PIONEER HEALTH

The Importance of Intellectual Property Protections for Patients

By William S. Smith, PhD and Dr. Robert Popovian

Research assistant: Gauri Binoy

WHITE PAPER

No. 264 | October 2023

PIONEER INSTITUTE
PUBLIC POLICY RESEARCH

MISSION

Pioneer Institute develops and communicates dynamic ideas that advance prosperity and a vibrant civic life in Massachusetts and beyond.

Vision

Success for Pioneer is when the citizens of our state and nation prosper and our society thrives because we enjoy world-class options in education, healthcare, transportation, and economic opportunity, and when our government is limited, accountable, and transparent.

Values

Pioneer believes that America is at its best when our citizenry is well-educated, committed to liberty, personal responsibility, and free enterprise, and both willing and able to test their beliefs based on facts and the free exchange of ideas.

PIONEER HEALTH

This paper is a publication of Pioneer Health, which seeks to refocus the Massachusetts conversation about healthcare costs away from government-imposed interventions, toward market-based reforms. Current initiatives include driving public discourse on Medicaid, presenting a strong consumer perspective as the state considers a dramatic overhaul of the healthcare payment process, and supporting thoughtful tort reforms.

PIONEER TRANSPORTATION

Pioneer Transportation seeks reforms that allow commuters to take full advantage of the coming mobility revolution — with access to a range of affordable and on-demand public and private transportation options, as well as transit-friendly real estate development.

PIONEER OPPORTUNITY

Pioneer Opportunity seeks to keep Massachusetts competitive by promoting a healthy business climate, transparent regulation, small business creation in urban areas, and sound environmental and development policy. Current initiatives promote market reforms to increase the supply of affordable housing, reduce the cost of doing business, and revitalize urban areas.

PIONEER EDUCATION

Pioneer Education seeks to increase the education options available to parents and students, drive system-wide reform, and ensure accountability in public education. The Center's work builds on Pioneer's legacy as a recognized leader in the charter public school movement, and as a champion of greater academic rigor in Massachusetts' elementary and secondary schools. Current initiatives promote choice and competition, school-based management, and enhanced academic performance in public schools.

Pioneer Institute is a tax-exempt 501(c)(3) organization funded through the donations of individuals, foundations and businesses committed to the principles Pioneer espouses. To ensure its independence, Pioneer does not accept government grants.

Table of Contents

"A country without a patent office and good patent laws is just a crab and can't travel any way but sideways and backwards."

— Mark Twain

Introduction

Protecting inventions through exclusive rights granted by a patent has long been controversial in the United States. During the Founding Era, there was discomfort because of recent experiences with the East India Company and the colonists' resistance to royal grants of monopolies on products such as tea. Likewise, in the current era, there is discomfort among some in the political class that patents provide inventors with the ability to unfairly inflict higher "monopoly" prices on consumers.

Despite the critics, the evidence is undeniable that patent protection is the mother of invention. No inventor will devote time, energy, and money to an invention if, the second the innovation goes to market, other firms can steal the discovery, copy it, and sell it themselves. In this sense, intellectual property marries self-interest and innovation.

In the biopharmaceutical context, patent protection is the foundation of the entire industry. It even underpins university research, where patents can be licensed for royalties and other remuneration. Without patents, progress against disease would stagnate. While it is not always thought about this way, intellectual property protection should give hope to every patient suffering from an uncured disease. Every uncured illness allows an inventor to find a cure that will provide an economic benefit.

Despite the critics, the evidence is undeniable that patent protection is the mother of invention.

Without the Patent Clause in the Constitution, which reads [The Congress shall have power] "To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries," the vibrant biopharmaceutical sector would not exist. The cranes building lab space in Cambridge, Massachusetts, are, in a sense, the most remarkable monuments to the sagacity of James Madison.

In this paper, we demonstrate that patent protections are one of the most important public policy innovations in human history and that patient advocates should fiercely guard against the weakening of patent protections that would create disincentives for innovation and breakthroughs. Intellectual property protections have saved the lives of millions of patients because these protections encourage innovation. The protections should be celebrated, not attacked.

While there can be abuses of patents, one cannot let these undermine support for intellectual property. The fact that there are speeders on the roads does not necessitate the conclusion that roads are not valuable. Because patents are so helpful, it is incumbent upon the patent holders themselves to guard against abuses of the patent system, because weakened support for patent protections would threaten the value of every patent.

Origin of U.S. Patent Law

In some instances, 15th-century Italy and other European nations granted patents to inventors and copyright protections to authors. Notably, the Venetian Patent Statute of 1474 is considered the first codified set of patent protections.

In the early colonial period, laws gave inventors an exclusive right to sell their inventions. However, inventors could sometimes apply to the colonial government for exclusive rights to sell their inventions. The Massachusetts and South Carolina colonial governments were the most active colonies in granting inventors exclusivity rights.

James Madison was convinced that the federal government should get in the business of granting patents and copyrights. After all, how could a patent issued by the Massachusetts state government provide an inventor protection in Virginia? Madison was convinced that the federal government needed to set the economic rules of the road; hence the Commerce Clause.

So, when drafting the Constitution, two framers proposed including patent and copyright protections: James Madison and Charles Pinckney of South Carolina. Their ideas were combined into one solution, and the journal of the Constitutional Convention indicates that the patent clause was included in Article I, Section 8 of the Constitution, without debate.

There were skeptics of the Patent Clause, with the two most notable being Thomas Jefferson and Benjamin Franklin. However, Jefferson was in France when the Constitution was being drafted, and Franklin did not offer any opposition during the Convention.

