

Economic Landscape of Federal Public Access Policy



A Report by the Office of Science and Technology Policy

Pursuant to the Consolidated Appropriations Act, 2022

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About the Office of Science and Technology Policy

The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization, and Priorities Act of 1976 to provide the President and others within the Executive Office of the President with advice on the scientific, engineering, and technological aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics. OSTP leads interagency science and technology policy coordination efforts, assists the Office of Management and Budget with an annual review and analysis of federal research and development in budgets, and serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the federal government. More information is available at <http://www.whitehouse.gov/ostp>.

About this Document

This document was prepared voluntarily by OSTP in response to a request made in report language accompanying H.R.2471, the FY 2022 omnibus appropriations legislation signed into law in March 2022. In that request, OSTP was asked to provide a report to Congress on the potential economic impacts of anticipated federal public access policy changes.

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Summary

The White House Office of Science and Technology Policy (OSTP) submits this report to the Appropriations Committees of the Senate and House of Representatives pursuant to the Consolidated Appropriations Act, 2022.¹ This report draws on current research and data available and information received through extensive engagement and consultation with diverse stakeholders, including publishers, federal agencies, and other organizations. Building on the status report on federal public access policies submitted by OSTP to Congress in November 2021,² this report elaborates on the potential economic impact of a change to federal agencies' public access policies to remove the current 12-month embargo period on making federally funded research publications publicly accessible. OSTP estimates that the total cost of public access to the American taxpayer through investments in research accrues annually on average to between roughly \$390 million on the low-end and \$789 million on the high-end. This range of costs is relatively small in comparison to the billions of dollars invested each year in research by American taxpayers at less than half a percent, on average.

Background

Broad and expeditious sharing of federally funded research is fundamental for accelerating discovery on critical science and policy questions. New insights into pandemic preparedness response, national security, climate change, energy, cancer, economic justice, and other research and development priorities of the federal government depend on reliable access to the latest state-of-the-art advances in these fields. Moreover, American taxpayers make investments in science for the benefit of all of society and public access policies help ensure that the returns on those investments are open, equitable, and available to all for general and specialized uses alike.

Since the Reagan Administration, it has been the policy of the federal government to provide unrestricted access to the products of basic and applied research funded by the United States to foster the free exchange of ideas.³ The Obama Administration reaffirmed this position for research publication products by issuing the policy guidance *OSTP Memorandum on Increasing Access to the Results of Federally Funded Research* (2013 Memorandum).⁴ The 2013 Memorandum directed each federal department and agency with more than \$100 million in

¹ H.Rept. 117-97 (Committee Report to accompany H.R. 4505, Commerce, Justice, Science, and Related Agencies Appropriations Bill, 2022) adopted by reference in the Joint Explanatory Statement for Division B—Commerce, Justice, Science, and Related Agencies Appropriations Act, 2022 accompanying Consolidated Appropriations Act, 2022 (Pub. L. 117-103), p. 121.

² https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report_OSTP.pdf

³ National Security Council. (1985, September 21). NSDD 189 National Policy on Transfer of Scientific, Technical and Engineering Information. National Archives Catalog. Retrieved from <https://catalog.archives.gov/id/6879779>

⁴ Holdren, J. P. (2013, February 22). Memorandum for the Heads of Executive Departments and Agencies: Increasing Access to the Results of Federally Funded Scientific Research. Obama White House Archives. Retrieved from https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf

annual research and development expenditures to develop a plan to support increased public access to the results of federally funded research, specifically providing access to scholarly publications and digital data resulting from such research. As of 2022, every federal agency subject to the 2013 Memorandum has developed and implemented public access policies, and additional agencies that were not originally subject to the 2013 Memorandum have also issued and implemented public access policies.^{5,6}

The 2013 Memorandum provided a 12-month grace period for academic publishers to embargo any publication resulting from federally funded research from public access. As a result, all federal agency public access policies have allowed for this provision, collectively known as the 12-month publication embargo.

Between 2013 and 2022, the technological and social landscapes of federally funded research have changed dramatically. The shift from print to digital, the sharp decline in costs of hosting data online, the rise of widespread availability of cloud storage services, advancements in digital persistent identifiers, and the founding of both generalist and domain-specific digital repositories have lowered barriers to sharing, storing, finding, and accessing research data and publications.⁷ Market conditions have also evolved toward greater favorability of research sharing: an increasing number of fields, including computer science and physics, now depend on the availability of online publication pre-print and data repository services.

Building on these important advances, the policy guidance laid out in the 2013 Memorandum can be improved to achieve more equitable delivery of federally funded research results and data to all of America. Years of public feedback have indicated that the primary limitation of the 2013 Memorandum is the optional 12-month embargo from public access any publication resulting from federally funded research. This provision has limited immediate equitable access of federally funded research results to only those able to pay for it or who have privileged access through libraries or other institutions. Financial means and privileged access must never be the pre-requisites to realizing the benefits of federally funded research that all Americans deserve.

OSTP and federal agencies draw distinctions between the terms *public access* and *open access*. *Public access* refers to the free availability of federally funded scholarly materials to the public (including publications, data, and other research outputs) and is a policy term; whereas, *open access* refers to a broad set of publication sharing principles and practices, including those required by public access, as adopted by the scientific and publishing communities. According

⁵ Implementation of Public Access Programs in Federal Agencies. Science.gov. (2022). Retrieved from <https://www.science.gov/publicAccess.html>

⁶ Lander, E. S. (2021, November 5). Public Access Congressional Report, 2021. The Executive Office of the President, Office of Science and Technology Policy . Retrieved from https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report_OSTP.pdf

⁷ Measuring the Digital Transformation: A Roadmap for the Future. (2019). OECD. <https://doi.org/10.1787/9789264311992-en>

to the UNESCO definition: “Open Access (OA) is the provision of free access to peer-reviewed, scholarly and research information to all. It requires that the rights holder grants worldwide irrevocable right of access to copy, use, distribute, transmit, and make derivative works in any format for any lawful activities with proper attribution to the original author.”⁸ This distinction is important in the context of the ongoing transformation towards greater openness and transparency in science, as open access models have become more diverse in practice than required by public access policies of the federal government. OSTP provides policy guidance to federal agencies on public access to federally funded research.⁹

Modernizing Public Access Policy Guidance to Federal Agencies

Since the 2013 Memorandum was issued by OSTP, there has been a seismic shift in the cultural and technological contexts in which science is conducted and communicated. Federal agency public access policies must be updated to reflect and support the more open and accessible landscape in which federally funded research now exists. There are at least four ways in which academic and scientific publishing has changed since federal agencies issued their public access policies that warrant elaboration.

