U.S. scientists or designated no acknowledged external funding. Further, some agencies, such as the U.S. Department of Energy, NASA, and DARPA, have search mechanisms that are very difficult to locate and use. In short, researchers received considerably more funding than is indicated in Table 1, but the table provides a glimpse as the amount of research funds that are awarded to researchers.

On a larger scale, Table 2 presents the U.S. institutions that received the most support from federal sources in fiscal year 2010.

TABLE 2
Top Ten Recipients of Federal Research Funding, FY 2010

Institution	Amount of Expenditures
*Johns Hopkins University	$1,737,261,000
University of Washington	$829,885,000
University of Michigan	$747,778,000
University of Pennsylvania	$642,180,000
University of Pittsburgh (main campus)	$594,675,000
Stanford University	$593,016,000
U. of California at San Diego	$580,279,000
Columbia University	$572,213,000
U. of North Carolina at Chapel Hill	$545,993,000
University of Wisconsin, Madison	$545,189.000
*Includes for the Applied Physics Laboratory	

The purpose of the table is to illustrate how much money is still expended on research at U.S. universities. Twenty-one spend more than $400,000,000 in federal dollars, and thirty-nine spend more than $300,000,000. By comparison, Table 3 shows total expenditures on science for fiscal year 2009. Table 3 includes sources other than the federal government, including internal resources, or grants and contracts with corporations, foundations, and other private entities. While corporate financing of academic research is not the focus of attention in this project, it is an activity that should be undertaken with considerable care. Jennifer Washburn (2005)[9] has chronicled numerous problematic relationships in which universities have suffered and the public good has been damaged. The matter is sufficiently serious that the American Association of University Professors (AAUP) has issued a statement on corporate research support.[10]

TABLE 3 Total Expenditures on Science, FY 2009	
Johns Hopkins University*	$1,856,270,000
U. of Michigan (all campuses)	$1,007,198,000
U. of Wisconsin at Madison	$952,119,000
U. of California at San Francisco	$947,697,000
U. of California at Los Angeles	$889,995,000
U. of California at San Diego	$879,357,000
Duke University	$805,021,000
University of Washington	$778,046,000
Pennsylvania State U. (all campuses)	$753,358,000
U. of Minnesota (all campuses)	$740,980,000
*Includes $977,951,000 for the Applied Physics Laboratory	

Legislation

Current open access legislation moves slowly and is not well advertised, thus making it hard to advocate for. The most recent open access legislation includes Senate Bill, S.350 and the House bill, H.R. 708, the Fair Access to Science and Technology Research Act (FASTR), both were introduced on February 14, 2013 (ALA, 2013).[11] Like the Federal Research Public Access Act (FRPAA), these bills would, in essence, advance and expand the NIH's current Public Access policy by increasing the number of government agencies required to provide public access to publically funded research by 11. Federal departments and agencies with extramural research budgets over $100 million would be required to create a policy stating that researchers must submit an electronic version of their final manuscript that has been accepted for publication in a peer-reviewed journal (ALA, 2013).[12] This would require the following departments provide the public with direct access to their research: the Department of Agriculture, Department of Commerce, Department of Defense, Department of Education, Department of Energy, Department of Health and Human Services, Department of Homeland Security, Department of Transportation, Environmental Protection Agency, National Aeronautics and Space Administration and the National Science Foundation (ALA, 2013).[13] Additionally, these agencies are charge with the creation and maintenance of a "stable digital repository" in order to provide free access, interoperability, and long-term preservation of publically funded research (ALA, 2013).[14]

Previous open access legislation includes the Federal Research Public Access Act (FRPAA). FRPAA would require that 11 US government agencies with extramural research budgets over $100 million makes journal articles from research funded by that agency publically available via the Internet within 6 months of publication. FRPAA was first proposed in 2006 and has since been introduced and referred to committee (died) three times (Govtrack, 2012).[15] The justification behind bills such as FASTR and FRPAA include the goals of: advancing science, maximizing dissemination of research, improving the lives and welfare of people through increased access to quality information, and the fact that this research is underwritten by taxpayers.

