

April 5, 2021



**Comment on:** Doc # 2020-27581

**Federal Register** / Vol. 86, No. 1 / Monday, January 4, 2021 / Proposed Rules

**Agency:** National Institute of Standards and Technology (NIST), United States Department of Commerce

**Docket identification:** 201207-0327

**Notice of proposed rulemaking:** Rights to Federally Funded Inventions and Licensing of Government Owned Inventions, 37 CFR 401 and 404

**Respondent:** Fred D. Ledley, M.D. Director, Center for Integration of Science and Industry; Professor, Departments of Natural & Applied Science, Management; Bentley University, Waltham, MA, 02452. Email: [fledley@bentley.edu](mailto:fledley@bentley.edu), Website: [www.bentley.edu/sciindustry](http://www.bentley.edu/sciindustry)

Our comments on the proposed rule changes are based on research at the Center for Integration of Science and Industry at Bentley University aimed at accelerating the translation of scientific discoveries for public value.<sup>1</sup> We make two arguments:

1. Proposed rule changes regarding limitations of march-in rights are inconsistent with government authority to consider pricing of products that benefit from “subject inventions” in the public interest and the objectives of Bayh-Dole.
2. The proposed rule changes limit mechanisms to provide taxpayers with a return on *their* investment in federally funded R&D.

### Ensuring taxpayers reap the benefits of federally funded research and receive a return on *their* investment in this research

The Executive Summary to the December 2018 “Green Paper” Return on Investment Initiative for Unleashing American Innovation<sup>2</sup> states: “*The U.S. innovation system is substantially fueled by the discoveries and inventions arising from federally funded R&D at the Nation’s universities, research institutes, and Federal Laboratories.*” The report further states that a focus of the initiative is to “...increase the taxpayers return on their investment in federally funded R&D.” (emphasis in original)

Our work recognizes the critical role played by the public sector as an “investor of first resort” in stimulating innovation and economic growth,<sup>3</sup> as well as the central role played by the Bayh-Dole Act of 1980 in operationalizing the transfer of federally funded inventions to industry for commercialization. We endorse the initiative’s recognition that public sector investments play a central role in stimulating innovation and the imperative of providing the public with a return on investment commensurate with the risk of these early-stage investments. In these comments, we argue that **the proposed rulemaking errs in weakening the already limited mechanisms by which the Bayh-Dole Act intends to advance the public interest and provide taxpayers with a return on *their* investment.**

## Proposed rule changes regarding limitations of march-in rights are inconsistent with government authority to consider pricing of products that benefit from “subject inventions” in the public interest and the objectives of Bayh-Dole

The Green Paper incorrectly states that march-in rights in the Bayh-Dole Act are triggered solely by “commercialization” (or non-commercialization) of the subject invention.<sup>4</sup> The Bayh-Dole Act clearly states that march-in rights involve steps to “...achieve practical application of the subject invention...” or “...alleviate health or safety needs that are not reasonably satisfied by the contractor, assignee, or their licensees.”<sup>5</sup> In the Act, the term “practical applications” requires “...that its benefits are, to the extent permitted by law or government regulations, available to the public on reasonable terms.”<sup>6</sup>

This definition of “practical application” is central to the design of the Bayh-Dole Act, which gives federal agencies the right to “revoke or modify” the rights of the contractor (recipient of federal funding) to retain or license the rights to subject inventions “...to the extent necessary to achieve expeditious practical application of the subject invention...”<sup>7</sup> For example, if a licensee fails to proceed with commercialization, then there is no question that march-in rights would be appropriate to facilitate a third parties’ practical application of the invention. Moreover, if a licensee were to seek pricing making a product unaffordable to a segment of society in the United States (i.e. a specific socioeconomic class), that too should be considered failure to achieve practical application.

