

TESTIMONY OF CRAIG L. GARTHWAITE, Ph.D.

**Professor of Strategy
Herman Smith Research Professor in
Hospital and Health Services Management
Director of Program on Healthcare at Kellogg (HCAK)
Kellogg School of Management
Northwestern University**

**Before the
Senate Committee on Health, Education, Labor, and Pensions**

On

**“Taxpayers paid billions for it: So why is Moderna considering quadrupling
the price of the COVID vaccine?”**

March 22, 2023

In contrast to all other developed countries, the United States relies more heavily on private markets to finance and provide healthcare goods and services. While this is a source of consternation for some, using economic markets for healthcare is not a policy accident and instead represents the many advantages provided by market-based healthcare. A large and diverse country such as the United States reflects a wide variety of preferences and meaningful differences in the willingness to pay for quality. In this setting, the central planning inherent to regulated prices is unlikely to maximize health and welfare, and an economic market is the superior method of allocating goods and services. This is even more true once we consider the wide variety of economic actors that take part in the development of innovative new healthcare products and services. It is hard to imagine that the federal government, or frankly any other plausible actor, would have enough omniscience to balance these forces more efficiently than a market. Therefore, despite many contentions to the contrary, a market-based system remains the best available mechanism for providing the appropriate incentives for long term welfare maximization.

Nowhere is the benefit of economic markets for healthcare clearer than in the development of novel pharmaceutical products. Over the past several decades, the world has benefitted from remarkable progress in the ability to address a wide range of medical conditions using pharmaceutical innovations. Patients with medical conditions that previously amounted to death sentences have either been completely cured or now live with manageable chronic conditions, those suffering from a multitude of cancers have seen their lives meaningfully extended, and cardiovascular mortality has remarkably declined.

Few, if any, of these advancements came to market without the involvement of private firms investing capital in a market-based setting. This demonstrates the centrality of private markets and capital to our system of drug development. Given this fact, our policies should focus on how best to support and organize efficient markets for drug development and commercialization. Such markets require, among other features, a clear and identifiable set of rules governing how firms will earn potential returns from successful innovations and a trustworthy regulatory state to enforce those rules.

Today's hearing focuses on the question of whether Moderna, a private firm that received unconditional government funding, should be able to charge a market price for its product. While this topic is important, it is imperative we also understand that such discussions have the potential to impact more meaningful questions about optimal drug development. In particular, we must be aware that private firms and their investors are watching hearings such as these to better understand the degree to which they can continue to place their trust in the explicit and implicit contracts that have historically served as the foundation of their investments in drug development. Therefore, attempts by the government to change the rules of the game

mid-stream for Moderna (or other firms) will likely have far reaching consequences that impact health and welfare long into the future.

Understanding the potentially broader ramifications of today’s hearing requires acknowledging the basic and incontrovertible fact that new pharmaceutical products are developed in an expensive and risky ecosystem that involves a variety of institutions and firms. Each type of firm plays a different role along the complex path from early-stage research to proof of concept to clinical trials and ultimately, if successful, to commercialization. The variety of organizations at each step of this process are motivated by different goals and each provides their own unique contribution to this development process. Therefore, optimal policies must carefully understand and respect the incentives of these firms.

While early-stage research is more often funded by public actors (i.e. governments or nonprofit organizations), this is only the first step in the long path from bench to bedside. Navigating the rest of this path requires private firms to invest large amounts of fixed and sunk capital with little certainty of a profitable return. Firms are willing to make these investments based on risk adjusted models of the profitability of their investments — models that require making strong predictions and assumptions about market conditions many years in the future.

These private firms can only attract the capital required for drug development if they can generate a return for their investors that is sufficiently attractive compared to other non-pharmaceutical investment options. This is the fundamental economic reality at the center of the drug development process. If we choose to ignore this fact in favor specious arguments and grandstanding about pharmaceutical greed, it is incontrovertible that we will forfeit access to some future medical innovations – which will likely decrease health and welfare.

While uncertainty around the scientific and commercial prospects of potential products makes all pharmaceutical investments inherently risky, we should strive to reduce additional uncertainty stemming from the policy environment. This is particularly true for policies that alter the rules of the game only after firms make their large, fixed, and sunk investments to develop new products. Sunk investments are expenditures that cannot be recouped by firms after they are made. For example, once a firm spends money to run a clinical trial it is unable to get that money back if the trial fails or the product is not commercially successful. To avoid being stuck in unprofitable situations, before making such an investment firms must be careful and diligent in attempting to predict how the market might subsequently evolve.

If firms believe policymakers will expropriate the gains from investments that are deemed “too successful,” they will almost certainly be less willing to make the same portfolio of investments as they make today. We

must always remember that it is this portfolio approach, where a small number of large successful investments support a larger number of failed projects, that serves as the foundation of drug development. If we desire to have firms to continue to willingly make the large capital investments necessary to promote health and economic welfare, we must sustain a system where firms trust that the government will be a reliable counterparty that establishes the rules of the game and then abides by those rules. This is true even when it means allowing firms to capture large windfalls from products that generate massive amounts of value and health for society.

The potential for sowing distrust in the process exists across a wide variety of dimensions. Consider the question of whether or not Moderna should be constrained from raising the price of SPIKEVAX (i.e. its vaccine for Covid-19). It is clear and undisputed that Moderna benefitted from extensive government financial support in the development of this vaccine through Operation Warp Speed (OWS). It is also clear that this was part of an agreement our government made with this private firm where we provided zero cost of capital funds. In return, Moderna was expected to work as quickly as possible to develop a vaccine that would address the negative health and economic effects from the pandemic. It was a proverbial win-win situation. Moderna would only earn large profits for its investors if they could develop a workable vaccine. Society would get such a vaccine more quickly than if we relied solely on the provision of private capital in remarkably uncertain times.

We provided these public funds to decrease a private firm's risk of product development and increase the speed of these products to patients. Absent government support, it is unclear whether private capital markets would have provided a similar amount of investment on a similarly short time frame. When these transfers occurred in early 2020, private firms faced risks from developing vaccines along two dimensions. First, they faced *commercial risk*, i.e. the possibility that by the time a vaccine was developed and manufactured in sufficient quantities the pandemic would be "over" and demand for the product would be quite low (or at least lower than would have been necessary to justify investing in the vaccine in the first place). This is a common concern of firms reacting to a novel pandemic with an uncertain duration. To address this first type of risk, the U.S. government (and other governments around the world) offered firms funding in the form of advanced market commitments (AMCs). These commitments guaranteed purchases of specific amounts of vaccine if the product was proven to be successful – purchases that would occur even if the pandemic "burned itself out" and demand for the vaccines was low.

The second form of funding was for clinical trials. This type of funding was intended to shield firms such as Moderna from *scientific risk* about whether its product would actually succeed in clinical trials. In this case there was meaningful scientific risk because mRNA vaccines had never been developed. As a result, Moderna

faced risk related to both this entire scientific approach to vaccine development as well as to their specific approach to this vaccine. In this particular case, this scientific risk was compounded by additional manufacturing risk related to a desire to have large amounts of product available as soon as possible – which required expending resources on manufacturing assets before it was even known whether mRNA would prove successful as a means of developing a vaccine of this nature.

Moderna accepted such funds to quickly move forward and develop a vaccine.¹ Absent such funding it is unlikely Moderna would have been willing to move as quickly as they ultimately did. For example, it likely would have followed the more traditional and deliberate development path of waiting until each trial was over before initiating the next stage of development. It is certainly unlikely it would have built the manufacturing scale necessary to quickly serve the entire market before it knew whether its product actually worked.