Jefferson's concerns revolved around the perceived abuses of royally chartered monopolies, such as the East India Company, which received "letters patent," that granted monopolies. Jefferson was worried that granting patents for inventions would be equivalent to protecting monopolies by granting them "letters patent," which could enable the abuse of American consumers with monopoly pricing and other monopolistic practices. However, his opposition later softened, observing that the passage of the federal patent law "has given a spring to

invention beyond [his] conception."[1]

When Madison defended the Patent Clause in Federalist 43, he argued that the "utility" of patents was beyond question and only the federal government could grant effective patents. When speaking about the importance of patents for inventors and copyrights for authors, he wrote: "The right to useful inventions seems with equal reason to belong to inventors. The public good coincides in both cases with the claims of individuals. The states cannot make effectual provision for either of the cases…"[2]

Patents' Influence on Drug Discovery and Development

One of the great modern myths is that scientists discover and develop drugs using government-funded research, and drug companies market these discoveries made initially with taxpayers' money. If that weren't bad enough, the biopharmaceutical company is given the patent on the drug, which blocks competition and allows it to be sold at a high price.

Myth #1: Drugs with a Patent Don't Face Competition

First, let's dispense with the falsehood that patented drugs don't face competition. There are too many examples of fierce competition among branded drugs, but let's start with the most famous.

One of the great modern myths is that scientists discover and develop drugs using government-funded research.

In September of 1987, Merck received the U.S. Food and Drug Administration's (FDA) approval for the first statin, a cholesterol-lowering drug known as lovastatin. In 1991, the FDA approved pravastatin, which became the second available statin in the U.S. Also in 1991, the FDA approved simvastatin, another statin developed by Merck. More statins were introduced and approved: fluvastatin in 1994, atorvastatin in 1997, cerivastatin in 1998, and rosuvastatin in 2003. Atorvastatin, brand name Lipitor, would go on to be the best-selling branded drug of all time, but it faced fierce competition from other branded drugs such as Zocor (simvastatin) and Crestor (rosuvastatin). Patents protected each of these compounds separately, but all competed because of their similar effects.

Another famous example of branded drugs facing fierce competition came with hepatitis C drugs. When the most effective cure for hepatitis C, Solvaldi, was approved in 2013, there was much handwringing by critics of the pharmaceutical industry that the drug's launch price of $84,000 for a 12-week course was unaffordable for the government healthcare programs where many hepatitis C patients would be treated. However, competition for Solvaldi came soon. An equally effective drug, Harvoni, was approved in 2014 at a wholesale price of $94,000. Approval of Epclusa followed in 2016, and Vosevi followed in July 2017. While these four drugs were all developed by Gilead, they all competed – and it was not long before a hepatitis C treatment from another company entered the market.

That happened in August 2017, when Mavyret was approved by the FDA as a competitor to these more expensive brands, with an average wholesale price (AWP) of $26,400 for an 8-week course and $39,600 for a 12-week course. (AWP prices do *not* include rebates or other discounts.) Perhaps as a response, Gilead launched an authorized generic version of Epclusa in early 2019, with a price tag of $24,000. Clearly, competition among these branded drugs and authorized generics brought prices down and did not allow the "monopoly pricing," critics claim happens with branded medicines.

We are likely to see a similar dynamic among weight loss-diabetes therapies now coming on the market. Ozempic, a diabetes drug that is also utilized for weight loss, was approved in October 2017. A follow-on drug, Wegovy, was approved in 2021. However, when approved, several compounds in the pipeline will likely serve as fierce competitors to Ozempic and Wegovy. As sometimes happens in other therapeutic classes, the newer branded drugs utilized to manage obesity may be cheaper, more effective, and have fewer side effects than the earlier branded drugs.

The notion that brand-name drugs still on patent do not face competition is a myth propagated by drug industry critics who know very little about pharmaceutical markets or do not acknowledge these relevant historical examples. Few understand that if you see a television advertisement for a drug, it is most likely that the medicine is on patent and faces competition from other brands.

Finally, this competition among branded drugs serves patients well. Despite its bestselling status, some patients taking Lipitor developed side effects and, as a result, were switched to another patented statin. Physicians regularly switch patients from branded drug to branded drug in a quest to find the safest and most effective drug for that individual. This is yet another way that competition among patented compounds benefits patients: The multiple available patented branded drugs can work for different patient populations with similar symptoms.

Myth #2: The Government Discovers and Develops Drugs

Dr. John LaMattina, the former head of R&D at Pfizer, describes Myth #2 this way: "The argument often raised is that this industry's success relies largely on the largesse of the National Institutes of Health (NIH) and the academic research it supports. The implication, of course, is that

Americans are getting an unfair deal when it comes to drug pricing as their tax money is being used to fund research relied upon by the industry."[3]

The false maxim that the government is primarily responsible for innovation has been refuted through published literature in peer-reviewed scientific journals over the past several decades.

An article published in 2019 in the *British Medical Journal* analyzed the topic. As with prior research, investigators found that the majority of biopharmaceutical research was conducted and funded by the private sector.[4]

Despite excluding vaccines, biological medicines, and gene therapies from their final analysis, a study limitation noted by the authors, the researchers found that 75 percent of all Food and Drug Administration-approved drugs between January 2008 and December 2017 were funded and researched by private companies. Only 19 percent of the approved drugs originated in publicly supported research and development, and 6 percent originated in companies created to exploit publicly funded research programs.

Thus, 25 percent of approved medicines benefited from "some" public support, with emphasis on "some." The impressive results indicate how central private-sector research is to biopharmaceutical innovation.

The results also confirmed previous research findings. For example, a 2011 study published in the *New England Journal of Medicine* found that the private sector was responsible for 80–90 percent of new drugs and vaccines approved by the FDA between 1990 and 2007.[5]

The public and private sectors play complementary roles in discovering and developing new treatments. Both conduct basic, translational, and clinical research; however, each sector's research type is generally different.

The public sector conducts and funds most basic research, while the private sector funds and performs most translational research and clinical studies. For example, a research paper published in 2016 in the *Drug Information Journal* found that 54 percent of basic science milestones were achieved predominantly by the public sector and 27 percent by the private sector. Of course, clinical trials are primarily funded by the biopharmaceutical industry and consume more than 80 percent of total research and development funding.[6]

Phase 3 clinical trials, which enroll the most patients and are therefore the most expensive, are the least likely to be funded through taxpayer funding.