Since the late 1880s, judicial opinion has held that the reasonableness of business prices is subject to government regulation in the public interest. As summarized by the Congressional Research Service,<sup>8</sup> an extensive body of case law has developed around whether this authority was restricted to businesses “affected with a public interest.” This case law recognized that government authority included the authority to require reasonable pricing, taking into account methods for valuation, and that price regulations not be confiscatory or materially damage the business involved. While the proposed rules do not pertain to price controls *per se*, several precedents are relevant:

1. It should be noted that “public interest” was recognized to apply not only to utilities, but also railroads, grain elevators, stockyards, and fire insurance companies among others which provide critical needs and services to functioning society. This approach was supplanted to some extent in the 1930s when the Supreme Court accepted the plenary power of the Federal Government to exercise regulatory power based on the Commerce Clause in the U.S. Constitution, making the public interest rationale less central to Federal regulation. That said, modern pharmaceutical companies, which not only provide products essential for public health, but benefit from government-granted and regulated monopoly over the sale of new pharmaceutical products, certainly meet the standard of providing for public interest, and conditioning licenses on this obligation is well within the authority of the Federal Government.<sup>9</sup>

Many respondents have detailed the profoundly detrimental effects that excessive drug prices can have on the public interest, and we will not repeat those arguments here. **We believe the operative question is not simply whether current drug prices are contrary to the public interest, but rather if it is possible to conceive of drug prices being contrary to the public interest**, for example, pricing practices that were discriminatory, anticompetitive, or inconsistent with the national interests of the U.S. (i.e., preferentially lower to other countries). As march-in rights are one of the few remedies available to the public under the Bayh-Dole Act, consideration of pricing as a potential trigger for the

march-in provisions is appropriate. Legal precedent is clear that consideration of price in protecting the public's interest in "...practical application of the subject invention..." under "reasonable terms" to "...alleviate health or safety needs" is an appropriate exercise of government power.

2. Courts have ruled that there is no single formula or method for determining a reasonable price, but that pricing "...involves balancing of the investor and consumer interests..."<sup>10</sup> This standard recognizes the imperative of considering both the public interest and the ability of companies to successfully commercialize products enabled by federally funded research in assessing the reasonableness of drug prices and the exercise of march-in rights.
3. Finally, legal precedent holds that reasonable prices should allow companies to achieve returns "...commensurate with returns on investments in other enterprises having corresponding risks..." and "...sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital." This is consistent with the overarching objective of Bayh-Dole, namely to promote commercialization of products based on federally funded research.

In this context, **the proposed rule that would prohibit consideration of price in the march-in rights associated with the Bayh-Dole Act<sup>11</sup> is inconsistent with government authority to consider prices in the public interest and the objectives of Bayh-Dole.** Legal precedent, as well as the clear language of the Act requiring "practical applications" to be "available under reasonable terms" provides balanced protections for both the licensee, who invests in commercializing the product, and the consumer, for whom the product may be essential for treating or preventing death or disability.

## The proposed rule changes limit mechanisms to provide taxpayers with a return on their investment in federally funded R&D.

Our research has focused on understanding the scale of the public sector (government) investments in biomedical research that enable new drug development, and also the mechanisms for providing the public with an appropriate return on investment commensurate with the risk of early-stage contributions to innovation. Specifically, we have shown that:

1. **The scale of the federal investment in research enabling new drug approvals is much greater than generally appreciated.** Specifically, we have shown that the National Institutes of Health (NIH) invested >\$187 billion for basic or applied research related to the new drugs approved from 2010-2019.<sup>12</sup> Significantly, NIH funding contributed to research related to every drug approved over this period, with >80% being basic research on the biological targets rather than research on the drug itself.
2. **A mature body of basic research is requisite for drug approvals.** Based on research showing that the maturation of the technology incorporated in a product is a critical determinant of product success, we developed a model for assessing the maturation of science underlying new drug approvals. We have shown that few, if any, targeted drugs are approved before the underlying research is established, and that the clinical development timelines are significantly shorter when the products enter clinical trials after this point.<sup>13</sup>

3. **A very small fraction of federally funded research is captured by economically significant patents.** Our work shows that only 9.4% of new drugs approved from 2010-2019 had a federally funded patent related to the drug or its biological target listed in DrugPatentWatch, a database of patents linked to market exclusivity.<sup>14</sup> These patents arose from 0.34% of the total NIH investment in research related to these products, including 0.83% of (applied) research on the drug and 0.09% of (basic) research related to the biological target.<sup>15</sup> These results are consistent with the fact that federal funding for biomedical research focuses on the basic science that enables drug discovery, rather than development itself. Basic research is less likely to meet the utility and enablement standards of an invention and, thus, less likely to generate a “subject invention” triggering Bayh-Dole.
4. **Academic institutions receive significantly lower royalties and payments than for-profit firms from biotechnology licenses.** Our work shows that academic institutions receive lower royalties (2.5-3.5% versus \$4.3-5.7%) and precommercial payment (\$0,1-2.0M versus \$7.8-10.3M) than for-profit firms. This disparity is not accounted for by differences in the clinical stage of the licensed product, licensee (biotech vs. large pharma) or license terms including exclusivity, R&D funding, equity, or co-development.<sup>16</sup> The Association of University Technology Managers (AUTM) reports that, from 1996-2017, universities received \$35 billion in total licensing income, including \$24.8 billion in royalties, across all technology sectors. This represents the total direct return to the public sector.