This swift approach was exactly our goal as a nation. It is my understanding from publicly available documents and news coverage that there were no constraints placed on Moderna about the future pricing of its product if it accepted these funds.² If the government did not desire for this to be the case, then they had the opportunity to address this issue at the time. Of course, that likely would have slowed down the process of vaccine development, which was our priority and appears to have been deemed an unacceptable cost in 2020.

Therefore, Moderna entered into an agreement with the United States government to accept the funds and develop the project with the reasonable expectation that at some point they would be able to charge a higher market price for the product than what they would initially charge the government. In understanding the decision facing Moderna's leadership at this time, it is important to consider that while the government paid for much of the scientific activity related to SPIKEVAX, this product would never have been possible without the meaningful private capital used to develop all of Moderna's existing infrastructure, including, but not limited to, its platform for developing mRNA vaccines. Moderna had previously raised over \$2 billion dollars in private capital from investors who were, in 2020, still seeking a profitable return on these investments.^{3,4} Moderna was also a publicly traded firm with a responsibility to maximize long term shareholder value. If faced with a future constraint on pricing as a condition for receiving government funds, Moderna's leadership would have evaluated that option against raising additional private capital that would

¹ Notably, Pfizer (the other firm successful at developing an mRNA based Covid-19 vaccine) did not accept funding to shield it from scientific risk. Perhaps they feared that there were unstated strings attached to such funding – a belief that might seem prescient given their CEO is not testifying today despite announcing a similarly large price increase.

² It is possible that such constraints exist in parts of the contract that have not been disclosed, but I have not seen any evidence of this fact.

³ <https://news.crunchbase.com/startups/with-flagship-behind-it-moderna-quickly-scaled-from-startup-to-world-changing-biotech/>

⁴ <https://www.science.org/content/article/mysterious-2-billion-biotech-revealing-secrets-behind-its-new-drugs-and-vaccines>

have initially been costlier but would not have included such restrictions on future prices (and the resulting profits). Moderna's leadership accepted the government funding with the belief they could trust the government to be a reliable counterparty that would not try and impose *ex post* conditions that were not present in the original funding agreement.⁵

Moderna lived up to its end of the deal by providing a vaccine in a timeline that beat most expectations.⁶ As a result, we were able to limit the negative health effects for individuals who became infected with SARS-COV-2 and governments felt comfortable reopening the economy. The question is whether the government will now live up to its end of the bargain or will instead attempt to change the terms of the deal they offered by instituting *ex post* controls on the pricing of SPIKEVAX. This includes attempts to shame Moderna for undertaking the actions that we have should rationally expected from a for-profit publicly traded firm. It would be unfortunate if Moderna's trust in the government ultimately proved to be naïve. However, this hearing and the broader commentary around Moderna's actions since developing a world-saving vaccine casts reasonable doubt on the U.S. government as a reliable counterparty for drug development – a reliability that has always served as a fundamental building block of innovation. This could have direct impacts on the willingness of firms to engage with the government in the case of another pandemic and broader indirect effects if firms lose more general trust in the government.

The potential broader loss of trust is only exacerbated by recent commentary and policy proposals regarding expansions to price setting power for pharmaceuticals granted to the Center for Medicare and Medicaid Services (CMS) as part of the Inflation Reduction Act (IRA). The already passed legislation will decrease investments in particular types of products likely to be affected by government mandated prices in the future. Perhaps more concerning, President Biden and other policymakers are already attempting to expand the scope of the IRA before it has been implemented or its impacts have been evaluated. Suggesting a desire to shrink the time period before negotiation to only 5 years would further chill investments.⁷ Even the suggestion of meaningful uncertainty of this nature around the value of potential investments will likely cause firms to pull back capital they might otherwise have invested.

A degradation of trust in government institutions is not an abstract concern. A fundamental tenet of investments in new pharmaceutical products is that a robust, fair, and trustworthy regulatory state will enforce existing market rules and regulations. Beyond the methods of determining market prices, these regulations include those surrounding valuable institutions such as patents and other forms of intellectual property

⁵ It is my understanding that this initial funding agreement did contain a large number of restrictions on how funds could be used, so it seems even more reasonable that firm believed it would represent a complete set of future constraints.

⁶ <https://www.wsj.com/articles/moderna-says-its-covid-19-vaccine-was-94-5-effective-in-latest-trial-11605528008>

⁷ <https://www.biopharmadive.com/news/biden-2024-budget-proposal-drug-prices/644674/>

protection. Firms require these government provided protections because the very heart of the innovative process for new drugs represents a market failure that must be addressed. The failure results from the fact that the scientific advancements generated by firms in the development of innovative pharmaceutical products are essentially a public good, i.e. the knowledge generated by these investments is effectively non-rival and non-excludable.⁸ Rational firms realize that, absent some form of government intervention, they will be unlikely to capture the value generated by the large investments necessary to bring a product to market. This results in an economic phenomenon known as “hold up” whereby firms, absent some form of intellectual property protection to protect their eventual returns are unwilling to make value-creating investments in the first place.

To address this initial market failure, governments offer various forms of intellectual property protection. Through patents or other forms of market exclusivity, governments arm firms with *time-limited periods* of enhanced market power that allow them to capture the value created by their innovative products. During this time period, the high prices curtail some access to valuable medicines.⁹ However, this reduced access today is deliberately traded off against the development of new products in the future. These new products provide access to patients for whom there would otherwise be no treatment – a situation could be seen as a more severe access problem than patient access restrictions due to higher prices. After all, prices can always be negotiated downward while there is no amount of negotiation that will grant access to treatments that don’t currently exist. Such treatments will only come from new investments in technologies that will improve patient health.

In this way, policies governing drug development exemplify the old adage that there is no proverbial “free lunch.” Instead, policies governing the development of pharmaceutical products involve trading off the static inefficiency of reduced access to products today in order to create the dynamic efficiency of the increased development of new products in the future. The goal is in balancing the magnitudes of these two effects. To the extent the value created by the new products exceeds the welfare losses created by the high prices (and resulting decreased quantity sold), the periods of market exclusivity are welfare-enhancing. Importantly, this could be true even if the prices today are quite high.¹⁰ In fact, for some products treating small patient

⁸ The degree to which this is fully a public good depends on how much information can be gleaned from the actual product, the regulatory filings, and the published research. For example, small molecule products can be more easily reverse-engineered and therefore absent intellectual property protections are relatively easier to copy. Biologic products, however, have a more complex production process and therefore copying the technology is easier than making the product *de novo* but harder than for a small molecule product.

⁹ The amount of reduced access is complicated by the presence of health insurance which mitigates the output restrictions by lower prices (Lakdawalla and Sood, 2013).

¹⁰ This is particularly true because the impact of high prices on quantity is far more complicated in a world of widely available health insurance. Those who are insured may not suffer as much decreased access as they would in a market without third party payment. However, those for whom drugs do not exist certainly will not access a treatment at any price.

populations the only thing that will induce an optimal level of private investment may in fact be very high prices per patient.

This tradeoff is a root cause of much of the controversy for prescription drugs because the reduced access today involves some number of readily identifiable individuals who are unable to access existing and potentially life-saving medications because of price.¹¹ Unsurprisingly, this particular form of a lack of access garners large amounts of press and political attention. However, it is always critical to remember a perhaps far greater access problem for patients suffering from conditions for which no treatment options exist at all. For these individuals, there is no price at which a treatment is available. These patients will gain access in the future only as a result of the dynamic incentives created by intellectual property protection. As we consider the optimality of policies governing the pharmaceutical market, we must balance the oft-discussed need for access to existing products with the less-discussed lack of access from the absence of effective treatments.

To be clear, it is perfectly acceptable to make reasoned and considered alterations to our existing regulatory frameworks. However, we should do so with careful deliberation and respect for the underlying economic facts. We must be honest and recognize that such changes will result in a lower level of investment in innovation, however, we may be willing to forgo such innovation in return for lower prices. That is the a debate that we should be having.