Both the private and public sectors are vital to advancing innovation. Their synergy is best described by Dr. Francis Collins, the National Institutes of Health's director, when discussing finding a treatment for sickle cell disease.

"I can see an emerging pathway toward curing that disease using gene editing of bone marrow cells, but it will take the full intelligence, resources, and technology from the government, academia, and the private sector to make it happen."[7]

Overall, the private sector contributes the lion's share of investment in U.S. medical and health research and development — $161 billion (66 percent of the total) in 2020 — with the biopharmaceutical industry providing approximately 76 percent ($122 billion) of that funding. Despite these findings, some policymakers and pundits continue to repeat the false narrative that the government drives drug discovery. This only distracts from the critical discussion around lowering overall healthcare costs.[8]

Myth #3: Competition in the pharmaceutical space doesn't translate to lower prices; hence we should reduce patent protection

The current opaque contracting scheme on the pharmacy benefit side involves rebates and fees paid to middlemen – pharmacy benefit managers (PBMs) — which prohibits the actual payer in the healthcare system — the patient, employer, and government — from observing the "net" price insurers and PBMs pay for life-saving medicines. Fortunately, the net price of drugs administered by providers in their offices is far more transparent, as it involves a different pricing scheme — average sales price (ASP). ASP is calculated considering all the money funneled back to the PBMs and insurers. As such, the ASP is the net price of a medicine.

Why is this distinction important? The apparatus of ASP in the biosimilar market demonstrates that, as competition is introduced, the prices of medicines that are administered in a provider's office take a precipitous decline.[9] Thus, competition promotes a reduction in net prices for drugs.

In other words, competition is alive and well in the biopharmaceutical market. Unfortunately, the rebate contracting tactics promoted by PBMs and certain biopharmaceutical executives undermine the ability to verify that fact.

The 1980s witnessed a remarkable bipartisan congressional effort to improve intellectual property law with one goal in mind: promote innovation to move the country forward and improve the healthcare quality of Americans.

Congressional Legislation on Intellectual Property

The 1980s witnessed a remarkable bipartisan congressional effort to improve intellectual property law with one goal in mind: Promote innovation to move the country forward and improve the healthcare quality of Americans. The political

landscape of the 1980s was so different from the modern Congress, where legislation is designed to embarrass political opponents and gain leverage for the next election. The improvements to intellectual property protections in the 1980s were developed with a genuine desire to improve the country by encouraging innovation and science, not to punish perceived political enemies. This legislation was also—in every case—bipartisan, another stark contrast with the modern Congress.

The Bayh-Dole Act

The first piece of legislation that provided one of the key foundations for the explosion of life sciences knowledge was the 1980 Bayh-Dole Act, authored by former Senator Birch Bayh (D-IN) and Senator Robert Dole (R-KS).

The post-WWII world witnessed the flowering of the American research university system. Almost every region in the nation saw universities researching scientific breakthroughs, with California and the Boston area leading the way. The problem was that the federal government funded many of the discoveries, especially in science. Federal agencies such as the Department of Defense, the National Science Foundation, and the National Institutes of Health were underwriting many university research projects. Federal law made it difficult for those discoveries to be commercialized because government owned the patent rights to those discoveries they helped fund.

Therefore, when universities made a discovery resulting in a patent, that discovery was put in a box. Americans saw little benefit from the discovery in their daily lives because the invention did not lead to a usable product. The Bayh-Dole Act changed all that. The law allowed universities to retain the patent rights on discoveries made with federal funds and encouraged universities to find commercial partners to bring a product to market. The provision in the law that enabled commercialization was the so-called "march in rights" given to the federal government, which could "march in" and take the patent away from a university that did not commercialize the invention within a reasonable period. The government said to universities with patents, "use or lose it."

The Bayh-Dole Act represents the starkest contrast between the outlooks of members of Congress in the 1980s and contemporary members. senators Bayh and Dole included the "march-in" provision in the law to move the country forward by swiftly bringing innovations to commercial markets.[10] According to the Senate Judiciary Committee Report that initially discussed senators Bayh and Dole's "march-in" provisions, the Committee recognized the problem of ineffectiveness in "the inability of the Federal agencies to deliver new inventions and processes from their research and development programs to the marketplace where they can benefit the public."[11] Later in the report, the Committee concludes, "[i]t is essentially a waste of public money to have good inventions gathering dust on agencies' shelves because of the unattractiveness of non-exclusive licenses. The presence of 'march-in-rights' in the licensing program (where the agency could issue additional licenses to competitors if such licensing were required to meet a public need) should be a sufficient safeguard to protect welfare requirements and prevent any undesirable economic concentration."[12]

A contemporary senator, Elizabeth Warren (D-MA) is leading an effort to prod the Biden administration into exercising "march-in" rights to strip patent rights from drug makers who had licensed a patent from a university discovery that the federal government had funded if the government deemed the efforts to commercialize inadequate.[13] The Warren proposal is a politicized attempt to weaken intellectual property rights. It would throw a wet blanket over the commercialization of university discoveries as potential commercial partners would universally avoid university patents. The result would be that American consumers would benefit little from university discoveries.

One can only conclude that legislators in the 1980s wanted to develop and further university-backed innovations such that Americans would benefit from those innovations; however, contemporary legislators would seem to discourage university-backed innovations from ending up at the patient's bedside. That current legislators could so mistakenly advocate for the wholesale abolition of intellectual property rights is a bad omen for the future of American innovation and demonstrates disregard for the needs of patients awaiting cures for uncured diseases.