First, in response to federal, institutional, local, and international public access policies and demands from scientists, researchers, students, and other producers and consumers of science for greater open access, there has been a slowly emerging move away from subscription-based models of academic journal use by research libraries and towards various “transformative agreement” models whereby institutions pay academic publishers for open access publishing of their scientists’ scholarship.¹⁰

Second, publishers have introduced other novel business models through a tiered system of open access publishing referred to as the *color system*. In this system, different open access colors—Diamond,¹¹ Gold,¹² and Green¹³—each represent a different copyright, payer, and access combination, allowing authors flexibility in choice of how their research becomes openly accessible.¹⁴ These models provide for open access research articles through a variety of

⁸ Swan, A. (2012). Policy Guidelines for the Development and Promotion of Open Access. UNESCO Digital Library. The United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000215863>

⁹ <https://www.govinfo.gov/content/pkg/USCODE-2020-title42/pdf/USCODE-2020-title42-chap79-subchapII-sec6623.pdf>

¹⁰ Borrego, Á., Anglada, L., & Abadal, E. (2020). Transformative agreements: Do they pave the way to open access? *Learned Publishing*, 34(2), 216–232. <https://doi.org/10.1002/leap.1347>

¹¹ Diamond OA: the publisher provides, without fees, immediate public access to the final published version, made freely available for anyone

¹² Gold OA: the publisher provides immediate public access to the final published version, made freely available for anyone, with the fee paid by either the author, their institution, or their funder as a publication charge

¹³ Green OA: free access to a version of the manuscript (not the final published version), self-archived by the author in a repository, with no author fee

¹⁴ Gadd, E., Fry, J., & Creaser, C. (2018). The Influence of Journal Publisher Characteristics on Open Access Policy Trends. *Scientometrics*, 115(3), 1371–1393. <https://doi.org/10.1007/s11192-018-2716-8>

mechanisms either through publisher systems paid for by the author (or the author's institution) or uploaded by the author to a freely accessible online digital repository. The scholarly publishing industry has also introduced alternative models such as article processing charges (APC) whereby authors and institutions pay publishers a fee to make research articles available in open access, peer-reviewed journals. Publishers prefer "Gold" open access models with their associated APCs, as they represent revenue growth opportunities.¹⁵ However, at least one study concluded that a transition towards open access involving a mixture of traditional subscription models along with a "Green" open access model would represent optimal economic benefits to the American public. Federal agencies, and their public access policies, do not make preferential recommendations for specific business models to provide public access to the scholarly publications that they fund and their researchers produce. OSTP proposes that remaining agnostic on these models would allow opportunities for business model innovation in this space while supporting zero-embargo public access to federally funded research publications and results.¹⁶

Third, online platforms that share and disseminate scholarly knowledge have grown in capacity and scope, with an increasing use of "pre-print" repository services to share pre-peer reviewed and final "post-print" peer-reviewed manuscripts alike.¹⁷ While a pre-print is typically considered to be a version of a scholarly manuscript that is early in the development process ahead of formal peer-review, many pre-print repositories have capacity for sharing peer-reviewed manuscripts and the full record of manuscript versions throughout the review and revision process as well.^{18, 19}

Finally, publishers across disciplines have demonstrated the ability to pivot quickly towards immediate open access models, particularly in response to several public health crises. This includes during times of rapid investment in research and development and greater demand for rapid publishing of findings and data. In the wake of the COVID-19 crisis, academic publishers voluntarily removed the 12-month publication embargo²⁰ and used various open access models to make research immediately available to the public just as they had done in years past to

¹⁵ Pollock, D. P. and A., & Michael, A. (2020, October 19). Open Access Market Sizing Update 2020. Delta Think. Retrieved from <https://deltathink.com/news-views-open-access-market-sizing-update-2020/>

¹⁶ Bernius, S., Hanauske, M., Dugall, B., & König, W. (2013). Exploring the Effects of a Transition to Open Access: Insights from a Simulation Study. *Journal of the American Society for Information Science and Technology*, 64(4), 701–726. <https://doi.org/10.1002/asi.22772>

¹⁷ Flanagin, A., Fontanarosa, P. B., & Bauchner, H. (2020). Preprints Involving Medical Research—Do the Benefits Outweigh the Challenges? *JAMA*, 324(18), 1840. <https://doi.org/10.1001/jama.2020.20674>

¹⁸ <https://www.nsf.gov/pubs/2016/nsf16009/nsf16009.jsp>

¹⁹ <https://web.archive.org/web/20110830003949/http://www.crossref.org/02publishers/glossary.html>

²⁰ <https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/03/COVID19-Open-Access-Letter-from-CSAs.Equivalents-Final.pdf>

respond to other emerging infectious diseases, such as Ebola virus disease and Zika fever.^{21,22} As a result, research and data flowed effectively, new accessible insights super-charged the research environment and the rate of discovery, and translation of science soared. The pandemic exception to the research embargo demonstrated how lives can be improved and saved as the result of immediately-available scientific results. As OSTP reported to Congress in November 2021, this last case—the public access changes compelled by wide-ranging crises—illustrates the critical need for an updated federal public access policy that makes federally funded research articles and data immediately available upon publication. As the report stated, “the COVID-19 pandemic highlighted the importance of open science to society and urgent national priorities and demonstrated new paths for innovation.”²³ The global and interconnected emergencies beginning in 2020 were a window into the power of immediate public access to federally funded research, and the ways it can accelerate scientific discovery and translation of science into practice and policy. The approach publishers voluntarily took to COVID-19 must not be an exception possible only in times of crisis; it must instead be the new norm for all federally funded scientific research.