Regardless of the policy we pick, it is critical that we make large changes before firms sink capital at risk into drug development. If instead, we attempt to expropriate the value of successful products from the firms that invested to create them we will ultimately chill some amount of future investment.

Making changes to the explicit and implicit contracts that currently govern the drug development process will have long run impacts on future innovations. For example, some activists and policymakers have put forward theories that the government, by virtue of its investments in basic scientific research, have broad abilities to seize intellectual property. Putting aside whether such “march-in” rights actually exist in response to high prices (which is a legal question beyond my expertise) it is clear that such rights have never been exercised in that way in the modern biopharmaceutical market. Therefore, this would represent a fundamental shift in the beliefs of firms about the value of intellectual property – beliefs that serve as the foundation of modern drug development. This would have widespread ramifications on how people and firms engage with government-funded science and the ability of such public investments in basic science to improve the availability of treatments in the market. It is hard to imagine that firms making decisions about commercializing products

¹¹ Garthwaite, Craig, and Benedic Ippolito. 2019. “Drug pricing conversations must take the cost of innovation into consideration.” STAT. January 11.

using NIH-funded basic science will not look at commentary by policymakers about Moderna’s pricing as further increasing the potential risk to their future profits from tools such as march-in rights.

That said, the time period where firms are granted market power over their innovations must be time-limited. Our goal is not to provide firms with unending returns on their investments but to balance the incentives necessary to attract private capital to these markets with access to medical innovations. Striking this balance requires the government to establish clear and firm rules about how long such a time period will last and then ensure we have strong and robust competition when periods of market exclusivity expire.

In my testimony below I provide details on policy solutions that will facilitate competition for products as their intellectual property expires – an area that is a critical component of our system. When considering optimal policies to promote competition and generic (or biosimilar) entry, it is important to remember that our goal is to decide on the preferred degree of intellectual property protection required to encourage the desired level and type of future innovation. After setting these parameters, it is incumbent on regulators to monitor and enforce these systems. This includes providing the necessary structures for strong competition between therapeutic substitutes during periods of exclusivity and the development of robust generic competition beginning immediately at the end of the exclusivity period.

Ultimately, firms will attempt to optimally respond to any incentives governments create – and therefore a well-functioning healthcare market requires policies that embrace economic reality rather than hope for a preferred outcome. In particular, we must ensure that our policy infrastructure matches the existing economic conditions created by the more complex and expensive medications we are currently developing. Much of the successful infrastructure that we have built over time for post-exclusivity competition was designed for the small molecule generic market. Small molecule generic products are exact bioequivalent copies of approved innovative medicines. As a result, we as a society are often more comfortable with competition promoting regulations such as automatic substitution that swiftly and effectively move almost the entire market to generic products after patent expiration. Large molecule (or biologic) products, however, are too complicated to create *exact* copies and therefore “generic” competitors come to market as “biosimilars” – a designation that means they are not automatically substituted.¹² This introduces important nuance for how we think about competition and entry after patent expiration. It also leads to an inherently more complex patenting environment that makes questions about entry timing more difficult.

¹² While there is a pathway for biosimilars to be labeled as interchangeable, this greatly increases the costs of development and to date has been rarely used by new entrants.

For example, biologic products are more often used to treat a wider variety of conditions and indications than many historical small molecule products. These broader uses for a product are socially valuable and are developed based on meaningful investments by firms in clinical trial evidence. As a society we must support the use of existing products for as many conditions as is appropriate. However, we must also develop and enforce policies that promote competition at the *indication level* which balances incentives for developing new uses for existing drugs with the need for time limitations for market power over a firm's initial innovations.

Firms should be rewarded for making the investments necessary to prove their products would be clinically effective against additional indications. However, as a society we must balance these additional financial rewards for firms with our desire to support competition in the market. Specifically, we must be wary that new indications could be exploited to thwart potential entry into the market by new firms attempting to market a generic version to treat only the original indications. If this were to occur, an innovative firm could capture an inappropriately large amount of the economic surplus created by the ability of their product to treat the original medical condition (as opposed to value created by the new indication).

To address this concern, one area where we require greater clarity, guidance, and potentially legislation is around the ability of new entrants to implement a so-called "skinny label" strategy. Under such a strategy, firms could introduce generic or biosimilar competitors to the market for single indications that are not protected by patents or FDA exclusivity. However, the new entrant would be prohibited from *marketing* this product for any indications that were still protected by a patent. As I discuss below, it is imperative we create a clear and appropriate pathway for competitors to enter at the indication level even if patents exist for other indications.

Emerging questions around skinny labels and market entry are examples of the inherent complexities created by the more sophisticated products and processes involved in modern drug development. These complexities also result in a wide array of patents for the same product. While many cite the existence of such a large number of patents as *prima facie* evidence of "gaming" and anti-competitive behavior by firms, the story is actually more complicated. Increasingly complex pharmaceutical products likely give rise to a far more complicated patenting environment. Given the sophistication of production methods and the increasing ability of products to be used for a variety of indications, successful products are now surrounded by meaningfully large patent estates. There is no question that this makes it harder for potential competitors to enter. There is, however, an open question as to whether large numbers of patents represent the large amount of intellectual property required to develop these types of products or a deliberate strategy by firms to deter entry. Of course, there is no single broad answer to this question and any policy solutions must respect the nuance of intellectual property protection and the resulting incentives in this area. That said, I outline several

policy solutions below intended to both increase the rigor of patent review (and therefore the strength of the resulting patents) and better regulate the process of generic and biosimilar entry.

Beyond questions around patents and labeling strategies, it is also clear that the lack of bioequivalent “generic” products for biologics creates difficulties for market entry. In particular, the lack of an exact, substitutable copy (an interchangeable biologic) creates some hesitancy for physicians to move patients off of existing reference products on which the patient is medically stable. This hesitancy likely results from the fact that achieving medical stability is often a process that can take many months or years of identifying the correct medication and dose for the patient. As a result, biosimilar entrants are often competing for only a portion of the existing market (either patients who are not medically stable or newly diagnosed patients who have not yet started a treatment regime). As I discuss below, this inability to rapidly access the entire market, combined with features of our existing pricing and rebate system can make it difficult (or impossible) for biosimilar firms to enter and gain meaningful market share. In particular, an existing system where firms often make rebates contingent (all or in part) on competitors not being “on formulary” can meaningfully benefit incumbents at the expense of new market entrants.¹³ Such formulary contracts that “reference a rival product” could dissuade entry and artificially extend the incumbent’s market position for particular types of biologic products. In the same way that rules around generic entry differ for small and large molecule products, it may be necessary to create different regulations for how formularies are constructed for biologic products.

In addition to concerns about formulary placement, our existing system of physician reimbursement for many biologic products creates incentives for physicians to continue to use more expensive products. This is particularly true under Medicare Part B but also pervades portions of the commercial market – where reimbursements often follow the structure (but not the absolute level) of Medicare payments. Reforms to Medicare Part B reimbursements could both promote entry and decrease artificial incentives to increase prices in the private market – both of which should be policy goals.

Finally, the difficulties for competitive markets created by more complex products are not limited to biologics. While we traditionally believe the small molecule generic market works well, this is primarily true with the more common large markets with numerous patients available to multiple firms. The success of the system supporting generic entry is far less clear when the size of the market is small and therefore struggles to support multiple competitors. In such cases, single firms can acquire all existing rights to market a drug, raise

¹³ It is important to note that the source of such exclusionary contracts is unclear. It is quite possible, and even likely, that firms are encouraged by PBMs to make an offer that would grant them the entire market. This could be optimal for each PBM even if it is not optimal for the entire market.

prices, and still face little entry because there are insufficient incentives for new firms to enter. In this way, the generic market would function as if a firm continued to enjoy some form of intellectual property protection. While this problem is limited to a relatively small number of products today, an increase in “precision medicine” where even small molecule products can be targeted at very small populations means this concern will only grow in prominence over time. Therefore, it is important to address these questions today before they become a dominant market feature with powerful political supporters.