On January 4, 2011 the American COMPETES Act Reauthorization was signed into law (Public Law 111-358). This was perhaps the first glimmer of receptiveness to open access legislation. This law assigns funding to agencies and governs the research output of agencies with federal research expenditures of over $100,000,000 (quite similar to portions of FRPAA). This law also stipulates that it will create an interagency Public Access Committee to assess the feasibility of broader open access initiatives (Section 103.7).

Although the American COMPETES Act Reauthorization could potentially be a good thing for other proposed legislation such as FASTR, it is also feared that it will "take the wind out of the sails" of bills like FASTR because it does not take a stance in one direction or the other on open access. The COMPETES Act is merely an investigation into open access, so the Public Access Committee which was established to investigate open access could be leveraged by either side of the debate. Additionally, John Tagler, Vice President and Executive Director of the Professional and Scholarly Publication (PSP) division of the Association of American Publishers (AAP) (who spoke out adamantly against FRPA and FASTR) spoke in support of the American COMPETES Act, "We welcome the opportunity to engage with the Administration to advance well-considered policies that do not undermine copyright or propose new government mandates that would result in the duplication of private sector activities" (Hadro, 2011;[16] Sporkin, 2013).[17]

The passing of COMPETES, although a move in the right direction, is not a definitive step towards open access. It is now two years since COMPETES was passed in January 2011 and very little progress

has been made. The first report on COMPETES was prepared by the U.S. Department of Commerce and came out in January 2012; while the report discussed the importance of public funding for research, it did not address the issue of direct public access to publically funded research. While this does not necessarily mean that COMPETES is slowing open access initiatives, it is indicative of many issues with this law and reaffirms concerns that it has the potential to slow other open access initiatives while establishing its interagency on public access to assess open access.

Discussion

The data presented here are admittedly select and from a limited time period. That selection has been intentional so that one can comprehend just how much money is earmarked for research in science and technology. Even while there is fear of cuts to federal research funding (particularly via the National Institutes of Health and the National Science Foundation), many researchers are still able to attract support in substantial amounts. It may well be that the researchers have to submit more proposals in order to attract the same amount of money. If so, then more of the time of university faculty members is spent simply trying to get the financial support. A genuine internal assessment on any university campus should examine opportunity costs—the costs in time of faculty effort spent writing the proposals relative to the amount of funds attracted (or effort relative to success). If faculty members are indeed spending more time writing proposals, what is it that they can *not* do because of the time constraints. These data indicate, subtly, a need to define success in terms of institutional mission. If a university valorizes, not only research productivity, but attraction of external funding, then the results may signal a call to revisit the mission. If the university is public, perhaps there should be a more complete accounting to the citizens of the state. In other words, the findings presented here are not neutral; data never are. There are political, as well as economic and intellectual, decisions being made about the quest for funding. One further project could include examination of the time spent by faculty members on seeking funding as opposed to the other rhetorical components of institutional mission, such as teaching and service.

In addition to the possibilities for interpretation of the data presented here, there are other questions worth pursuing that cannot be addressed here. Given the relative decline in federal research support, the gap is being filled, in part, by corporate sources. For example, as Jill Richardson reports,

> The report [by Food and Water Watch] found that nearly one quarter of research funding at land grant universities now comes from corporations, compared to less than 15 percent from the USDA. Although corporate funding of research surpassed USDA funding at these universities in the mid-1990s, the gap is now larger than ever. What's more, a broader look at all corporate agricultural research, $7.4 billion in 2006, dwarfs the mere $5.7 billion in all public funding of agricultural research spent the same year.[18]

Even in the economic downturn since 2007 there are many corporations that have cash to spend on research in the fields of agriculture, pharmaceuticals, and elsewhere. A question that can conclude this project is the following: Do federal and corporate sources of research funding exercise equal oversight and demand the same quality of research protocols? That question deserves immediate attention.

Notes

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