Most importantly, the scholarly publishing industry has undergone a comprehensive shift toward digital content, with nearly 90 percent of all science, technology, and medicine publications now produced in digital format.²⁴ As costs associated with printing have decreased, remaining publisher costs are now primarily associated with staffing and services related to moving the article from submission to publication, such as editing or proofreading. Evidence reported in a cost-benefit analysis of moving to a zero-embargo policy for research publications funded by United Kingdom Research and Innovation finds that “marginal costs of publishing have fallen to close to zero” as a result of the digital transformation to online publishing.²⁵ In part, this shift has resulted from improvements in commercial cost and efficiency of hard digital data storage, which has fallen from roughly \$0.05 (five cents) per gigabyte in 2013 to roughly \$0.01 (one cent) today. Additionally, distributed storage systems (i.e., 'the cloud') that have recently come to market in the last decade make throughput,

²¹ Global Scientific Community Commits to Sharing Data on Zika. Wellcome. (2016, February 10). Retrieved from <https://wellcome.org/press-release/global-scientific-community-commits-sharing-data-zika>

²² Arrizabalaga, O., Otaegui, D., Vergara, I., Arrizabalaga, J., & Méndez, E. (2020). Open Access of COVID-19-Related Publications in the First Quarter of 2020: A Preliminary Study Based in Pubmed. *F1000Res*, 9, 649. <https://doi.org/10.12688/f1000research.24136.2>

²³ Lander, E. S. (2021, November 5). Public Access Congressional Report, 2021. The Executive Office of the President, Office of Science and Technology Policy. Retrieved from https://www.whitehouse.gov/wp-content/uploads/2022/02/2021-Public-Access-Congressional-Report_OSTP.pdf

²⁴ International Association of Scientific, Technical, and Medical Publishers. (2021). STM Global Brief 2021 – Economics & Market Size. Retrieved from https://www.stm-assoc.org/2021_10_19_STM_Global_Brief_2021_Economics_and_Market_Size.pdf

²⁵ United Kingdom Research and Innovation. (2021, August 6). Economic Implications and Benefits of Updated UKRI Open Access Policy. UKRI. Retrieved from <https://www.ukri.org/publications/economic-implications-and-benefits-of-updated-ukri-open-access-policy/>

storage, and access simpler and affordable and improve the equitability stakes for institutions and individuals that do not have access to in-house storage.

Other technological and policy advances in the last decade that support public access include the advent of data translators for improved interoperability between repositories, a more robust data and information science federal workforce, development and adoption of linking structures like digital persistent identifiers that enable open research systems, the development of application programming interfaces between data repositories, and improved interagency coordination and cooperation to share digital resources through policy alignment.

Restrictions on public access to federally funded research results and publications, such as the 12-month publication embargo, create inequities between the taxpayers funding the research, the public at large, academic institutions, and the scientific community. Those with greater financial means or specialized access can benefit sooner from research publications and results than those without such resources. The benefits which researchers provide to taxpayers through their publications—and which taxpayers fund with their tax dollars—are delayed in delivery through such restrictions. Moreover, the embargo creates a perverse incentive for individuals without means to access federally funded publications behind paywalls to undertake circumvention strategies that violate copyright.²⁶ Lifting the embargo will likely have immediate benefits by reducing these inequities at a relatively small cost.

While there are budgetary implications of implementation that federal agencies must consider—including some which would require Congressional appropriations—federal agencies are largely in a place of technological readiness for improved public access to the research they fund on behalf of the American public. A recent study published in *Nature* suggests that around 5 percent of research expenditures would be appropriate to fund long-term management of public access to research results and data. Specific appropriations would be contingent upon individual federal agency missions and their existing resources.²⁷

Modernizing public access policies to remove the 12-month publication embargo would deliver research results to all Americans quickly, equitably, and accessibly by leveraging the cultural, economic, and technological advances described above. In the balance of this report, OSTP provides Congress an analysis of the economic landscape of the public access policy for federally funded research. Using the most current and available data, OSTP describes the ways American taxpayers subsidize publication costs of federally funded research publications under the current policy, the underlying financial implications of these costs, and the likely results of a change to an immediate public access policy by removing the 12-month publication embargo. The following sections describe the state of knowledge about, and OSTP estimations of, the costs and benefits of such a change

²⁶ McCallum, J. C. (2022, May 15). Disk Drive Prices 1955+. JCMIT. Retrieved from <https://jcmitt.net/diskprice.htm>

²⁷ Mons, B. (2020, February 25). Invest 5% of Research Funds in Ensuring Data are Reusable. *Nature News*. Retrieved from <https://www.nature.com/articles/d41586-020-00505-7>

Economic Analysis

American taxpayers support academic publishing costs in at least five direct and indirect ways:

Agencies fund the research. Taxpayers directly support research and development funding agencies, which in turn, provide financial awards to researchers, who produce research results in scholarly publications.

Researchers pay to publish their articles. A researcher can generally use their award “allowable costs” to fund the per-article costs of publication in subscription-based or open access journals.

Libraries pay for journal subscriptions. Taxpayers indirectly fund libraries to pay for access to journal content through journal subscriptions. These funds are included as “indirect costs” charged against federal awards.

Researchers dedicate unpaid time to review the research articles. Taxpayers indirectly provide financial support to researchers, whose salaries often come, in part, from federal research awards, who regularly serve as uncompensated peer reviewers and editorial board members on academic journals.

Americans pay direct costs to access content behind paywalls. Additionally, individuals who do not have specialized access to scholarly publications, such as through institutional support of research libraries, must pay out-of-pocket for access to federally funded research publications subject to the 12-month embargo.²⁸

For their part, publishers provide a range of services to taxpayers through their intellectual property and financial agreements with individuals, researchers, and institutions. These services include management of peer-review; editorial, and copyright processes; public access curation of the final peer-reviewed version of scholarly publications, including some that interface directly with federally funded repositories such as PubMed, housed at the NIH and made publicly available after the 12-month publication embargo has ended; print material; tracking metrics; advertising and press coverage for research; support for scholarly conflict resolution, support for professional associations; and, in some cases, prestige.

Additional research, and more extensive and detailed data from the publishing industry, scholarly societies, and large and small research institutions alike, is needed to determine the full scope of the economic impact of a zero-embargo public access model. These data limitations are described in the next section, which is subsequently followed by OSTP’s analysis.

Limitations on Data

There is limited public information available on the exact per-article publication costs and revenues incurred by the publishing industry because most publishers consider this type of data

²⁸ Publons Global State of Peer Review Report. Publons. (2018). Retrieved from <https://publons.com/community/gspr#open-elg-form-slider-DLGSPR>

to be proprietary information.²⁹ Few publishers are publicly traded companies with SEC filing requirements. Additionally, many publishers hold non-disclosure agreements with their subscribing libraries that limit those institutions from releasing details on contracts with specific publishers. However, data from United States federal agencies, indirect market indicators, reports from institutions and organizations, and cost comparisons with peer agencies in other countries facilitate prudently conservative estimates of the economic landscape. Additional data on the impact on other stakeholders and the general public is also limited. These data limitations have been previously noted in reports by the Government Accountability Office and the Scholarly Publishing and Academic Resources Coalition (SPARC).^{30,31} The basis for the evaluation provided in the balance of the report reflects these data limitations which may affect generalizability.