As you can see, my testimony today focuses on promoting competition in pharmaceutical markets – with a particular focus on competition after regulatory exclusivity. That said, it is always important to remember that the goal of government policy in this area is to balance the incentives for innovation with a patient’s access to value-creating products. Others have proposed more drastic exercises of government power in order to simply reduce prices today. This is often driven by inappropriate promises that these price decreases will come without cost. However, that is not the case. When considering the potential patient access benefits of such proposals to artificially reduce prices, we must be comprehensive in our analysis and consider both the degree of improved access today and the ability of the market to continue to provide access in the future to patients who currently lack existing treatments.

I understand it is tempting to cave to the crass political calculus that purports to increase access in a visible way today and obscures the potential long-term costs of such decisions. After all, once we observe the magnitude of those costs most elected officials making these decisions will have moved on to other careers. But the goal of policy is to carefully weigh those future costs and not believe snake oil promises that expropriating value from firms today can cure all of our ills with no side effects. In the testimony below I provide more details about policies that will balance these various forces to ideally enhance health and economic welfare.

I. The Tradeoff Between Access and Innovation in the Modern Pharmaceutical Market

It is not surprising that attention to high healthcare prices has focused so heavily on the pharmaceutical sector.¹⁴ Patented prescription drugs are sold for many multiples of the marginal cost of production and, as a result, firms *appear* to simply be profiteering at the expense of patients. Complaints that high prices are primarily about corporate greed ignore that they are the result of deliberate government policies intended to provide the necessary incentives for the continued development of innovative products. By granting intellectual property protection, governments allow innovative firms to earn positive economic profits for a

¹⁴ In thinking about this attention, we should note that pharmaceuticals make up at most 20 percent of healthcare spending.

period of time without facing the threat of competition that would result from the immediate entry of a firm making an identical product. Economic research suggests this profit incentive matters and consistently documents that pharmaceutical R&D responds to expected market size. Pretending this is not the case ignores reality and will only lead to inefficient, value-destroying policies.

While the logic of trading off some amount of access today in order to gain access tomorrow is clear, the parameters of the length and breadth of this tradeoff are policy decisions for which there is no definitive economic answer. These policy parameters reflect the relative value society places on lost access today and potential welfare gains from future innovation. They also reflect the degree to which high prices today may not lead to a correspondingly large reduction in access because of the market-expanding features of health insurance.¹⁵

Understanding the nature of the trade-off and determining the appropriate policy parameters in the contemporary market requires understanding a bit more about the modern pharmaceutical development process. New products come to market through the partnership of a variety of actors in the value chain. This includes basic science done for understanding the nature of disease, early-stage pre-clinical research to develop a proof of concept, and then an arduous process of navigating the regulatory process to prove that a product is ultimately safe and efficacious. Each stage of this process represents meaningful risk and firms will only undertake each successive step in the development process if the expected net returns are sufficiently attractive compared to the next best use of the invested funds.

I.A. Basic Science Research and the National Institutes of Health

Certainly, the development process begins with basic science research – a meaningful portion of which is financed by government entities such as the National Institutes of Health (NIH) as well a variety of other non-profit organizations. This means many expensive products on the market rely to some degree on knowledge generated as a result of government funding. For example, one study found that all of the 210 products approved from 2010-2016 relied to some degree on research funded by an NIH grant.¹⁶ This fact has led many activists and policymakers to contend that the NIH is “responsible” for bringing these products to market and therefore should be required to demand price concessions as part of their patenting activity.¹⁷ Some have gone as far as to say that the NIH should exercise its “march-in rights” and seize the patents of

¹⁵ It should be noted that these high drug costs could impact premiums and the ability to buy insurance. Heavily-insured markets can create an incentive for higher drug prices and could result in decreasing welfare in situations where insurance is sold for generic and branded products as a bundle.

¹⁶ E. Galkina Cleary, J. Beierlein, N. Surjit Khanuja, L. McNamee, F. D. Ledley, “Contribution of NIH funding to new drug approvals 2010–2016,” *Proceedures of the National Academy of Sciences*, March 2018, 115(10).

¹⁷ L. Zhou, “The new bipartisan Senate bill aimed at making Big Pharma lower drug prices, explained,” *VOX*, July 31, 2019.

products which are deemed to have prices that are too high.¹⁸ While such policies might lend themselves to attractive slogans and sound bites, the reality is far more complicated than is often discussed.

Understanding the pitfalls of proposals to strengthen the role of the NIH in pricing requires thinking more carefully about the government's role in drug development in the first place. At a broad level, advances in basic science that improve the understanding of how diseases work or the mechanisms of action driving the efficacy of potential products are relatively hard to successfully protect with our existing intellectual property tools. As a result, firms worry they will be unable to appropriate the value of investments in developing novel advances in basic science. In effect, despite various intellectual property protection regimes, investments in basic science still suffer from many of the public good-related market failures that would plague an entirely unrestricted pharmaceutical market. Firms that do not reasonably believe they can profit from investments will not make them, and as a result there is a fear that basic science research will be under-provided. Given its lack of profit incentives, the NIH is ideally situated to solve this public goods problem by stepping into the market and funding the basic science that otherwise would not occur.

That said, without significant additional investments in drug development, this government-funded basic science research would not result in treatments that address unmet needs in the market and increase economic welfare. In the current market, these additional investments are provided by private firms that undertake additional research and development to commercialize the NIH-funded basic science. The appropriate economic framework for understanding these government investments in basic science is one where this research is a *complement to* rather than a *substitute for* research funded by private risk capital. When you consider government funding as a complement to private research, it becomes clear that our goal should be to attract as many private firms as possible to leverage these NIH investments in basic science. This would provide the most “bang for the buck” for our government dollars. Currently, this is accomplished by placing relatively few constraints on partnerships between the NIH and private firms. Given the benefits to society from moving basic science from the bench to the bedside – this policy of few constraints should remain.

I.B. The Decentralization of Early-Stage Drug Development

Proponents of strict price regulation point to the fact that the savings from such efforts could be redirected back to the NIH and offset any expected decline in innovation. This belief, however, ignores the current assets and activities of the NIH – which is to evaluate and fund *basic science* and not undertake drug development and commercialization activities. While there are a small number of examples of the NIH taking part in more advanced stages of drug development, these are certainly the exception rather than the rule – as

¹⁸ M. Mezher, “Lawmakers Urge HHS to Exercise 'March-in' Rights to Fight Higher Drug Costs,” *RAPS.org*, January 11, 2016.

would be expected given the purpose of the NIH is to solve the public goods problem for basic science research. To move into a primary drug development role, the NIH would need to transform into something that more closely resembles a private firm. It is not simply a question of providing more funding for the NIH's current system, but transforming in many ways the purpose and activities of the current NIH.

While it is possible the NIH could complete this transformation, this would mean it is no longer primarily solving the public goods problem of basic science and instead would attempt to determine which potential opportunities to commercialize this science should come to market. This effectively involves introducing more central planning to the development of new products where a single firm is undertaking both basic science and drug development activities. In considering the wisdom of such a strategic shift, we should consider that it would run counter to the recent decisions of the major players in the private market. In recent years, large pharmaceutical firms are *decreasing* the degree to which they singularly dictate the path of research through internally funded R&D programs. Instead, the world of biotech drug development involves large numbers of small startups that are increasingly funded by venture capital firms. The most promising and successful of these firms are generally acquired by the larger market participants that then guide the product through the FDA approval process and handle the post approval sales and marketing strategies.