Over the same period, AUTM (working with the Biotechnology Industry Organization) estimates the indirect economic impact of university licensing to be \$723 billion–\$1.7 trillion in gross industry output or \$374–\$865 billion in GDP.<sup>17</sup> It should be noted that these estimates are not based on the value new products provide to consumers, but rather the price paid by consumers (taxpayers) for these products. Moreover, while the jobs embodied in this growth were generated by technology-driven innovation, the salaries are paid from the sales of these products. Specifically, the return on investment is not the gross value of the products or jobs enabled by federally funded research, but rather the net value of these products after considering the price paid by consumers. Thus, the public return on investment is only a fraction of this total economic impact. **In this context, high prices on pharmaceutical products reduces the public’s return on investment. Conversely, public policy that assures a reasonable price could provide an increased return.**

Bayh-Dole also posits that taxpayers receive a return on investment by stimulating US-based economic activity, jobs, and taxes. Since the passage of Bayh-Dole in 1980, the emergence of Milton Friedman’s doctrine of maximizing shareholder value has subordinated industry’s traditional focus on consumers to that of shareholders, who have gained unprecedented power over corporate priorities and profits. The result has been that companies increasingly offshore jobs, revenues, and taxes and use stock-based strategies to extract value from corporations.<sup>18</sup> **This increasing financialization of industry diminishes the return to taxpayers anticipated by the Bayh-Dole Act.**

We are aware that many of the comments regarding this proposed rule change will argue that the potential for using march-in rights to reduce drug prices is a threat to innovation. There is limited objective evidence to support such claims.<sup>19</sup> In a recent study, we showed that from 2000-2018 the 35 largest companies reported \$11.5 trillion of sales with gross profits of \$1.9 trillion, distributed \$1.7 trillion to shareholders in the form of dividends or stock buybacks, and funded \$1.7 trillion in R&D while achieving a net income significantly higher than other large public companies.<sup>20</sup> In this context, **it seems**

**unjustifiable to argue that the existing Bayh-Dole regulations, which include the implied threat of using federal march-in rights for failure to commercialize products under reasonable terms (including price), represents an ongoing disincentive for innovation.**

Finally, we note that the proposed, Trump-era changes to Bayh-Dole posit a distinct constitutional vision for the role of government in providing for the public interest. In a recent article, Mila Sohoni wrote that many of the Trump administration's initiatives "...renovate the *Lochner*-era Court's commitment to protecting liberty of contract from state encroachment,"<sup>21</sup> invoking a 1905 court decision that stands in contradistinction to the reforms of the New Deal that made the public interest central to the role of government. This comparison illustrates the essential error of the proposed rule changes. In 2019, the US government spent >\$1.4 trillion on Medicare and Medicaid, and federal healthcare expenditures accounted for 29% of all health expenditures, with state and local governments accounting for another 16%. The government, itself, is the largest payer for healthcare and the greatest stakeholder in reasonable drug pricing and has a shared interest in having the products that result from "subject inventions" available under reasonable terms. In this context, **it is fiscally irresponsible to prohibit consideration of price as a factor in policies designed to promote and protect the interests of taxpayers.**

---

<sup>1</sup> Center for Integration of Science and Industry, Bentley University. Retrieved from <https://www.bentley.edu/sciindustry>.

<sup>2</sup> Copan, W. G., Shyam-Sunder, S., Singerman, P. A., Zielinski, P. R., Silverthorn, C. F., Na, C. J., ... & Cranmer, D. C. (2018). Return on Investment Initiative for Unleashing American Innovation. National Institute of Standards and Technology (NIST). Retrieved from <https://www.nist.gov/publications/return-investment-initiative-unleashing-american-innovation>.