The Warren proposal is based upon a fundamental misunderstanding of the contribution of government-funded research to drug development. In his recent book, Dr. John LaMattina tells the story of how the rheumatoid arthritis drug Xeljanz was discovered.[14] At a medical conference, a Pfizer researcher seeking to discover a drug that could suppress the immune system talked to a researcher from the National Institutes of Health who had recently "discovered a particular enzyme from a class known as kinases that could play a role in immune function."[15]

The NIH researcher had not invented a drug nor did clinical trials to prove safety and efficacy other than a pathway to immune suppression. However, the NIH scientist provided a valuable insight into how the human body functions. The Pfizer researcher now knew which enzyme had to be blocked, giving that researcher an idea of which compounds might accomplish this blocking in the human body.

The story of Xeljanz provides important insight into how basic research done in universities or other government-funded laboratories can lead to drug discoveries but are not a substitute

for the enormous capital expenditures required to fund clinical trials and bring a compound to market that has been extensively tested for safety and efficacy.

Do governments and universities that provide the insights that may lead to drug discoveries deserve royalties and compensation for their discoveries? Of course they do, and the Bayh-Dole Act created the legal infrastructure for such payments. And, of course, the license agreement should be more generous when the government-funded discovery is crucial to the drug.

However, the university and the government do not shoulder the risk of funding a clinical trial that can cost hundreds of millions, if not billions of dollars. The commercial partners of the universities and government bear this risk, and it is enormous. For example, the biopharmaceutical consulting firm IQVIA recently pointed out that the global success rate for oncology clinical trials was only 3.5 percent.[16] At the same time, the costs of later stage clinical trials (phase two or phase three clinical trials) may exceed $1 billion, making for very expensive clinical trials with a low likelihood of success.

And despite this low success rate, the industry funded more than 2,000 oncology clinical trials in 2022, up 22 percent from 2018. According to a Deloitte study, the top 20 pharmaceutical companies collectively spent $139 billion on R&D in 2022.[17] Total R&D spending by all biopharmaceutical companies tops $200 billion, dwarfing the NIH budget of $41 billion in the same year.

The university and the government do not shoulder the risk of funding a clinical trial that can cost hundreds of millions, if not billions of dollars.

The Bayh-Dole Act was one of the most significant legislative achievements in the history of science because it unleashed university discoveries by providing universities with intellectual property protections that allowed for resulting innovations to be commercialized. It should provide some comfort for patients who lack treatments for their condition that if a university researcher discovers something that could lead to a cure, that university will find a well-funded commercial partner who can bring a new treatment to market. In this sense, the Bayh-Dole Act was a boon for patients.

Orphan Drug Act

Another bipartisan legislative achievement that benefited patients enormously was the 1983 Orphan Drug Act. Authored by Representative Henry Waxman (D-CA) and Senator Orrin Hatch (R-UT), the law corrected a market failure that discouraged commercial companies from investing in R&D projects for rare or "orphan" diseases, which are roughly defined as diseases with a prevalence of less than 200,000 U.S. patients.

As John Swann, an FDA historian, characterized the problem, "[t]he relatively limited prevalence of a particular disease acted as a barrier for commercial investment in the research and development required to show evidence of safety and efficacy of treatments."[18] In short, if commercial companies were going to undertake the enormous financial risk involved in launching a clinical trial, they wanted to test drugs that would have many customers one day. One estimate is that before 1983, the year of enactment of the Orphan Drug Act, only 10 drugs were developed that would have met the orphan definition.[19]

The incentives provided for in the Orphan Drug Act changed the landscape for orphan disease drugs. As the National Pharmaceutical Council describes the provisions of the bill, "innovators are granted seven years of exclusivity for the approved orphan indication, a tax credit for expenditures related to clinical trials, a waiver from user fees, and potential use of the FDA's accelerated approval pathway, among other benefits."[20]

In our view, the most crucial incentive in the law is the seven years of market exclusivity. Market exclusivity is different from patent rights and, in a sense, represents a kind of "super patent." The FDA is not permitted to approve any drug that may potentially compete with a drug made for an orphan disease for seven years following approval of a drug approved with "Orphan Drug Exclusivity." As we explain in another section of the paper, a patent on a medicine does not insulate that drug from competition. Patented drugs can face fierce competition from other patented or non-patented medications approved by the FDA to treat the same disease.

As a result, market exclusivity limits potential competition for seven years, giving the company a monopoly pricing period. On the other hand, drugs without exclusivity may have patent rights but can face substantial competition with competing medications in terms of price, efficacy, or safety. Market exclusivity can also, in some cases, serve as a kind of patent extension if the drug's patent expires but the exclusivity period continues. Even though the patent has expired, the FDA will not approve a generic competitor until the exclusivity period has passed. In this sense, the incentives in the Orphan Drug Act provide another protection that effectively bolsters the proprietary rights associated with the invention.

There can be no doubt that these incentives have worked. In 1983, the year of the law's enactment, there were only 38 approved drugs to treat rare diseases. By early 2023, 1,100 of these drugs had been approved by the FDA. The drugs span all therapeutic areas, significantly impacting cancer treatments, blood diseases, and central nervous system disorders.[21] The World Health Organization (WHO) has categorized many orphan drugs as essential, such as Coagulation Factor

IX, which helps control bleeding for those with hemophilia, who otherwise risk fatal infection from plasma transfers.[22] Additionally, the continued growth of orphan drugs naturally results in increased traction with big pharma, increasing big pharma's sponsorships of the drugs. Therefore, some orphan drugs are forecast to outsell other medicines by 2026.[23]

Probably due to advances in science and incentives in the Orphan Drug Act, there is now a flood of requests to approve orphan drugs or orphan drug indications. Here is how *Pharmaceutical Technology* has characterized the growth in orphan drug approvals: "Between 1983 and 2000, only 568 drugs received their first orphan drug designation for a specific therapeutic indication. During 2001–10, the number of granted designations almost tripled, with 1,527 drugs receiving their first orphan drug designation. The total number of designations more than doubled during 2010–21 compared to those given in the preceding decade."[24] In recent years, the number of orphan drug approvals has rivaled and even surpassed non-orphan drug approvals; one example is that over half of all approvals in 2021 received orphan designation by the FDA's Center for Drug Evaluation and Research.[25]

Patient advocacy was integral to the passage of the Orphan Drug Act. At the time, a new patient advocacy organization was formed to lobby for the bill's passage, the National Organization for Rare Disorders (NORD).