The fact that so much early-stage innovation is done by small private firms that do not ultimately commercialize the product has led many to claim that regulators have the freedom to decrease prices without harming innovation. After all, since the firms currently selling the product didn't actually undertake the costly investments in early-stage R&D, those early innovative activities are not driven by the eventual profits of these more established firms. This couldn't be further from the truth. The ultimate goal of the providers of private risk capital for early stage firms (e.g. venture capital investors) is a profitable "exit" for their funds. This traditionally happens in the form of an acquisition, though increasingly we are also seeing early-stage biotechnology firms going public through an initial public offering (although this trend has reversed in recent years given existing market conditions). The financial terms of these eventual exits are dictated by the potential revenues of the product in the market and thus would be affected by regulated prices that decrease average returns.

In this way, the access and innovation tradeoff is perhaps even greater in the modern world of venture capital backed early stage drug development. This private funding is inherently mercenary in nature and in search of the highest returns. If potential returns from biotech investments fall, investors will simply redirect their funds from the pharmaceutical sector towards the next best option.¹⁹ In this way, policies which decrease the

¹⁹ While it is true that there are a number of venture capital firms that focus entirely on the biopharmaceutical sector, they are primarily investing other people's funds and those investors are targeting areas of the economy that provide the greatest returns.

potential profits will lower investments in early-stage investments and the resulting increase in profits. While we might think that the NIH could step into the role of venture capital firms and provide funding to early stage biotech firms, there is little evidence they would be effective at this role. At a minimum, we must acknowledge that it is a vastly different enterprise than they are currently engaged in and therefore requires more than simply additional funding for their current activities.

Again, we may find it optimal to limit the flow of innovation in exchange for greater access to the smaller number of products. However, this must be a reasoned calculation and not one based on the false belief that the efforts of even a better-funded NIH or the better angels of a scientist's nature will somehow fill the void vacated by the venture capitalists. This reasoned choice must consider the overall value created by innovation over the long term compared to the relatively short period of exclusivity where access is diminished because of high prices but is certainly not reduced to zero.

II. The role of government in limiting welfare losses during period of market exclusivity

For the reasons discussed above, determining the parameters of the access and innovation tradeoff is difficult. That said, there is clearly a role for the government in attempting to limit (to the extent possible) the loss of welfare that occurs during periods of market exclusivity. This can be done both by ensuring the existence of robust competition among therapeutic substitutes and supporting the operation of well-functioning insurance markets. There are four areas where the government could do more in these areas: (1) promoting competition at the indication level when products can treat multiple conditions; (2) supporting a robust system for evaluating patents; (3) creating a modern infrastructure for regulating competition between biosimilars and reference products; and (4) developing strong incentives for price competition between products in government insurance programs.

II.A. Promoting Competition at the Indication Level when Multiple Indications are Present

When products are able to treat multiple conditions the time period for the market entry of competing generic or biosimilar products can become muddled. Innovative products often contain various types of patents and exclusivity related to the underlying molecule, its production, and its method of use. Even in the situation where all of these are valid, it can be difficult for firms to navigate this large set of patents (a concern that I also discuss in the following section).

We want to provide the incentives for firms to find multiple uses for existing products. After all, society has already invested meaningful resources to show that such products are safe and provide efficacy in at least one condition. This includes both clinical trial evidence but also valuable real world evidence about safety from patient populations that are often much larger than those in the original trials.

That said, we also do not want these additional indications to shield firms from appropriate generic competition for the original uses of these drugs. For this reason, existing regulations allow generic firms to enter with a “skinny label” that only allows them to market the product for indications that no longer have patent protection or other forms of exclusivity. However, existing regulations also require that the label for a generic product matches the existing reference product’s label. Recently, a federal court ruled that certain information that is required to be on the label could be viewed as an inducement to infringe on the reference products method of use patents.²⁰

This ruling creates an untenable tension in current law where we want generic firms to enter with a skinny label, but existing regulatory requirements could apparently require such firms to include information on their label that would result in them infringing on some of the patents held by the manufacturers of the reference products. Regardless of future court decisions in this area, it is imperative that Congress consider future legislation that offers a clear path to market for generic firms at the indication level.

II.B. Negotiations over patent infringement

Market exclusivity is governed by a variety of governmental institutions. Central to this system are the intellectual property protections provided by patents. Patents offer protection for firms developing novel products. During the time period of patent protection, firms are safe from competition arising from a new entrant selling an exact copy of their innovative product. After patents expire, the intention is for other firms to swiftly enter the market and sell copies of the patented product, with the resulting competition lowering prices and increasing access.

Obviously, there is a clear role for government involvement in this area. After all, the initial granting of patents and other forms of intellectual property protection is solely a government action. Governments also regulate the challenges to such patents and the process by which competitors enter the market as exclusivity expires.

Potential entrants observe the rules created by governments and weigh the potential costs and benefits of attempting to enter into competition with a branded product. Increasingly, this includes navigating a myriad of patents related to the underlying pharmaceutical product, the various uses of the product, and its production process. Given the requirement that patents be narrow and specific to a particular invention, modern complex products are often covered by a wide range of patents. Critics claim this large number of

²⁰ https://www.supremecourt.gov/DocketPDF/22/22-37/222237/20220429174452402_Scanned%20Application.pdf

patents reflects an attempt by innovative firms to create a “patent thicket” that raises the costs of entry. These critics believe that rather than reflecting intellectual property, the large number of patents is solely intended to create a costly entry barrier that decreases the number of potential entrants and extends the length of market exclusivity. Given this concern, some critics have gone as far as to suggest that each branded product should be limited to a single patent.²¹

While it is surely true that some firms engage in such a “thicketing” strategy to deter entry, the mere existence of even a very large number of patents is not, on its own, evidence of a nefarious strategy. As the complexity of the production process increases, it is reasonable to assume that these processes will also involve the creation of important and necessary intellectual property. All else held equal, this would result in a greater number of patents per product.

Beyond the complexity of production, pharmaceutical products are increasingly used to treat multiple conditions. Discovering potential new uses for these existing drugs requires additional expenditures on scientific discovery and clinical trials. The incentives to invest in those activities stems from the ability to appropriate some of the value created. Given there are great benefits to society from firms developing new uses for existing products, we should encourage firms to investigate whether products which have already been determined to be safe could be used for additional indications. A system that limits the number of patents that can exist for a product would diminish the financial incentives for firms to invest resources to determine these new uses.

That said, the existence of large numbers of patents creates a more difficult path for generic and biosimilar entry. The heart of this concern, however, should not be about the *number* of patents pertaining to a particular product but instead about the underlying *validity* of those patents. Ultimately, this is a question about the efficacy and rigor of the patent approval process undertaken by the Patent and Trademark Office (PTO). If the PTO is granting a large number of relatively weak patents to firms that are deterring entry, this is something that should be addressed directly. It could be that this is the result of the growth in demand for patents on potential new innovations outstripping the resources available to the PTO. Academic research has shown that resource constraints affect the accuracy of patent examiners, with more time-constrained examiners issuing patents that were more likely to be later invalidated.²² Rather than making sweeping rules about the number of patents, policymakers should more directly examine increased resources in an efficiently run PTO.

²¹ R. Feldman, “One-and-done’ for new drugs could cut patent thickets and boost generic competition,” *STAT News*, Feb 11, 2019.

²² Frakes MD, Wasserman MF. *Investing in Ex Ante Regulation: Evidence from Pharmaceutical Patent Examination*. National Bureau of Economic Research; 2020.