<sup>3</sup> Mazzucato, M. (2016). An entrepreneurial society needs an entrepreneurial state. Harvard Business Review. Retrieved from <https://hbr.org/2016/10/an-entrepreneurial-society-needs-an-entrepreneurial-state>.

<sup>4</sup> The Green Paper describes the provisions of the Bayh-Dole Act that protect U.S. taxpayer interest in public good as "...U.S. manufacturing preference, government use licenses, and march-in rights to ensure commercialization..." Copan, et al. *op cit* page 25, par 1.

<sup>5</sup> "...Federal agency has the right to grant such a license itself if the Federal agency determines that: (1) Such action is necessary because the contractor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use. (2) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the contractor, assignee or their licensees;" Title 37 - Patents, Trademarks, and Copyrights, 37 CFR §401.14 (j) Original Date: 2013-07-01 As Amended: 2018-04-13.

<sup>6</sup> "(3) Practical Application means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or government regulations, available to the public on reasonable terms." Title 37 - Patents, Trademarks, and Copyrights, 37 CFR §401.14(a)(3) *op cit*.

<sup>7</sup> "(2) The contractor's domestic license may be revoked or modified by the funding Federal agency to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions at 37CFR part 404 and Agency licensing regulations (if any). This license will not be revoked in that field of use or the geographical areas in which the Contractor has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the funding Federal agency to the extent the contractor, its licensees, or the domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country." Title 37 - Patents, Trademarks, and Copyrights, 37 CFR §401.14 (e)(2) *op cit*.

<sup>8</sup> Congressional Research Service, U.S. Constitution Annotated, U.S. Constitution Annotated, Amendment XIV. RIGHTS GUARANTEED, Section I, DUE PROCESS OF LAW, Regulation of Business Enterprises: Price Controls. Retrieved from <https://www.law.cornell.edu/constitution-conan/amendment-14/section-1/regulation-of-business-enterprises-price-controls>.

<sup>9</sup> Business with a public interest included "Businesses which though not public at their inception may be fairly said to have risen to be such and have become subject in consequence to some government regulation. They have come to hold such a peculiar relation to the public that this is superimposed upon them. In the language of the cases, the owner by devoting his business to the public use, in effect grants the public an interest in that use and subjects himself to public regulation to the extent of that interest..." Congressional Research Service, *op cit*.

<sup>10</sup> “...involves a balancing of the investor and consumer interests,” which does not, however, ‘ensure that the business shall produce net revenues.’ ... From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock... By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital.” Quoted in Congressional Research Service *op cit* and referencing: *FPC v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944) (citing *Chicago & Grand Trunk Ry. v. Wellman*, 143 U.S. 339, 345–46 (1892)); and *Missouri ex rel. Southwestern Bell Tel. Co. v. Public Serv. Comm’n*, 262 U.S. 276, 291 (1923).

<sup>11</sup> “(e) March-in rights shall not be exercised exclusively based on the business decisions of the contractor regarding the pricing of commercial goods and services arising from the practical application of the invention” National Institute of Standards and Technology (NIST), United States Department of Commerce. Notice of proposed rulemaking 37 CFR Parts 401 and 404, [Docket No.: 201207–0327], Rights to Federally Funded Inventions and Licensing of Government Owned Inventions, Federal Register, Vol. 86, No. 1 / Monday, January 4, 2021. Retrieved from <https://www.govinfo.gov/content/pkg/FR-2021-01-04/pdf/2020-27581.pdf>.

<sup>12</sup> Cleary, E.G., Beierlein, J.M., Khanuja, N.S., McNamee, L.M. and Ledley, F.D. (2018). Contribution of NIH funding to new drug approvals 2010–2016. *Proceedings of the National Academy of Sciences*, 115(10), pp.2329–2334. Retrieved from <https://www.pnas.org/content/115/10/2329>; Cleary, E., Jackson, M.J. and Ledley, F. (2020). Government as the First Investor in Biopharmaceutical Innovation: Evidence From New Drug Approvals 2010–2019. Institute for New Economic Thinking Working Paper Series, (133).