Publication Expenditures for Federally Funded Research

Just six federal agencies—the National Institutes of Health (NIH), National Science Foundation (NSF), Department of Defense (DOD), Department of Energy (DOE), Department of Agriculture (USDA), and NASA—account for more than 94 percent of the approximately \$150 billion in funds obligated to federal research and development. Around \$85 billion of these obligations were committed in 2020 to research, representing a significant source of funding in research and development that results in scientific publications. Between 2013 and 2020, universities were awarded on average about 42 percent of the federal government’s research obligations. Federal intramural research—defined as science conducted by the federal scientific workforce—constituted about 30 percent of total research obligations. The balance (28 percent) was made up by other entities, including private companies, individuals, and research institutes. While only a few federal agencies support the total federal research and development funding, virtually all federal agencies have either some such obligations or otherwise use federally funded science in their policy, regulatory, and decision-making capacities. Collectively, NSF estimates all federal expenditures on basic research to equate to roughly 40 percent of the total spending on all basic research in the United States, inclusive of all sources of support including non-governmental sources.^{32,33}

²⁹ Aspesi, C. (2022). Setting the Default to Open in Research and Education. SPARC. Retrieved July 18, 2022, from <https://sparcopen.org/wp-content/uploads/2022/04/Public-Research-and-Publisher-Profits.docx.pdf>

³⁰ Aspesi, C. 2022. Public Research Benefits and Publisher Profits. SPARC. Retrieved from: <https://sparcopen.org/wp-content/uploads/2022/04/Public-Research-and-Publisher-Profits.docx.pdf>

³¹ Campbell, S., & Shirley, C. (2018, June 21). Estimating the long-term effects of federal R&D spending: CBO's current approach and research needs. Congressional Budget Office. Retrieved from <https://www.cbo.gov/publication/54089>

³² National Center for Science and Engineering Statistics (NCSES). 2022. Federal Funds for Research and Development: Fiscal Years 2020–21. NSF 22-323. Alexandria, VA: National Science Foundation. Available at <https://nces.nsf.gov/pubs/nsf22323/>.

³³ Robbins, C., Khan, B., & Okrent, A. (2020, January 15). The State of U.S. Science and Engineering 2020, Science & Engineering Indicators. National Science Foundation. Retrieved from <https://nces.nsf.gov/pubs/nsb20201/u-s-r-d-performance-and-funding#:~:text=Although%20the%20levels%20of%20federal,from%2025%25%20to%2022%25>

According to NSF data, the United States accounted for only about 16 percent of the global output of science and engineering journal articles in 2020, with American investigators contributing roughly 464,000 of the 2.9 million total peer reviewed articles published worldwide. The Organisation for Economic Co-operation and Development (OECD) additionally estimates that United States scientists contributed 626,295 science and technology publications in 2020.³⁴ While there are limited data on how many of these publications were supported by federal funds, taking the 42 percent of research that the United States government funds as a proportional basis, OSTP estimates that between 195,000 and 263,000 articles were federally funded in 2020.

A recently published report by the Scholarly Publishing and Academic Resources Coalition (SPARC) showed the average cost to publish a research article from all funding sources falls between \$2,000 and \$3,000 dollars.³⁵ In their report, SPARC estimates that this range captures the preponderance of the variance around publication costs for American science and engineering research. These figures most likely represent *revenue per article* and not the production cost per se as the totals include sunk costs of marketing, investments in infrastructure, and other costs not typically attributed solely as costs of sale or production. However, revenue estimates based on available data on prices of journal content from Wiley and Elsevier are concurrent with this figure, at roughly \$2,300 and \$3,000 respectively.³⁶ Because publishers seek revenue parity between publication models, together with the consistency in estimates from available data, the relationship between the two likely represents relatively stable values.

Data are limited on the costs of production of an article to a publisher. Recent estimates from the literature on the cost of producing an article range from \$200 to \$1,000, with the high end representing a selective, prestigious journal with a 90 percent rejection rate.³⁷ Over the last decade, publishers have seen total revenues grow well in excess of the rate of inflation (sometimes as high as 110 percent of inflation).³⁸ A recent article estimates that the average total profit expectation for a representative article by a publisher of scholarly articles to be about \$1,200, although that is conservative relative to estimates made by SPARC, which estimates profits between \$1,500 and \$2,000 per article for publishers. Comparatively, the “production” cost of depositing a federally funded research article into a free public access

³⁴ <https://www.oecd.org/sti/scoreboard.htm#publications>

³⁵ Aspesi, C. (2022). Setting the Default to Open in Research and Education. SPARC. Retrieved July 18, 2022, from <https://sparcopen.org/wp-content/uploads/2022/04/Public-Research-and-Publisher-Profits.docx.pdf>

³⁶ Elsevier. (2022, July 12). Article Publishing Charge (APC) Price List. Wiley Journal Price List. Wiley Online Library. (2022). Retrieved from https://onlinelibrary.wiley.com/pb-assets/PriceLists/Wiley_journals_price_list-1646045161317.xls

³⁷ Grossmann, A., & Brembs, B. (2021). Current Market Rates for Scholarly Publishing Services. F1000Research, 10, 20. <https://doi.org/10.12688/f1000research.27468.2>

³⁸ Shu, F., Mongeon, P., Haustein, S., Siler, K., Alperin, J., & Larivière, V. (2018). Is it Such a Big Deal? On the Cost of Journal Use in the Digital Era. *College & Research Libraries*, 79(6), 785–798. <https://doi.org/10.5860/crl.79.6.785>

repository can be, conservatively, as low as \$15 and even lower under a federally owned and managed repository such as PubMed.³⁹

Notably, costs associated with publishing an article can be charged against contracts, grants, and research budgets associated with federally funded research awards. Several federal agencies, including NSF and NIH, currently permit including publication costs in allowable expenses. An expansion of this allowance by all federal agencies with research and development budgets that support scholarly publications would improve public access policy implementation and help to control costs by offsetting any new financial burdens on authors. Most federal agencies that fund scientific research currently do not explicitly set aside dedicated funding for these costs and do not track such expenditures. One example is NIH, which allows for researchers to include funds as allowable expenses although they do not track such expenditures post-award. However, using data from the NIH, OSTP estimates that per-article publication charges (for subscription and open access journals) accrue to approximately \$150-200 million per year for NIH-funded research (representing on average about 0.5 percent of the total annual NIH research and development budget).