Patients with rare disorders began speaking out in favor of the bill. One of the most famous people lobbying for the bill was Hollywood actor Jack Klugman, who starred in and produced a popular television show, *Quincy, M.E.* Klugman was able to highlight the problems of rare disease research in the scripts of several of his shows. Klugman's brother Maurice was suffering from a rare disease, and Maurice had educated his brother about the lack of available drugs for rare diseases. Jack Klugman even testified on Capitol Hill about the bill, which, at that time, was a rarity for a Hollywood celebrity. While the Orphan Drug Act led to significant progress, advocacy must continue, as many rare diseases still do not have proper treatments.

Many patient advocates may not have fully understood that they were lobbying to strengthen protections adjacent to intellectual property rights by enacting market exclusivity for orphan drugs. In our view, patient advocates, especially those living with rare diseases, need to embrace intellectual property protections and other similar exclusivity rights as the most fundamental policy tool to drive the discovery of novel treatments and thereby assist patients. Innovation in medical research is simply unthinkable without intellectual property rights.

Many patient advocates may not have fully understood that they were lobbying to strengthen protections adjacent to intellectual property rights by enacting market exclusivity for orphan drugs.

Hatch-Waxman Act

In 1980, congressional leaders unleashed the power of university research by facilitating the commercialization of university patents through the Bayh-Dole Act. Three years later, they addressed the problem of orphan diseases and created powerful incentives for research into cures for orphan diseases, legislative changes that, a decade later, led to an explosion in the number of therapies for rare diseases.

However, there was more work to be done. There remained a couple of problems with America's intellectual property system. The first had to do with the bargain the law had made with patent holders. The bargain was this: when you discover a new drug, you have the right to sell it under patent *for a limited period*, and when that period expires, other companies have the right to swiftly copy it and bring to market a cheaper, generic version of that same drug, which would be a boon to American consumers by providing similar drugs at a lower price point.

The problem with intellectual property law in 1984 was the inability of generic companies to *copy branded drugs swiftly*. This swiftness problem was, in general, twofold. The first problem was that to bring a generic drug to market, the generic firm would often need to commence clinical trials to prove the generic copy was safe and effective. This requirement seemed redundant since, if the generic firm could prove their molecule was identical to the branded molecule, why were new clinical trials necessary?

The second problem causing delays for generic approvals related to a 1984 Federal Circuit Court decision, *Roche v. Bolar*, in which the court ruled that the generic firms could not start using the branded drug for testing until the patent expired. Therefore, when a patent expired, a branded drug effectively had an extension in patent life: No generic firm could even begin testing a generic drug and developing an FDA application until the last day of patent life. As the Congressional Research Service described the problem, "under *Roche v. Bolar*, competitors that commenced activities necessary for regulatory approval before a patent expired could be enjoined as patent infringers. This possibility was seen as a *de facto* period of exclusivity that the patent proprietor enjoyed beyond the actual term of the patent."[26]

However, intellectual property problems for branded companies also needed to be solved. As the FDA's approval process for a new drug continued to lengthen, branded companies lost valuable patent time before a drug was marketed. The longer the FDA took to review an application, the less time a branded company had to sell the drug under patent. The shorter resulting exclusivity impeded cures from getting to patients in need.

The formal title of the Hatch-Waxman Act was the Drug Price Competition and Patent Term Restoration Act of 1984. The "Price Competition" part of the title referred to the law speeding up the approval of generic competition, and the "Patent Restoration" part referred to the law "giving back" some of the patent life that had been lost during the FDA approval process.

The new law addressed these problems in sagacious ways. First, the law overturned the *Roche v. Bolar* decision and allowed generic firms to test copies of a branded drug before its patent expired. The law, therefore, enables generic firms to begin testing on a generic version of a branded drug if that testing was done with a view toward FDA approval.

Second, the new law created an "Abbreviated New Drug Application" (ANDA) process that eliminated the requirement that generic firms perform redundant clinical trials. As the Congressional Research Service explains this key provision, "[a]n ANDA may be filed if the active ingredient of the generic drug is bioequivalent of the approved drug. An ANDA allows a drug manufacturer to rely upon the safety and efficacy data developed by the original manufacturer."[27]

These reforms led to an explosion in the use of affordable and high-quality prescription drugs. The U.S. intellectual property system's genius is its enormous incentives for innovation. However, Hatch-Waxman also has considerable incentives to bring those innovations to market at low prices when the relevant patent terms expire. The new law led to widespread generic drug availability, and today the FDA reports that 90 percent of U.S. prescriptions are for low-cost generics. Again, to repeat the theme of this paper, patients benefit when intellectual property law brings high-quality innovations to market at a low cost. Weaken the incentives for innovation, and you will dry up the pipeline of branded drugs for these affordable generics to provide low-cost medicines that benefit people. With the right balance in intellectual property law, you have innovation and, ultimately, low cost.[28]

Hatch-Waxman...has considerable incentives to bring those innovations to market at low prices when the relevant patent terms expire.

As discussed, the Hatch-Waxman Act also sought to restore patent life lost for branded companies during the period of FDA review of the drug. As the Congressional Research Service explains, "the patent holder is entitled to have restored to the patent term one-half of the time between the IND application and the submission of the NDA, plus the entire period spent by the FDA approving the NDA."[29]

The Hatch-Waxman Act caps the patent term extension at five years. Moreover, the patent restoration does not happen automatically, as drug manufacturers must file for an extension with the U.S. Patent and Trademark Office. In addition, a patent term can only be extended for one drug for one indication, limiting some potential benefits to the innovator pharmaceutical company.