<sup>13</sup> McNamee, L.M., Walsh, M.J. and Ledley, F.D. (2017). Timelines of translational science: From technology initiation to FDA approval. *PLoS One*, 12(5), p.e0177371. Retrieved from <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0177371>; McNamee, L.M. and Ledley, F.D. (2017). Modeling timelines for translational science in cancer; the impact of technological maturation. *PLoS One*, 12(3), p.e0174538. Retrieved from <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0174538>; Beierlein, J.M., McNamee, L.M., Walsh, M.J., Kaitin, K.I., DiMasi, J.A. and Ledley, F.D. (2017). Landscape of innovation for cardiovascular pharmaceuticals: from basic science to new molecular entities. *Clinical therapeutics*, 39(7), pp.1409–1425. Retrieved from <https://www.sciencedirect.com/science/article/abs/pii/S0149291817307208>; Cleary et al., 2021. *INETEconomics op cit*.

<sup>14</sup> Cleary et al., *INETEconomics, op cit*; Ledley, F.D., Cleary, E.G., Zhang, K. Public contribution to pharmaceutical innovation is not captured by drug patents (in preparation).

<sup>15</sup> DrugPatentWatch represents an expanded version of the Orange Book which aggregates current and expired patents from Orange Book since 1980 along with a proprietary set of patents on biologics linked to market exclusivity. Retrieved from <https://www.drugpatentwatch.com>.

<sup>16</sup> Shah, P., Vaughan, G., Ledley, F.D. Licenses of biotechnologies provide lower economic returns to academic institutions than biopharmaceutical companies. (in preparation). This work made use of a database of biotechnology licenses maintained by BioScience Advisors. Retrieved from <https://www.bioscienceadvisors.com>.

<sup>17</sup> Pressman, L., Planting, M., Bond, J., Yuskavage, R., Moylan, C. The economic contribution of university/nonprofit inventions in the United States: 1996–2017. Retrieved from <https://www.bio.org/letters-testimony-comments/economic-contribution-universitynonprofit-inventions-united-states-1996>. It should be noted that federal non-defense R&D spending across technology sectors over this same period totaled \$1.5 trillion.

<sup>18</sup> Lazonick, W. (2014). Profits without prosperity. *Harvard Business Review*, 92(9), pp.46–55. Retrieved from <http://gesd.free.fr/lazonick14.pdf>.

<sup>19</sup> The work of Vernon and colleagues showed that pharmaceutical R&D spending dropped during the years that the Clinton administration’s healthcare proposal, which would have controlled drug prices, was under consideration. Giaccotto, C., et al. (2005). “Drug prices and research and development investment behavior in the pharmaceutical industry.” *The Journal of Law and Economics* 48(1): 195–214. Retrieved from <https://www.journals.uchicago.edu/doi/abs/10.1086/426882>; Golec, et al. (2010). “Pharmaceutical R&D spending and threats of price regulation.” *Journal of Financial and Quantitative Analysis* 45(1): 239–264. Retrieved from <https://www.cambridge.org/core/journals/journal-of-financial-and-quantitative-analysis/article/pharmaceutical-rd-spending-and-threats-of-price-regulation/1ADD6875F2AA693D267052C2AE0AA6AF>;

Vernon, J. A. (2005). “Examining the link between price regulation and pharmaceutical R&D investment.” *Health Economics* 14(1): 1–16. Retrieved from <https://onlinelibrary.wiley.com/doi/abs/10.1002/hec.897>.

In October 2019, the Congressional Budget Office’s assessment of H/R.3 (the Pelosi bill) estimated that the proposed reductions in drug price would reduce in 8–15 fewer drugs over a 10-year period. Retrieved from <https://www.cbo.gov/system/files/2019-10/hr3ltr.pdf>.

<sup>20</sup> Ledley, F.D., McCoy, S.S., Vaughan, G. and Cleary, E.G. (2020). Profitability of large pharmaceutical companies compared with other large public companies. *Jama*, 323(9), pp.834–843. Retrieved from <https://jamanetwork.com/journals/jama/fullarticle/2762308>.

<sup>21</sup> Sohoni, M., 2018. The Trump Administration and the Law of the Lochner Era. *Geo. LJ*, 107, p.1323. Retrieved from <https://heinonline.org/HOL/LandingPage?handle=hein.journals/glj107&div=43&id=&page=>.