One potential model to provide greater resources for the PTO is a process similar to the Prescription Drug User Fee Act (PDUFA) which provides vital additional resources to the FDA that flex with the level of regulatory demand. It is possible that pharmaceutical patents could be assessed additional fees that could be used to increase resources in this area.

The large number of patents creates a further concern about negotiations between branded firms and potential entrants about the timing and manner of entry. Under our existing system, an economically meaningful fraction of generic entrants come to the market by challenging some of the underlying patents of the branded product. Given the potential cost and complexity of these lawsuits, these firms often settle on a negotiated date of entry. These negotiated dates are invariably before the formal end of every related patent but after the date indicated by the earliest patent affecting the product in question. There are valid concerns that such negotiations are a ruse to extend the exclusivity period for branded firms. Effectively, the concern is that the brand and potential entrant are colluding to split the surplus resulting from the lack of competition. Such concerns are correctly heightened when branded firms transfer something of value to the potential entrant. While the oft-discussed *Actavis* decision stops firms from transferring money in exchange for delayed entry, that has not eliminated concerns that settlements detailing entry could be a source of concern.

That said, such settlements are an expected result of a system where we rely on potential entrants to use “Paragraph IV” challenges to effectively police the validity of patents granted by the PTO. Litigation is costly, uncertain, and distracting to the main business activities of firms. For this reason, firms in all markets often attempt to settle lawsuits out of court rather than taking them to trial. Rather than attempt to cast all settlements as attempts to manipulate the market, I would encourage policymakers to revisit the policies that govern such challenges. Over time, Paragraph IV challenges under Hatch-Waxman have become a very common feature of the entry of new products. Even unmeritorious challenges are expensive for the system. It is possible that various features of the market, including but not limited to the 180 day exclusivity for the first-to-file generic firm and the 30 month stay for patent challenges, may be an inefficient means of policing and operating an intellectual property protection system.

One potential avenue to consider is the Reforming Evergreening and Manipulation that Extends Drug Years (REMEDY) Act of 2019. This proposed act would eliminate the 30-month delay for generic entry that is automatically triggered when a patent is challenged. Importantly, this would only apply to patents that are not the main product patent. Without the automatic 30 day stay, a generic firm would be free to enter “at risk,” i.e. if they are later found to be infringing on a valid patent they would owe damages to the patent holder. The economic incentives here would result in firms only entering when they believe that the patent is truly weak,

i.e. firms would be unlikely to enter at risk against strong patents because they would be afraid of having to pay damages. In that way this would eliminate the protections for weak patents that are currently created by automatic 30 month stay.

II.C. Biosimilar Adoption and Rebates

While rebates serve a vital function in drug price negotiations, there are also situations where the structure of the rebate contract can potentially create a barrier to entry for new competing products. For example, rebate contracts sometimes reference rival products, particularly with respect to a rival's placement on the formulary. Depending on the economic context, such rival-referencing contracts could be either anti-competitive or pro-competitive. For example, a manufacturer may offer larger rebates if its product is the only one in a therapeutic area on the preferred tiers of the formulary. If there are many potential products that are competitors for the entire market, such a contract could be efficient. In fact, these types of contracts are at the heart of the PBM strategy. In describing his strategy, the Chief Medical Officer of Express Scripts said, "So we went to the companies, and we told them, we're going to be pitting you all against each other. Who is going to give use the best price? If you give us the best price, we will move the market share to you. We will move it effectively. We'll exclude the other products."²³ Since 2012, there has been marked growth in the use of these exclusion lists.

In situations where manufacturers are competing for access to the PBM's entire patient population, these types of contracts can be pro-competitive, leading to large discounts and increased welfare. However, for some types of products, large portions of the market are not truly contestable, i.e., the PBM will not be able to effectively move a fraction of the patients to the low-price product. For example, patients who are currently using a biologic product may be unlikely to be willing to switch to a competing biosimilar at almost any price. In addition, PBMs might find that payers would not be happy with strategies that forced their patients to move across biologic products in this manner.²⁴

In a situation where a new entrant cannot effectively compete rapidly for a large fraction of patients, a rebate contract for the incumbent product that is contingent on the absence of the rival entrant on the formulary can serve as an almost impenetrable barrier to entry. This situation is sometimes referred to as a rebate "wall" or "trap." Effectively, the new entrant finds that it cannot offer the PBM a large enough rebate on its products (which represent a relatively small share of sales) to overcome the lost rebate dollars from the incumbent (which represents a majority of the market). In such a situation, the new entrant would find it

²³ Wehrwein, Peter. 2015. "A Conversation with Steve Miller, MD: Come in and Talk With Us, Pharma." *Managed Care*. April 5.

²⁴ Plan sponsors are not simply looking for the lowest cost plan, but instead the plan that best balances costs and benefits for their customers or employees.

quite hard to ever gain meaningful market share. Perhaps more concerning, realizing the existence of these rival-referencing contracts, potential biosimilar manufacturers may never choose to attempt to create products in the first place. Concerns about the use of rebates in this manner have been raised by many individuals, including FDA Chairman Scott Gottlieb and the CEO of Novartis Vas Narasimhan.^{25,26} They are also the subject of antitrust litigation between reference products and biosimilar firms, which is winding its way through the court system and should provide additional guidance about the legality of these practices.^{27,28}

Given the potential for the rebates contingent on rival products to block potential entrants, regulators should consider more careful oversight and monitoring of rebate contracts that reference rivals. In situations where a large portion of the market is not contestable by the new entrant – for example, in the case of the first biosimilar entering against a reference product – it may be advisable for regulators to create additional restrictions on the ability of rebate contracts to reference the position of rival products on the formulary. In particular it may be necessary to consider separate rules or tests for contracts and rebates based on whether patients are treatment-naïve or medically stable on a particular biologic product or biologic products.

In considering why government intervention may be necessary to address these contract structures, it is important to note that even if exclusive contracts limit entry and raise market wide prices, each PBM may have an incentive to demand a bid from a manufacturer for exclusive formulary placement. This could maximize the rebate for the PBM and allow for a more competitive PBM and/or health insurance product. Any individual PBM would benefit from such a contract and may not be able to influence the individual entry decision for any particular product. This could result in a “tragedy of the commons” problem that might be best solved by government action.

II.D. Creating Stronger Incentives for Negotiation in Government Programs

Supporting a competitive market for prescription drugs is made even more complicated by the heavy role of government in the procurement of healthcare for vulnerable populations such as the indigent, elderly, and disabled. Given the fact that healthcare is a unique product for which society places particular value on an individual’s ability to access services regardless of their ability to pay, the U.S. has developed a series of social insurance and transfer programs to help vulnerable populations access care. Over time these programs have

²⁵ Liu, Yanchun. 2018. “FDA chief says pharmas use rebates to block biosimilar competition.” MarketWatch. July 19.

²⁶ Narasimhan, Vas. 2018. “Novartis CEO: How To Create Cheaper Alternatives To The Most Expensive Drugs.” Forbes. April 12.

²⁷ Biosimilars Council. 2018. “Brief Of The Biosimilars Council As Amicus Curiae In Opposition To Defendants’ Motion To Dismiss.” Civil Action No. 2:17-cv-04180-JCJ. United States District Court For The Eastern District Of Pennsylvania, January 26. Accessed March 4, 2019. <https://www.accessiblemeds.org/sites/default/files/2018-01/AAM-Amicus-Brief-Pfizer-vs-J%26J-1-26-18.pdf>.

²⁸ United States District Court for the Eastern District of Pennsylvania. 2017. “Complaint, Case 2:17-cv-04180-JCJ.” September 20. Accessed March 4, 2019. <https://www.courtlistener.com/recap/gov.uscourts.paed.534730.1.0.pdf>.

grown, and public spending now accounts for just over half of all healthcare spending in the United States – a fact that makes healthcare markets distinct from the rest of the economy.