This patent extension provision seems a fair compromise because what use would a pharmaceutical patent be for patients in desperate need if the patent life was used up during FDA review and the company had no time to bring the product to market before the patent expires. No company would have the incentive to develop innovative products if those products could be immediately copied once ready to be sold.

Potential Patent Abuses

There are ubiquitous critics of life sciences companies who argue that the patent system is systematically abused by biopharmaceutical companies to "stifle" competition and prevent generic copies from coming to market, thereby raising patient costs.

Inevitably, the problem with this type of criticism is its generality. One can only know if a patent rewards genuine innovation or stifles competition by assessing that specific patent. Have drug companies ever filed for patent protections intending to stifle competition? To believe this has never happened, one must be utterly pollyannaish. However, many critics are so blinded by antipathy toward drug companies that they refuse to recognize that most patents, even those related to a previously patented drug, act to encourage and reward innovations. Innovations that help improve patient care and outcomes. Innovations without which there would be no possibility of a future generic drug at a lower cost to help patients suffering from some as-yet untreated indication.

A biopharmaceutical company can reduce drug side effects and improve the effectiveness of a medicine by developing a new formulation or delivery mechanism of a previously patented molecule that allows for improved medication absorption. A real-world example is the improvement in devices that enable enhanced delivery of older formulations to the lungs. These devices allow for greater drug concentration to be delivered into the pulmonary system, thus reducing the dosage required, leading to improved outcomes and often fewer side effects. Further, some time-release drugs allow the patient to take the medication less frequently, potentially increasing adherence and managing the amount of bioavailable drug at any given time. In such cases, the new formulations or devices cannot be considered patent abuse because they do not prevent a generic company from copying the original molecule when the patent expires and releasing a far less expensive version of the older formulation into the marketplace.

Rather than broad, general statements about patents for methods or processes abusing the patent system, perhaps by

being considered part of a patent thicket, each patent should be judged on its own merit and recognized for the separate innovation it protects.

Additionally, critics of the biopharmaceutical industry do not appreciate that research and development processes continue long after the FDA has approved the original medicine. This "follow-on innovation" phenomenon is critical to developing the biopharmaceutical industry. Examples of follow-on innovation include new formulations and dosages, improved safety-efficacy profiles, and better drug-safety measures, all leading to improved patient outcomes.[30] An example of a critical follow-on innovation was for the HIV drug, AZT (zidovudine). First approved as a cancer drug, AZT failed to treat cancer successfully. Then, through follow-up research and a secondary patent, an improved mechanism was found and identified as helpful in treating HIV.[31]

Secondary patents are critical in follow-up research and findings. Though criticism follows the use of secondary patents, it is vital to acknowledge the impact these secondary patents have upon incentivizing research that increases product quality, sometimes being the only way products can be brought to market. Secondary patents do not hinder competition or extend the original patent terms; they are only created for that specific advancement.[32] The original innovation can be copied once the original patents have expired, but the new patents would continue to protect the further innovations that are later developed.

Another example of how the patent system can improve patients' lives comes from the Best Pharmaceuticals for Children Act. The BPCA became law in 2002 to encourage the testing of new drugs on children. As the National Institutes of Health describes it, the goal of the BPCA is to "encourage the pharmaceutical industry to perform pediatric studies to improve labeling for patented drug products used in children by granting an additional six months of patent exclusivity."[33]

Recognizing the continuous amendments to patent quality and oversight in the United States is also important. Just recently, in August 2022, U.S. Senators Thom Tillis (R-NC) and Patrick Leahy (D-VT) introduced the Patient Examination and Quality Improvement Act of 2022. This legislation calls for evaluating the standard of patents and creating amendments to improve patent quality.

While we are not naïve about the fact that some companies may use clever patent strategies to stifle competition, the onus is on the critics to point to specific examples of when such action is taken. After all, two government watchdogs — The Food and Drug Administration and the Patent and Trademark Office — are tasked to certify that new products are genuine innovations.

Intellectual Property and Health Disparities

It is also essential to recognize the critical nature of incentivizing innovation to progress medicine and continue to close the significant health inequity gaps prevalent in underprivileged communities. While there has been some progress in recent decades, there remains a persistent gap in life expectancy between black and white Americans, with white Americans living an average of 3.6 years longer.

A new paper from Dr. Tomas Philipson of the University of Chicago highlights medical innovation's importance in closing this gap.[34] He discusses the progress that has already been made, stating that the life expectancy gap has "narrowed by nearly 50% in three decades," decreasing from 7.0 years to 3.6 years.[35] Philipson then proceeds to argue that most of this progress made in closing this life expectancy is due to continuous biopharmaceutical innovation.

> If intellectual property protections and the innovation they encourage work to lessen health disparities, we can conclude that weakening them would increase health disparities.

Significant academic literature suggests that biopharmaceutical innovation, especially new drugs, increases life expectancy among all Americans. But how has innovation improved health disparities specifically? Philipson estimates that somewhere between 35 percent and 73 percent of the 3.4-year decrease in life expectancy gap and 53 percent of the decline in health disparities was due to medical and biopharmaceutical innovation. The equal application of pharmaceuticals has resulted in a benefit to a lifespan that has disproportionately improved the lives of underprivileged individuals.

Philipson points to three therapeutic areas where medical innovation has had particular benefits for minority populations: hepatitis C, HIV, and COVID-19. When biopharmaceutical innovations came along that could effectively treat these three diseases, the effect was particularly important for minority populations as they are disproportionately affected by these ailments. Philipson utilized Medicaid data to demonstrate the mass benefits of these therapies in minority populations.

There seems little doubt that the strong intellectual property infrastructure of the U.S. helped encourage companies to devote research and development efforts to these three therapeutic areas. In fact, while HIV is not technically an orphan disease (given the size of the patient cohort), many may not recall that the FDA utilized the intellectual property incentives in the Orphan Drug Act to jump-start HIV research.

If intellectual property protections and the innovation they encourage work to lessen health disparities, we can conclude that weakening them would increase health disparities, which is precisely what Philipson concluded.