Assuming proportionality with the research and development budgets of the other major federal funders, together with the estimated annual federally funded publications (195,000 to 263,000), and the range of estimates for per-publication costs (\$2,000 to \$3,000), OSTP estimates that the total cost to the American taxpayer through these investments accrues annually on average to between roughly \$390 million on the low end and \$789 million on the high-end. This range of costs is relatively small in comparison to the billions of dollars invested each year in research by American taxpayers, at less than half a percent, on average.

Library Expenditures for Public Access

The vast majority of expenditures on public access publications for federally funded research are absorbed by research libraries. Average individual research library expenditures on public access resources range greatly, from around \$65,000 to over \$2.5 million depending on the size, mission, and budget of the institution (which also vary widely from \$10 million to \$100 million).⁴⁰ These investments include transitional agreements, article processing charges, membership fees with open access journals, institutional repositories, and open access monograph subscriptions or funding. The Association of Research Libraries estimates research library expenses in Fiscal Year 2021-2022 dedicated to open access range between 0.2 and 11 percent with a median of 1.45 percent of their budgets. It is predominantly through contracts with research libraries that publishers monetize the products of federally funded research either through multi-year subscription or through transformative agreements with these

³⁹ Schopf, J. and Boukacem-Zegmouri, C. (2017) Assessing the Return on Investments in Grey Literature for Institutional Repositories. <https://doi.org/10.1515/9783598441493.2.227>

⁴⁰ Ruttenberg, J. & Vitale, C.R.H. ARL United States Academic Member OA Publishing Expenditures FY 2021-2022. Washington, DC, Association of Research Libraries, 2022

institutions—some offering immediate access for library members to all journal content regardless of funding mechanism of individual scholarly work through these contracts.

Several studies have estimated the cost implications of switching from subscription-based models to various transformative, hybrid, or other open access models.⁴¹ In general, the literature reflects broad consensus that large research-intensive universities would pay more on an annual basis under a fully open access model because such models generate large numbers of articles that would accrue article processing charges, whereas universities conducting a lower rate of research would pay less. However, the University of California (UC) system reports that it reached a landmark multi-publisher agreement for a net-zero year-over-year cost of switching from a subscription to an open access model, demonstrating that the published model assumptions may not accurately reflect real-world market responses to increased public access.⁴² Many research libraries are already engaged in adopting their own open access policies to better support their constituents and expand the global reach of their institutions' research findings.⁴³ As recently as March 2021, the University of California system, whose researchers produce nearly 10 percent of United States academic publications, and with more than a dozen public research libraries, negotiated a single contract worth around \$12 million with Elsevier for providing open access publications under a transformative agreement.⁴⁴ This contract resulted directly from the UC's adoption of an open access policy that required immediate access to published research by their researchers.⁴⁵ This shift set an important

⁴¹ Borrego, Á., Anglada, L., & Abadal, E. (2020). Transformative agreements: Do they pave the way to open access? *Learned Publishing*, 34(2), 216–232. <https://doi.org/10.1002/leap.1347>; Shu, F., Mongeon, P., Haustein, S., Siler, K., Alperin, J., & Larivière, V. (2018). Is it Such a Big Deal? On the Cost of Journal Use in the Digital Era. *College & Research Libraries*, 79(6), 785–798. <https://doi.org/10.5860/crl.79.6.785>; Robinson-Garcia, N., Costas, R., & van Leeuwen, T. N. (2020). Open Access Uptake by Universities Worldwide. *PeerJ*, 8. <https://doi.org/10.7717/peerj.9410>; Campbell, C., Dér, Á., Geschuhn, K., & Valente, A. (2022, July 5). How are Transformative Agreements Transforming Libraries? IFLA Repository. Retrieved from <https://repository.ifla.org/handle/123456789/1973>; Schlak, T., & Macklin, A. (2022). Open Access Overtaking Academic Library Leadership: Staying Ahead of the Organisational Dynamics an Increasingly Open Future May Bring. *New Review of Academic Librarianship*, 28(2), 117–124. <https://doi.org/https://doi.org/10.1080/13614533.2022.2079539>

⁴² University of California. (2022, June 7). UC Publisher Relationships, Press room. Office of Scholarly Communication. Retrieved from <https://osc.universityofcalifornia.edu/uc-publisher-relationships/press-room/>

⁴³ AIP Publishing. (2022, June 10). Open Access Advocacy is High, Despite Pressures on Librarians. *Research Information*. Retrieved from <https://www.researchinformation.info/premium-access/7/open-access-advocacy-high-despite-pressures-librarians>

⁴⁴ University of California. (2021). 2021 University of California Accountability Report. *Accountability Report: Research*. Retrieved from <https://accountability.universityofcalifornia.edu/2021/chapters/chapter-9.html>; Elsevier. (2021, March 16). University of California and Elsevier Sign Ground-Breaking Transformative Agreement. *Elsevier Press Releases*. Retrieved from <https://www.elsevier.com/about/press-releases/corporate/university-of-california-and-elsevier-sign-ground-breaking-transformative-agreement>; University of California. (2021, March 16). UC Secures Landmark Open Access Deal with World's Largest Scientific Publisher. *California Digital Library*. Retrieved from <https://cdlib.org/cdlinfo/2021/03/16/uc-secures-landmark-open-access-deal-with-worlds-largest-scientific-publisher/>

⁴⁵ University of California. (2022, March 16). UC and Elsevier. Office of Scholarly Communication. Retrieved from <https://osc.universityofcalifornia.edu/uc-publisher-relationships/uc-and-elsevier/>

precedent, demonstrating the industry's capacity to absorb major shifts in public access policies and negotiate agreements that are agreeable to both parties. In fact, many large, well-resourced research libraries have negotiated transformative agreements with publishers, including Cambridge University Press, Wiley, Elsevier, and the American Chemical Society, among others.⁴⁶ Smaller institutions which may not be as well-resourced as their larger counterparts benefit from open access as it delivers research publications to their members.

Another important precedent comes from the 2020 agreement between Wiley Publishing and universities in the United Kingdom (UK). The agreement allows for a four-year read-and-publish deal, which permits UK institutions to access Wiley's journal portfolio for an undisclosed fee and grants researchers at UK universities the ability to publish their research as open access articles in all Wiley journals at no direct cost to them.⁴⁷ It is expected that this deal will increase the number of articles UK researchers produce as open access publications from 27 percent to 85 percent within the first year, with the potential to reach 100 percent by the end of 2022. Wiley is negotiating or has negotiated other comprehensive agreements with consortia in Austria, Finland, Germany, Hungary, Netherlands, Norway, and Sweden. Wiley's 2021 annual report to investors cites such agreements as a potential source of future growth in revenue.⁴⁸

Impact of Change to Zero-Embargo Public Access

Updating federal agency policies to require immediate public access to federally funded research results would be a critical step in ensuring the continued economic, social, and scientific advantage of American investment in research and development today and into the future. Immediate access to federally funded research would lower barriers to accessing science, accelerate discovery and translation, and strengthen scientific integrity through greater transparency.