Given the economically meaningful role of the public sector in the healthcare market, the ability to maintain a competitive market inherently relies, at least in part, on government policies and regulations. Ultimately, healthcare is our nation’s most meaningful public-private partnership. This has become even more apparent as the United States increasingly relies on private firms for the provision of publicly funded social insurance benefits. This includes the Medicare Advantage program, Medicaid Managed Care, and the Affordable Care Act – which I’ve previously noted is perhaps the most conservative, market-based approach to the provision of health insurance for such a large number of low-income individuals.²⁹ Private firms are being used to provide these services because, at their core, they have the strong incentive to respond to consumer demand in a quest to maximize profits. These incentives allocate resources in ways that increase welfare. It is unlikely that a government entity could achieve a similar result, and therefore optimal healthcare policy harnesses market forces while maintaining no illusions about the motivations of the firms it employs to efficiently provide goods and services.

However, successfully managing these public-private partnerships requires establishing rules that enhance rather than inhibit competition. While the existing Medicare Part D program involves a large amount of price negotiation, there are still many drugs paid for by Medicare that effectively involve no direct price negotiation by a payer and instead attempt indirectly benefit from private market negotiations. These drugs are administered by providers and covered under the Medicare Part B benefit. Rather than use private firms to directly negotiate prices for these products, Medicare operates under a “buy and bill” system. Physicians purchase these drugs and then are reimbursed a fixed percentage above the average sales price (ASP) of the product – a price measure intended to account for rebates paid by manufacturers to payers. The purpose of this reimbursement system is to provide doctors with simplicity and predictability of reimbursement. These attractive features, however, come at a meaningful cost for the entire system, as the Part B procurement rules increase prices for the public and private markets while also shifting share at the margin to more expensive treatment options.

In order to understand the widespread effects of Part B, consider the motivations of a pharmaceutical manufacturer negotiating with PBMs and payers to determine its optimal price. Given that these firms are attempting to maximize profits, they set prices that are expected to earn the greatest profits. Once those profit-maximizing prices are set, higher prices will, by definition, decrease the firm’s total profits. This occurs

²⁹ Garthwaite, Craig. 2017. “Why replacing Obamacare is so hard: It’s fundamentally conservative.” The Washington Post. July 10.

because the increased margin will not make up for the lost quantity (and related profits) that comes from a greater use of prior authorization, step therapy, increased cost sharing, or other utilization management tools.

By linking public and private prices, the Part B purchasing rule distorts the optimal pricing decision in the private market. Firms are willing to increase private prices, and suffer declining profits in the private market, because they know they can make up those lost profits and more from the public market. In addition, because they know that physicians earn more money from administering a higher-priced drug, they have an additional incentive related to Part B for raising prices.

The combination of these factors means that the Part B procurement rules create the incentives for firms to offer fewer discounts in the private market, resulting in a higher ASP and greater profits from the public market. As a result, the current Part B rules for purchasing physician-administered drugs result in higher prices in both the public and the private markets. These incentives increase with Medicare's market share in each drug – a larger Medicare market means the potentially higher reimbursement from the public payers is more important for determining profits than the lost sales in the private market. Given the age and disease profile of Part B enrollees, there are a large number of high-cost drugs for which Medicare has a meaningfully large market.

As we look for policy solutions to address the lack of competition created by the Part B reimbursement rules, we must confront two areas of concern. Part B can cause higher prices both because physicians have an incentive to prescribe higher priced drugs (because they earn more for administering such products) and because manufacturers have an incentive to raise private prices to influence the public market.

In attempting to address physician incentives, we must be careful not to create perverse incentives to inappropriately prescribe lower-cost drugs. We also must be careful about creating a situation where it is no longer economically viable for physicians to practice in particular areas or in particular organizational forms. For example, attempts to reform the Part B procurement rules that switch to simply paying physicians a flat fee for each administered drug ignore the fact that physicians can face meaningful inventory costs for stocking and maintaining a large volume of high-cost drugs. Many of these costs are likely a function of the acquisition cost of the product. These costs could be particularly acute for small practices, which may lack sufficient liquidity to maintain sufficient stock of medications and may make prescription choices to limit these costs. At the extreme, this could push further consolidation of the provider market.

Congress should consider policies that adopt a vendor model for the distribution of physician-administered drugs that would transform that market from the existing “buy and bill” system to one where physicians have little financial incentive to prescribe particular medications. The details of such a fundamental shift in the

market are important and must be worked out. In doing so, Congress should investigate why previous attempts to establish a similar model under the Competitive Acquisition Program (CAP) did not successfully attract vendors and providers. Certainly, part of this failure results from the fact that many providers are currently dependent on the revenues they earn from the buy-and-bill system. Thus, any successful reform must figure out a way to attract those physicians and other providers into the system. In addition, such a program would need to be sufficiently attractive to vendors to attract entrants to the market. This would likely require empowering vendors with the ability to walk away from particular drugs in order to secure greater discounts. This may limit the access of Medicare patients to some products, but we must be honest and adamant that some degree of reduced access is a necessary part of any true price negotiation process.

While there are many details to work out in this area, I would strongly encourage policymakers to follow the policy lead of Part D and find ways to utilize private-sector vendors to negotiate lower prices for Part B, rather than accepting this portion of Medicare as being a price taker. Failing to do so will continue to perpetuate a policy that increases spending across the system.

III. The role of government in supporting a robust small molecule generic market

As discussed above, the access-innovation trade off involves granting firms a time-limited period of market exclusivity. At the conclusion of this period, it is in the best interest of society for products to be sold in a robust and competitive market. Our existing system of follow-on competition has largely worked well since the passage of the Hatch-Waxman Act in 1984. However, the complexity of the modern drug market has created a new set of challenges for this previously well-functioning process.

Markets for generic small molecule products are intended to have fierce price competition facilitated by the automatic substitution of prescriptions towards less-expensive generic products. In a well-functioning generic market, firms compete primarily on price and therefore profits are determined by a firm's ability to manufacture products at the lowest marginal cost. This fierce price competition means that successful entrants must be able to produce enough to reach the minimum efficient scale (MES) of their production process. Absent sufficient quantity, entrants realize they will find themselves at a perpetual cost disadvantage to incumbent firms and therefore will rationally decline to enter the market. For sufficiently small markets, there is only enough demand for a single manufacturer to reach MES – and the incumbent firm is a natural monopolist that maintains meaningful pricing power.

In recent years, several firms appear to have recognized the pricing power available to ANDA holders for generic products with sufficiently small potential markets. This was perhaps best personified by the pricing strategies of Turing Pharmaceuticals, but aspects of this strategy have been implemented by other firms and

thoroughly documented in several media outlets.³⁰ The ability for these firms to charge monopoly prices for generic products is not the result of the above-discussed tradeoff between access today and innovation tomorrow – society has long since paid for the innovation from any of these products. Instead, the high prices represent firms taking advantage of a market failure created by the small patient population. While large pharmaceutical firms were historically either unwilling to exploit this pricing power or unaware of this financial strategy, the practice of firms charging high prices without fear of entry in small generic markets is now widespread throughout the industry (albeit the strategy is typically employed by smaller firms with fewer invested assets in the industry). If Congress hopes that for-profit firms will simply avoid this pricing strategy going forward, they will be sorely mistaken. Instead, solutions to market failures for small-market generics will need to come either from firms being harmed by this practice or through government action.