By far the most aggressive attack on the intellectual property rights of biopharmaceutical inventors came with the Inflation Reduction Act (IRA), signed into law by President Biden in August 2022. Over the next decade or so, the IRA will allow the federal government to impose price controls on more than 100 of the bestselling drugs in the Medicare program, regardless of the patent status of those drugs. In the many cases of drugs for which the patents covering those drugs have not expired, the IRA essentially shortens the patent life. As a result, it mounts an attack on intellectual property rights.

The Congressional Budget Office, which advised the authors of the bill, acknowledged that the legislation would dampen innovation. For example, the Congressional Budget Office estimated that the IRA could lead to 15 fewer new drugs over the next 30 years.[36]

However, new research has recently emerged estimating that the IRA will lead to 230 fewer new drugs over the next decade and total job losses, direct and indirect to life sciences companies, of 730,000 to 1,100,000.[37]

Philipson similarly concludes that the IRA will curb biopharmaceutical innovation, consequently increasing health disparities. He also estimates that this will reduce potential longevity gains by 9.8 percent for the population as a whole. This reduction in longevity will negatively impact the recent progress made to minimize health disparities, with Philipson even concluding that "the convergence in life expectancy between Blacks and Whites will be reduced by .11 years through 2032" and "the enacted price controls in the Inflation Reduction Act have a detrimental effect on reducing health disparities, which conflicts with the promise of the Biden Administration."

It is critical to assess the different aspects that play a role in mitigating healthcare disparities rather than simply addressing issues in silos. It is vital to maintain incentives for conducting research that provides high efficacy and easily accessible treatments to all populations. If we continue to curb this process, research will only serve particular groups of individuals; usually those of higher privilege and specific racial groups, and health inequity in America will only continue to grow.

Conclusion

Intellectual property protections for biopharmaceuticals are under assault in the Western world. Policymakers in the European Union (E.U.) have proposed reducing the exclusivity period for branded drugs from 10 years to 8 years, essentially reducing intellectual property protections by 20 percent.

In the U.S. there has been a massive attack on intellectual property protections for innovator companies, first in the Inflation Reduction Act price controls and continuing in the so-called Smart Prices Act, which would essentially end patent protection five years after FDA approval.

While these proposals would undoubtedly weaken innovation, reduce the number of new drugs, and lead to employment losses, the most harmful impact would fall upon the end user of medicines — the patient. Without patent protection, biopharmaceutical companies will not be incentivized to invest time and money in high-risk research. There are so many unmet medical needs that are the indirect result of this political hostility to intellectual property rights. Ironically, the same politicians who promise to cure cancer feel free to mandate price negotiations that limit the incentive to develop novel drugs to treat cancer and, therefore, act as a brake on the very R&D organizations that can bring cancer cures to the market.

> Many attacks on intellectual property rights are premised on myths and lack of understanding of the patent system.

Moreover, many attacks on intellectual property rights are premised on myths and a lack of understanding of the patent system. Patents do not foreclose competition. The government does not invent drugs. Patents do lead to biopharmaceutical innovation, which narrows health disparities.

When you look carefully at the leadership of Henry Waxman and Orrin Hatch, or Bob Dole and Birch Bayh, you see politicians of both parties blessed with ingenuity and sagacity. These politicians sought to balance the need for innovation with a sense that they must also find ways to lower patient costs. Most importantly, they understood that, over the long run, intellectual property protections would help lead to cures for American patients who needed those cures.

They did not view the art of legislating as merely a tool to gain leverage over political opponents; they considered legislating to move the country forward, solve problems, and most importantly, help the people.

You do not see those same qualities and motivations when you view contemporary proposals to weaken intellectual property protections. Instead, you see political gimmicks rooted in demagoguery. There is the sense that contemporary politicians know their proposals will not bring new cures to market, but they don't care. Their prime motivation is to secure a talking

point for a voter town hall meeting where they can attack easy targets such as drug companies or their political opponents, all the while knowing deep down that their proposals will not benefit Americans. The reality is that the United States was not always the leader in life sciences; in the 20th century, Europe was in the lead for research and development. However, their leadership was undermined due to price controls and the lack of I.P. protection. Similarly, American politicians are happy to throttle the marvelous life sciences research and development engine that has been carefully built over four decades.

Endnotes

1 Letter from Jefferson to Benjamin Vaughan, June 27, 1790.

2 Madison, *Federalist #43*, second paragraph.

3 "Pharma and Profits," by John L. LaMattina, p. 34.

4 Nayak R K, Avorn J, Kesselheim A S. Public sector financial support for late stage discovery of new drugs in the United States: cohort study BMJ 2019; 367 :l5766 doi:10.1136/bmj.l5766.

5 N Engl J Med 2011; 364:535–541 DOI: 10.1056/NEJMsa1008268

6 Chakravarthy R, Cotter K, DiMasi J, Milne CP, Wendel N. Public- and Private-Sector Contributions to the Research and Development of the Most Transformational Drugs in the Past 25 Years: From Theory to Therapy. Ther Innov Regul Sci. 2016 Nov;50(6):759–768. doi: 10.1177/2168479016648730. Epub 2016 Jul 10. PMID: 30231735.

7 https://www.washingtonpost.com/news/on-leadership/wp/2017/11/20/a-conversation-with-the-nih-director-on-overseeing-medical-breakthroughs-making-music-and-riding-a-harley/.

8 https://www.researchamerica.org/wp-content/uploads/2022/07/ResearchAmerica-Investment-Report.Final_.January-2022.pdf

9 https://www.amgenbiosimilars.com/commitment/2022-Biosimilar-Trends-Report Figure 5.

10 https://www.wlf.org/wp-content/uploads/2021/08/82021DerzkoMaldonado_CLN.pdf.

11 S. Rep. No. 96–480, at 2 (1979).

12 S. Rep. No. 96–480, at 28.

13 https://www.warren.senate.gov/oversight/letters/senators-warren-and-king-and-representatives-doggett-castro-porter-and-jacobs-lead-100-lawmakers-urging-hhs-to-exercise-authority-to-lower-drug-prices-immediately.