The potential economic costs of a change in federal public access policy toward immediate public access are fewer and less varied than the economic benefits. These potential costs include increased fees to publish (i.e., through the use of article processing charges) should publishers adopt greater fidelity to such business models, increased need for federal expenditure on public access policy compliance, and direct effects of lower revenues for some scholarly publishers and societies. The societal and economic benefits of a change in federal policy toward immediate public access to federally funded research results greatly exceed costs.

⁴⁶ Borrego, Á., Anglada, L., & Abadal, E. (2020). Transformative agreements: Do they pave the way to open access? *Learned Publishing*, 34(2), 216–232. <https://doi.org/10.1002/leap.1347>

⁴⁷ Wiley. (2020). Open Access Agreement for Authors at Eligible UK Institutions. Open Access for Authors in the UK. Retrieved from <https://authorservices.wiley.com/author-resources/Journal-Authors/open-access/affiliation-policies-payments/jisc-agreement.html>

⁴⁸ Wiley Financials Annual Reports. Annual Reports. (2021). Retrieved from <https://investors.wiley.com/financials/annual-reports/default.aspx>

Effects on Scholarly Publishing

An update to federal public access policy would likely affect the scholarly publishing industry and its practice. At present, more than half of the 8.2 million articles deposited into NIH PubMed to comply with the NIH Public Access Policy are available immediately at the time of publication, despite the policy allowing an embargo period of up to 12 months.⁴⁹ Recognizing that the global scholarly publishing industry is already in this active transition toward greater public access through the open access movement, any change in federal policy is likely to result in some downward pressure on publishers to adapt business models.

Consistent with these trends, the International Association of Scientific, Technical, and Medical Publishers (STM) estimates that by 2024 open access journal revenue will represent between 7 and 9 percent of the market and constitute around \$1.1 billion of all scholarly publication outputs.⁵⁰ The growth in open access publishing has also outpaced the underlying market, with a revenue compound annual growth rate estimated to be in the range of 12.5 percent between 2019 and 2021.⁵¹ OSTP anticipates that this growth would further accelerate under a zero-embargo public access policy as publishers already anticipate growth in their open access journal portfolios.

A shift in federal policy would also likely impact smaller not-for-profit publishers and those supporting scholarly and professional societies. Professional and scholarly societies often use surplus revenues (i.e., profit equivalent) from scholarly journal publishing to support other activities, including hosting conferences and seminars, public education and lobbying, and providing travel and research grants.⁵² Using data from the United Kingdom, the Research Information Network estimated the average profits in 2008 at 18 percent of revenues per publication, equivalent to £600 for for-profit publishers and £315 in surpluses for not-for-profit publishers. It is difficult to estimate how a shift in federal public access policy would affect these figures, given that most data available is on for-profit publishers.⁵³ Assuming market conditions slightly disadvantage not-for-profit publishers because they are smaller and hold less

⁴⁹ U.S. National Library of Medicine. (2022). PubMed Central National Library of Medicine. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/>

⁵⁰ Albee, B., & Bosch, S. (2021, April 27). The New Abnormal: Periodicals Price Survey 2021. Library Journal. Retrieved from <https://www.libraryjournal.com/story/The-New-Abnormal-Periodicals-Price-Survey-2021>; Pollock, D. P. and A., & Michael, A. (2020, October 19). Open Access Market Sizing Update 2020. Delta Think. Retrieved from <https://deltathink.com/news-views-open-access-market-sizing-update-2020/>

⁵¹ International Association of Scientific, Technical, and Medical Publishers. (2021). STM Global Brief 2021 – Economics & Market Size. Retrieved from https://www.stm-assoc.org/2021_10_19_STM_Global_Brief_2021_Economics_and_Market_Size.pdf

⁵² Thorn, S., Morris, S., & Fraser, R. (2009). Learned Societies and Open Access: Key Results from Surveys of Bioscience Societies and Researchers. *Serials: The Journal for the Serials Community*, 22(1), 39–48. <https://doi.org/10.1629/2239>

⁵³ Activities, costs and funding flows in the scholarly communications system in the UK Report. Research Information Network. (2008, May). Retrieved from <https://docplayer.net/15594627-Activities-costs-and-funding-flows-in-the-scholarly-communications-system-in-the-uk-report-commissioned-by-the-research-information-network-rin.html>

market leverage, it is possible that any loss in revenue resulting from a zero-embargo policy would disproportionately affect their surpluses relative to those of their for-profit counterparts. However, the same downward pressure to adapt to new business models would apply to not-for-profit publishers and similar innovation in business models in response to policy change would be expected. Additionally, since 2008, publishers have experienced increased profit margins. Moreover, according to SAGE Publications, there is no evidence that a zero-embargo policy would negatively affect subscriptions, which is the primary mode of funding for society publishers.⁵⁴

Likewise, while OSTP estimates that federal funds currently only support between 16 and 18 percent of research resulting in scholarly publications, a shift toward immediate public access would likely increase the use of open access and related models by publishers, resulting in a rise in the market share of global scholarly publishing output produced through such mechanisms. Federally funded investigators who publish their research results would likely also be impacted by a shift toward a zero-embargo publication policy. In addition to additional administrative processes related to new compliance mandates that agencies may issue, any economic burden falling on individual researchers resulting from a zero-embargo publication policy would likely be offset by the greater benefits of increased visibility, consumption, and potential impact that their research would realize. Many studies show that articles published under an open access model would offer greater impact through better readership and generate more citations than subscription-based articles.^{55,56,57}

In assessing these benefits to researchers and the public, the Congressional Budget Office (CBO) used a bibliometric approach to estimate the return-on-investment of federally funded research publications through the lens of a direct link between federal funding and research outputs.⁵⁸ That study concluded there was insufficient data to make inferences on such links and that more research would be needed on the matter. It is likely that the lack of data referenced by CBO was in part due to poor funding disclosure compliance in research

⁵⁴ Grove, J., Pells, R., & Ross, J. (2019, April 23). Open Access: 'no evidence' that Zero Embargo Periods Harm Publishers. Times Higher Education . Retrieved July 18, 2022, from

<https://www.timeshighereducation.com/news/open-access-no-evidence-zero-embargo-periods-harm-publishers>

⁵⁵ Langham-Putrow, A., Bakker, C., & Riegelman, A. (2021). Is the open access citation advantage real? A systematic review of the citation of open access and subscription-based articles. PloS one, 16(6), e0253129.