For some of these products, private firms are stepping forward with market-based solutions. Specifically, a consortium of hospitals led by Intermountain Healthcare has created CivicaRx – a joint venture designed to address the high prices charged for many generics that are administered in a hospital setting.³¹ For products administered in the inpatient hospital setting, providers are unable to pass the increased costs along to patients or payers and have therefore decided to vertically integrate and manufacture the products themselves.

While vertical integration in this setting is an efficient response by hospitals in response to a market failure in their supplier market, CivicaRx will likely not find it valuable to undertake the manufacturing of products that are sold directly to patients through retail or specialty pharmacies or administered in an outpatient setting. Those products do not impact the financial health of the hospitals involved in the joint venture. Therefore, solutions for these other products must come from new government policies that either reduce the number of natural monopoly markets or use economic tools to more directly intervene in the natural monopoly markets that remain.

If high fixed entry costs make it difficult for multiple firms to profitably produce small-market generics, one potential policy solution is to lower these fixed costs. This would decrease the quantity required for a new entrant to reach MES and compete with the incumbent manufacturer. In recent years, the FDA has been focused on programs to accomplish this goal. For example, there have been efforts to streamline and

³⁰ [Hopkins, Jared S., and Andrew Martin. 2018. "These New Pharma Bros Are Wreaking Havoc on Prescription Drug Prices." Bloomberg. April 6.](#)

[Pollack, Andrew. 2015. "Drug Goes From \\$13.50 a Tablet to \\$750, Overnight." The New York Times. September 20.](#)

[Rockoff, Jonathan D., and Ed Silverman. 2015. "Pharmaceutical Companies Buy Rivals' Drugs, Then Jack Up the Prices." The Wall Street Journal. April 26.](#)

³¹ [Abelson, Reed, and Katie Thomas. 2018. "Fed Up With Drug Companies, Hospitals Decide to Start Their Own." The New York Times. January 18.](#)

harmonize the generic application process across developed countries.³² There have also been attempts to increase the speed and efficiency of the ANDA process, which would decrease barriers to entry and potentially increase the number of markets that could support multiple firms.³³

I would encourage the FDA to continue to evaluate the approval process to look for additional efficiencies that would decrease entry costs. However, even the most efficient process for entering a generic market will require some expenditures to demonstrate the safety and bioequivalence of the product – and this will always represent a meaningful fixed-cost investment. Therefore, another potential solution to promote entry is to attempt to increase the size of some generic markets. While this can't be accomplished within any geographic boundary (i.e., we are unlikely to uncover more patients with these types of conditions), I would encourage Congress and regulators to consider a broader system of importation across developed countries with similar safety and regulatory systems (i.e., the countries the FDA is currently empowered to turn to in the case of drug shortages). Aggregating demand across these markets would increase total quantity and the number of products that could successfully be produced by multiple manufacturers. Some have argued the FDA could implement this strategy today by considering generic products with large price hikes to be a situation of shortage.³⁴ However, it is likely that Congressional investigation and debate are needed before we implement such an important change to the sourcing of generic medications.

Even after efforts to decrease costs and increase market sizes, there likely will remain some markets that still cannot support multiple firms. In this case, further regulations are likely necessary to reach an efficient outcome. Senator Elizabeth Warren has previously proposed that the government step in to manufacture generic drugs when products have small market sizes and large drug price increases.³⁵ I understand and appreciate the motivation for Senator Warren's proposal and think that it is a potentially viable policy option for addressing this particular market failure, i.e., the lack of competition in markets for generic products without sufficient size to support multiple firms.

However, I fear that a government entity will likely fail at being an efficient producer of these products – after all, this is not an enterprise in which they specialize. As a result, the marginal costs of a government producer would likely be higher than for a private firm with experience in drug production. Before the government undertakes such a new and complicated economic activity, I would propose a private-sector

³² Gottlieb, Scott. 2018. "Advancing Toward the Goal of Global Approval for Generic Drugs: FDA Proposes Critical First Steps to Harmonize the Global Scientific and Technical Standards for Generic Drugs." FDA. October 18.

³³ Elvidge, Suzanne. 2018. "FDA sets another record in 2018 for generic drug approvals." BioPharma Dive. October 12.

³⁴ Greene, Jeremy A., Gerard Anderson, and Joshua M. Sharfstein. 2016. "Role of the FDA in Affordability of Off-Patent Pharmaceuticals." JAMA 315 (5): 461-462. doi:10.1001/jama.2015.18720.

³⁵ Warren, Elizabeth. 2018. "It's time to let the government manufacture generic drugs." The Washington Post. December 17.

solution in which Congress empowers the FDA to provide a new form of market exclusivity for generic products with market sizes that do not support multiple competitors.

The exact specifics of such an exclusivity would need to be worked out, but a first step would be for Congress to ask the FTC to examine how many potential patients are necessary for a market to support multiple generic firms. While most generic prescriptions are likely for molecules that can support multiple competitors, there are potentially a large number of molecules with small patient populations that can't support multiple manufacturers. For example, there has been an increase in the number of exits by ANDA holders in recent years, with many firms citing a lack of profitability. The median generic market currently has only two manufacturers, and approximately 40% have a single manufacturer – which likely is the result of limited market potential for these molecules.³⁶ That said, the current number of firms participating in the market in equilibrium does not provide sufficient information to understand whether the market could ultimately support multiple firms. After all, it is the threat of entry and not actual entry that disciplines profits. Inferring the number of firms that a particular generic market could support based on the number of current firms could be particularly problematic given the ongoing allegation of collusion in this market.³⁷ Therefore, it is important for economists at the FTC to determine the exact market size and structure that would indicate that the market for the generic product is a natural monopoly where the incumbent firms possesses significant pricing power. Ideally this investigation would incorporate the potential market-expanding policies of decreasing entry costs and potentially increasing the market size to include some limited foreign markets.

After establishing the market characteristics likely to lead to natural monopolies, I would propose the FDA be required to undertake a request for proposal (RFP) process for those markets. Under this RFP process, any private firm could apply for the rights to be the exclusive manufacturer of a natural monopoly generic medicine at a certain fixed percentage above manufacturing costs. As part of this RFP process, firms would compete on the amount of margin they would require to serve the market. The winning firm would possess the exclusive rights to sell the drug at this regulated price for a time period sufficient to recover the fixed costs of entry. At that time, the FDA would have the option of re-auctioning off the market exclusivity. In order to ensure the efficient operation of this process, it may also be necessary for the FDA to set a maximum percentage that they will accept before they will turn to a non-profit or government supplier for the product. This will limit any ability of firms to collude to divide up the markets they choose to enter.

³⁶ Berndt, Ernst R., Rena M. Conti, and Stephen J. Murphy. 2017. "The Landscape of US Generic Prescription Drug Markets, 2004-2016." NBER Working Paper No. 23640.

³⁷ Silverman, Ed. 2019. "Here's how prosecutors say generic drug makers schemed to fix prices." STAT. February 19.

I would encourage Congress to immediately investigate solutions in the area of small-market generics, as this problem will only grow in importance. Recent scientific advances have allowed for an increasing personalization of medicine. Along with co-authors, I have documented the rising share of clinical trials involving a patient-specific biomarker to determine either efficacy or safety.³⁸ Almost by definition, personalized medicine will involve products with limited patient populations, and for many of these products we should be worried about whether robust generic or biosimilar competition will ever emerge.³⁹ Therefore, while the problem of small-market generics is not a dominant feature of today's market, it will only grow in importance. It will likely be far easier to address the problem now than it will be when the number of powerful interests manufacturing such products increases.

³⁸ Chandra, Amitabh, Craig Garthwaite, and Ariel Dora Stern. 2018. "Characterizing the Drug Development Pipeline for Precision Medicines." NBER Working Paper No. 24026.

³⁹ The problem of competition for precision medicine will be further complicated in situations where the patented product is a biologic product.