14 https://www.amazon.com/Pharma-Profits-Balancing-Innovation-Medicine/dp/1119881331/ref=sr_1_1?qid=1684943154&refinements=p_27%3AJohn+L.+LaMattina&s=books&sr=1-1.

15 https://www.amazon.com/Pharma-Profits-Balancing-Innovation-Medicine/dp/1119881331/ref=sr_1_1?qid=1684943154&refinements=p_27%3AJohn+L.+LaMattina&s=books&sr=1-1, page 37.

16 https://www.iqvia.com/-/media/iqvia/pdfs/institute-reports/global-oncology-trends-2023/iqvia-institute-global-oncology-trends-2023-forweb.pdf, page 2.

17 https://www.prnewswire.com/news-releases/deloittes-13th-annual-pharmaceutical-innovation-report-pharma-rd-return-on-investment-falls-in-post-pandemic-market-301738807.html#:~:text=The%20top%2020%20global%20pharmaceutical,to%20%242.3%20billion%20in%202022.

18 https://www.fda.gov/industry/fdas-rare-disease-day/story-behind-orphan-drug-act.

19 https://www.iqvia.com/insights/the-iqvia-institute/reports/orphan-drugs-in-the-united-states-rare-disease-innovation-and-cost-trends-through-2019.

20 https://www.npcnow.org/resources/continuing-innovation-rare-conditions-under-orphan-drug-act.

21 https://info.evaluate.com/rs/607-YGS-364/images/Evaluate%20Orphan%20Drug%20Report.pdf.

22 https://info.evaluate.com/rs/607-YGS-364/images/Evaluate%20Orphan%20Drug%20Report.pdf.

23 https://info.evaluate.com/rs/607-YGS-364/images/Evaluate%20Orphan%20Drug%20Report.pdf.

24 https://www.pharmaceutical-technology.com/features/rare-disease-spotlight-tracing-the-rise-of-orphan-drug-designations-over-almost-40-years/.

25 https://info.evaluate.com/rs/607-YGS-364/images/Evaluate%20Orphan%20Drug%20Report.pdf.

26 https://crsreports.congress.gov/product/pdf/R/R44643/3#:~:text=The%20Hatch%2DWaxman%20Act%20created,States%20a%20patented%20invention%20..., Page 4.

27 https://crsreports.congress.gov/product/pdf/R/R44643/3#:~:text=The%20Hatch%2DWaxman%20Act%20created,States%20a%20patented%20invention%20..., page 6.

28 https://www.fda.gov/drugs/generic-drugs/office-generic-drugs-2021-annual-report#:~:text=Currently%2090%20percent—9%20out,States%20are%20for%20generic%20drugs., page 1.

29 https://crsreports.congress.gov/product/pdf/R/R44643/3#:~:text=The%20Hatch%2DWaxman%20Act%20created,States%20a%20patented%20invention%20...,page 8. (An "IND" is an Investigational New Drug application which is filed by a drug manufacturer. Under an IND, the FDA considers whether the compound is safe for human testing and considers how clinical trials might be designed. An NDA is filed when the clinical trials are complete and the FDA considers whether the drug should be allowed to market.).

30 https://www.liebertpub.com/doi/10.1089/blr.2018.29073.cmh.

31 https://www.liebertpub.com/doi/10.1089/blr.2018.29073.cmh.

32 https://www.liebertpub.com/doi/10.1089/blr.2018.29073.cmh.

33 https://www.nichd.nih.gov/research/supported/bpca/about.

34 https://ecchc.economics.uchicago.edu/2023/04/03/policy-brief-the-role-of-medical-innovation-in-reducing-health-disparities-and-the-impact-of-the-inflation-reduction-act/.

35 https://ecchc.economics.uchicago.edu/2023/04/03/policy-brief-the-role-of-medical-innovation-in-reducing-health-disparities-and-the-impact-of-the-inflation-reduction-act/.

36 https://www.cbo.gov/publication/58290.

37 https://vitaltransformation.com/2023/06/the-impact-of-ira-policy-expansion-proposals-on-the-us-biopharma-ecosystem/.

About the Authors

William Smith is Senior Fellow in Life Sciences at Pioneer Institute. He has 25 years of experience in government and in corporate roles, including as vice president of public affairs and policy at Pfizer, and as a consultant to major pharmaceutical, biotechnology and medical device companies. He held senior staff positions for the Republican House leadership on Capitol Hill, the White House, and in the Massachusetts Governor's office. He is affiliated as research fellow and managing director with the Center for the Study of Statesmanship at The Catholic University of America (CUA), where he earned his PhD.

Dr. Robert Popovian is Senior Visiting Health Policy Fellow at Pioneer Institute. Dr. Popovian is the Founder of the strategic consulting firm Conquest Advisors. He previously served as Vice President, U.S. Government Relations at Pfizer. One of the country's foremost experts on every significant facet of biopharmaceuticals and the healthcare industry, he is also a recognized authority on health economics, policy, government relations, medical affairs, and strategic planning.

Mission

Pioneer Institute develops and communicates dynamic ideas that advance prosperity and a vibrant civic life in Massachusetts and beyond.

Vision

Success for Pioneer is when the citizens of our state and nation prosper and our society thrives because we enjoy world-class options in education, healthcare, transportation, and economic opportunity, and when our government is limited, accountable, and transparent.

Values

Pioneer believes that America is at its best when our citizenry is well-educated, committed to liberty, personal responsibility, and free enterprise, and both willing and able to test their beliefs based on facts and the free exchange of ideas.

PIONEER INSTITUTE
PUBLIC POLICY RESEARCH

185 Devonshire Street, Suite 1101 Boston MA 02110 617.723.2277
www.pioneerinstitute.org Facebook.com/PioneerInstitute Twitter.com/PioneerBoston