<https://doi.org/10.1371/journal.pone.0253129>

⁵⁶ Sotudeh, H., Estakhr, Z. (2018) Sustainability of open access citation advantage: the case of Elsevier's author-pays hybrid open access journals. Scientometrics 115, 563–576. <https://doi.org/10.1007/s11192-018-2663-4>

⁵⁷ OACA List. SPARC Europe. (2017, March 4). Retrieved from <https://sparceurope.org/what-we-do/open-access/sparc-europe-open-access-resources/open-access-citation-advantage-service-oaca/oaca-list/>;

Piwovar, H., Priem, J., Larivière, V., Alperin, J. P., Matthias, L., Norlander, B., Farley, A., West, J., & Haustein, S. (2018). The state of OA: A large-scale analysis of the prevalence and impact of open access articles. PeerJ, 6. <https://doi.org/10.7717/peerj.4375>

⁵⁸ Campbell, S., & Shirley, C. (2018, June 21). Estimating the long-term effects of Federal R&D spending: CBO's current approach and research needs. Congressional Budget Office. Retrieved from

<https://www.cbo.gov/publication/54089>

publications and the lack of immediate access to federally funded publications. A change in federal policy to remove the embargo would improve tracking and reporting of the research outputs that Federal agencies fund by making publications more findable and accessible. While a direct link between publications and return on investment is difficult to ascertain, the annual rate of financial return on investment of federally funded research and development estimated in a working paper at the National Bureau of Economic Research (NBER) to be between 25 percent and 100 percent.⁵⁹

Effect on Society

Equally important to the economic impact is the rate of social returns on research and development investments.⁶⁰ Social returns involve the societal goods and improvements to quality of life that result from direct financial investment in research. These research benefits can be traced across society, and include outcomes such as improved longevity, greater diversity and representative participation in innovation, improved air and water quality, improved health outcomes, reduced economic inequality, and greater food security, among many other benefits.⁶¹ The NBER study has also studied the social returns on federal research investments and concludes that these returns are likely comparably as high as—or even higher than—the direct financial returns.⁶² The NBER study concludes: "Even under very conservative assumptions, it is difficult to find an average return below \$4 per \$1 spent. Accounting for health benefits, inflation bias, or international spillovers can bring the social returns to over \$20 per \$1 spent, with internal rates of return approaching 100%." These figures represent substantial social benefits and are more quickly and equitably realized when the barriers to accessing research, such as publication embargos, are removed.

Importantly, the NBER study assessed several models to measure social returns of delaying translation from research to practice, concluding that longer the delay in translation of basic research led to lower return on investment and an immediate translation of results in the highest benefit with an estimated average of 67 percent annual social return on investment. Research publications and data are essential to the translational process; by removing the delay of the embargo and providing results more quickly, the translational process happens more efficiently and individuals, communities, and industry can sooner realize important societal benefits.

⁵⁹ Hall, B.H., Mairesse, J. & Mohnen, P. (2009). Measuring the Returns to R&D. NBER Working Paper. DOI: <https://www.doi.org/10.3386/w15622>

⁶⁰ Tennant, J. P., Waldner, F., Jacques, D. C., Masuzzo, P., Collister, L. B., & Hartgerink, C. H. (2016). The Academic, Economic and Societal Impacts of Open Access: An Evidence-Based Review. *F1000Research*, 5, 632. <https://doi.org/10.12688/f1000research.8460.3>

⁶¹ Jones, B. (2022). The Social Value of Science and Innovation Investments and Sources of Breakthroughs. *The Reporter*. No. 1, March, Retrieved from: <https://www.nber.org/reporter/2022number1/social-value-science-and-innovation-investments-and-sources-breakthroughs>

⁶² Jones, B.F. & Summers, L.H. A Calculation of the Social Returns to Innovation. (2020). NBER Working Paper. Retrieved from: <https://www.nber.org/papers/w27863>

OSTP also notes that a shift to zero-embargo for federally funded research would effectively lower the cost of access to scientific research and lead to faster knowledge diffusion across society.⁶³ The rapid delivery of research to the public under a zero-embargo policy also benefits educators and ensures that students have access to the latest state of the science in course curricula.⁶⁴ In addition to these research and development gains, other benefits include improved capabilities of plagiarism detection systems to identify academic dishonesty and improve scientific integrity; removing a perverse incentive to pirate embargoed publications by individuals without the ability to pay for access during the current 12-month embargo, and facilitating greater reproducibility.⁶⁵

Some social costs would likely be associated with a change in public access policy. These may include complications for early-stage investigators, who are less likely to have funding available than their more senior counterparts, but under greater pressure to publish their research more frequently.⁶⁶ Academic faculty have expressed concerns that open access publications pose a barrier to their tenure and promotion packages.⁶⁷ There are also concerns that funds available to pay rising APCs create a two-tiered system between funded and unfunded researchers where only funded researchers can publish their research in open access journals.^{68,69} Similarly, academic institutions with fewer resources, including minority serving institutions, may find it difficult to negotiate similar contracts with publishers to support open access publishing as their larger counterparts.⁷⁰ While the impact on minority serving institutions of a shift to zero-embargo is difficult to assess given the limited data available, a recent study indicates that

⁶³ Tennant, J. P., Waldner, F., Jacques, D. C., Masuzzo, P., Collister, L. B., & Hartgerink, C. H. (2016). The Academic, Economic and Societal Impacts of Open Access: An Evidence-Based Review. *F1000Research*, 5, 632. <https://doi.org/10.12688/f1000research.8460.3>

⁶⁴ Strand, J. F., & Brown, V. A. (2019). Publishing Open, Reproducible Research with Undergraduates. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.00564>

⁶⁵ Turnitin partners with core, the world's leading aggregator of Open Access Research Articles. Turnitin. (2019, May 19). Retrieved from <https://www.turnitin.com/press/turnitin-partners-with-core>; Björk, B.-C. (2017). Gold, Green, and Black Open Access. *Learned Publishing*, 30(2), 173–175, <https://doi.org/10.1002/leap.1096>; Green, T. (2017). We've failed: Pirate black open access is trumping green and gold and we must change our approach. *Learned Publishing*, 30(4), 325–329. <https://doi.org/10.1002/leap.1116>; Bohannon, J. (2016). Who's downloading pirated papers? Everyone. *Science*, 352(6285), 508–512. <https://doi.org/10.1126/science.352.6285.508>;

⁶⁶ Flaherty, C. (2017, June 6). Analysis suggests age bias at play in reduction of Federal funding to early-career researchers. Retrieved from <https://www.insidehighered.com/news/2017/06/06/analysis-suggests-age-bias-play-reduction-federal-funding-early-career-researchers>

⁶⁷ Odell, J., Coates, H., & Palmer, K. (2016). Rewarding open access scholarship in promotion and tenure: Driving Institutional Change. *College & Research Libraries News*, 77(7), 322–325. <https://doi.org/10.5860/crln.77.7.9518>

⁶⁸ Ross-Hellauer, T., Reichmann, S., Cole, N. L., Fessler, A., Klebel, T., & Pontika, N. (2022). Dynamics of cumulative advantage and threats to equity in open science: a scoping review. *Royal Society open science*, 9(1), 211032. <https://doi.org/10.1098/rsos.211032>

⁶⁹ <https://doi.org/10.1038/d41586-022-00724-0>

⁷⁰ HBCU Library Alliance. (2015). Expanding Library Support for Faculty Research in Historically Black Colleges and Universities. Retrieved from: <http://hbculibraries.org/images/FinalLibrarySurveyResults8-2015.pdf>

HBCU librarians have a favorable position on open access policies overall.^{71,72} Open access publications increase equitable and inclusive reach of science for all members of the scholarly community, including people from underrepresented groups, early stage investigators, and students and academic faculty at under-resourced institutions.

However, the concerns that such inequities would expand under a zero-embargo policy are important to consider and federal agencies' public access policies should be accompanied with support for protecting against any inequalities that might arise from a change toward a zero-embargo public access model. Some of these protections are already in place and more are in development. For instance, many federal agencies, including DOE, NIH, and NSF have launched programs aimed at awarding grants to support early-stage researchers as well as increasing the racial and gender diversity of award applicants and the scientific workforce.^{73,74,75} Other federal agencies have focused grantmaking efforts on leveling the playing field for minority serving institutions, including at colleges, museums, and libraries.^{76,77} Additionally, incentive structures to reward institutions for supporting open access publications and open science products produced by their faculty are increasing in number and have the support of many stakeholders across government, industry, and education, as recently reported by the National Academies of Science, Engineering, and Medicine.^{78,79}

While OSTP anticipates that such social costs might expand under a zero-embargo policy, considerable offsets—including the availability of more research available through public access at no cost, a greater number of grant and workforce development programs aimed at reducing inequalities in research, and the ability to charge publication costs to grants, awards, and contracts—would counteract their effect. OSTP expects that a change toward a zero-embargo public access policy would accelerate these incentives and further alleviate the concerns about social costs of such a change. On balance, OSTP estimates that the potential financial and social gains realized from increased access to federally funded research— by removing the 12-month publication embargo— greatly outweigh the potential costs.

⁷¹ Ross-Hellauer, T. (2022). Open science done wrong, will compound inequities. *Nature* 603, 363. <https://doi.org/10.1038/d41586-022-00724-0>

⁷² Crawford II, J. (2022). How HBCU libraries can help with ACEJMC standard 5. *Journalism at Historically Black Colleges and Universities*, 133–159. https://doi.org/10.1007/978-3-030-97501-2_9

⁷³ <https://beta.nsf.gov/funding/initiatives/broadening-participation>

⁷⁴ <https://extramural-diversity.nih.gov/guidedata/data>

⁷⁵ <https://www.energy.gov/articles/doe-awards-36-million-promote-equity-and-diversity-clean-energy-innovation>

⁷⁶ <https://ies.ed.gov/aboutus/diversity.asp>

⁷⁷ <https://imls.gov/grants/grant-programs>

⁷⁸ <https://www.nationalacademies.org/our-work/roundtable-on-aligning-incentives-for-open-science>

⁷⁹ Advancing open science practices: Stakeholder perspectives on incentives and disincentives. (2020). National Academies Press. <https://doi.org/10.17226/25725>; Roundtable on Aligning Incentives for Open Science. National Academies of Sciences, Engineering, and Medicine. (2022). Retrieved from <https://www.nationalacademies.org/our-work/roundtable-on-aligning-incentives-for-open-science>

Conclusion

This report has described the current state of federal access policies and laid out the potential economic impact and feasibility of updating policies to remove the 12-month embargo on federally funded research publications. The landscape of the scientific research enterprise has changed significantly in recent years, with a worldwide cultural and technological shift towards a more open, collaborative, and equitable model of conducting scientific activities. Scholarly publishing has moved with this shift, with nearly 90 percent of articles available in digital format and many available as open access publications. However, the 12-month publication embargo period represents a significant delay in the ability for scientists to share their research, industry to translate science into practice, and the American public to access the returns on their investments in science and technology. This sentiment was articulated by Senators Ron Wyden and Senator Ed Markey in their February 2022 letter to Dr. Alondra Nelson in her capacity as performing the duties of director of OSTP. The Senators noted: “To truly meet the magnitude of the research and innovation needs of today’s fast-paced, globalized world, including meeting the goals of the Cancer Moonshot, our nation needs a bold, comprehensive, and government-wide public-access policy guaranteeing rapid access for all federally funded research articles with broad re-use rights.”⁸⁰ Updating federal public access policies to provide immediate access to the research results they conduct and fund would answer this call.

The public access policy of the United States Government should benefit all sectors of society. Evidence demonstrates that many constituents are ready, willing, and able to remove the 12-month publication embargo on federally funded research: from the publication industry’s shifts to an open access model and other rapid changes to longstanding institutional policies during the COVID-19 response, to federal funding agencies’ incorporation of publication costs into grant and contract budgets, the new technological capabilities for online research sharing, and many new innovative models that the publishing industry has introduced to adapt to existing open access policies. Ultimately, a change in federal policy is unlikely to cause significant market disturbance as evidenced by the recent precedents mentioned in this report. Instead, our analysis indicates it could deliver extraordinary benefits for the American people and beyond.

⁸⁰ Wyden, R., & Markey, E. J. (2022, February 23). Letter to Deputy Director Nelson from United States Senators Wyden and Markey. United States Senate. Retrieved from <https://www.wyden.senate.gov/imo/media/doc/OSTP%2002232022.pdf>